

**Operator's
Guide
Revised
August 1990**

Version 10 Operator's Guide

**Danfoss-EMC's ZX Interface Manual
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Danfoss-EMC, Inc.

Version 10

IT IS RECOMMENDED THAT THE USER READ THIS ENTIRE MANUAL BEFORE USING THIS SYSTEM.

COMPANY CONFIDENTIAL

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TABLE OF CONTENTS

SECTION 1: GENERAL INFORMATION

1.0 THE ENERGY MANAGEMENT SYSTEM	3
2.0 LOGGING ON/OFF THE EMS/Z	5
2.1 LOG ON	5
2.2 LOG OFF	5
3.0 GENERAL INFORMATION	7
3.1 ABBREVIATIONS	7
3.2 BOLD FACE TYPE	7
3.3 SCREENS	7
3.4 RETURN KEY	7
3.5 ESCAPE KEY	8
3.6 OPTIONAL ENTRIES	8
3.7 SPACING	8
3.8 'Q' OPTION	8
3.9 @ FEATURE	8
3.10 MULTIPLE ENTRIES PER LINE	9
3.11 'X' FEATURE	9
3.12 MILITARY TIME	9
3.13 MACHINE TIME OUT (LOG OFF)	9
4.0 MANUAL FORMAT	11
5.0 ACTION MENU	13
5.1 HEADING LINES	14
5.2 ACTION MENU ITEMS	15

SECTION 2: DATA SCREENS

6.0 CONTROL POINT STATUS	23
6.1 CONTROL POINT STATUS FIELDS	24
6.2 SWITCH & SOFTWARE MANUAL MODES	25
6.3 ACCESS/PROMPT	29
7.0 EXPANDED STATUS	31
7.1 Refrigeration System Types	31
7.2 HVAC & LITE System Types	32
7.3 EXPANDED STATUS FIELDS	32
7.4 REFRIGERATION TYPES ONLY	34
7.5 HVAC & LIGHTING TYPES	35
7.6 ACCESS/PROMPT	36

8.0 REFRIGERATION STATUS REPORT	39
8.1 REFRIGERATION STATUS REPORT FIELDS	39
8.2 ACCESS/PROMPT	42
9.0 SWITCH OVERRIDE REPORT	43
9.1 SWITCH OVERRIDE REPORT FIELDS	43
9.2 ACCESS/PROMPT	44
10.0 CONTROL ALARMS	45
10.1 ACCESS/PROMPT	45
11.0 UTILITY REPORT	47
11.1 UTILITY REPORT FIELDS	47
11.2 ACCESS/PROMPT	48
12.0 HVAC STATUS REPORT	51
12.1 HVAC STATUS REPORT FIELDS	51
12.2 ACCESS/PROMPT	53
13.0 CONDITIONS LIST	55
13.1 CONDITIONS LIST FIELDS	56
13.2 NESTING	57
13.3 ACCESS/PROMPT	58
14.0 SENSOR AVERAGES	59
14.1 ACCESS/PROMPT	60
15.0 DIGITAL SENSOR REPORT	63
15.1 ACCESS/PROMPT	63
16.0 ANALOG SENSOR REPORT	65
16.1 ACCESS/PROMPT	66
17.0 SENSOR ALARM REPORT	67
17.1 SENSOR ALARM REPORT FIELDS	67
17.2 ACCESS/PROMPT	69

SECTION 3: CHANGE SCREENS

18.0 GENERAL INFORMATION	73
18.1 DATA BASE CHANGED	73
18.2 ENTRY LIMITS	73
18.3 UNCHANGED DATA	73
18.4 ESCAPE FUNCTION	73
18.5 CORRECT? (Y/N) OR SURE? (Y/N)	73

19.0 EXPANDED STATUS, CONTROL POINT #	75
19.1 REFRIGERATION OPERATOR CHANGES	75
19.2 DEFROST OPERATOR CHANGES	77
19.3 HVAC OPERATOR CHANGES	78
19.4 ACCESS/PROMPT	79
20.0 CONDITIONS LIST	81
20.1 ACCESS/PROMPT	81
21.0 SCHEDULE GROUPS	83
21.1 OPERATOR CHANGES	84
21.2 CHANGING A SCHEDULE	84
21.3 ACCESS/PROMPT	85
22.0 HOLIDAY DATES	87
22.1 ACCESS/PROMPT	87
23.0 PHONE NUMBERS	89
23.1 ACCESS/PROMPT	90
24.0 BUILDING HOURS	91
24.1 OPERATOR CHANGES	91
24.2 ACCESS/PROMPT	92
25.0 HISTORY POINTERS	93
25.1 ACCESS/PROMPT	94
26.0 CHANGE DIGITAL SENSORS	97
26.1 OPERATOR CHANGES	98
26.2 ACCESS/PROMPT	98
27.0 CHANGE ANALOG SENSORS	101
27.1 OPERATOR CHANGES	102
27.2 ACCESS/PROMPT	102
28.0 SENSOR ALARMS CHANGE SCREEN	105
28.1 OPERATOR CHANGES	106
28.2 SENSOR NUMBER	107
28.3 ACCESS/PROMPT	109
29.0 BUILDING STANDARDS	111
29.1 ACCESS/PROMPT	111
30.0 CP MANUAL CHANGE	113
30.1 CLEAR OPTIONS	113
31.0 NC25 COMMUNICATIONS	115
32.0 AUDIT TRAIL	117

SECTION 4: APPENDICES

APPENDIX A: SPECIAL KEY SUMMARY	121
APPENDIX B:	123
APPENDIX C: ALARM DEFINITIONS	125
APPENDIX D: SYSTEM NUMBERS	127
APPENDIX E: FIGURE NUMBERS	129
APPENDIX F: GLOSSARY	131
APPENDIX G: MESSAGE STORAGE CAPABILITIES	135
APPENDIX H	137
APPENDIX I: ALARM ARMING	139
APPENDIX J	141
APPENDIX K: INTERPRETING DAT'S	143
APPENDIX L: MISCELLANEOUS INFORMATION	149
APPENDIX M: COMMANDS KEYS	153
APPENDIX N: SAMPLES OF SOME TYPICAL CHANGES	155
N.1 COMPRESSOR SETTINGS	155
N.2 CONDITION TARGETS	157
N.3 HOLIDAY DATES	161
N.4 PHONE NUMBERS	162
N.5 LIGHTING SCHEDULES	164
N.6 BUILDING HOUR BASE	167
N.7 HISTORY POINTERS	168
N.8 DIGITAL SENSORS	170
N.9 ANALOG SENSOR	173
N.10 SENSOR ALARMS	176
N.11 MESSAGES	177
INDEX	181

SECTION 1
GENERAL INFORMATION

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1.0 THE ENERGY MANAGEMENT SYSTEM

The EMS/Z is a Z80 based microcomputer system designed to perform primary control in building automation. Its general purpose software is programmed to perform multi-tasking control of refrigeration, lighting, heating, ventilation and air conditioning systems in an energy saving manner. The system can handle up to 384 control points or digital outputs, 384 digital inputs and 384 analog inputs. The system supports four (4) simultaneous channels of on-line status and/or command communications. These channels are (1) CRT/terminal devices directly connected to one of the EMS/Z's RS232 ports; (2) a built-in modem, connecting through the public switched telephone network to a remote modem/terminal, or a communications program on mini or microcomputer; (3) the EMS/Z6 display, usually located physically in a centralized location in the mechanical/compressor room (the CRT/terminal device can also be connected to this port), which supports all Network Controllers; and (4) an RS485 two wire long distance transmission system.

The EMS/Z is extremely user friendly and has been designed to require minimal input to achieve operator requests for information. It is a menu-oriented system which presents the operator with a series of options. By selecting the option desired, the operator directs the system to the screen containing the specific data to be reviewed or updated. Whenever data is changed by the operator, the EMS/Z will echo the data as it is entered, (except for the Authorization Code) and then give the operator a yes/no question as to validity before permanent storage.

This operator's manual will assist in the operation of the EMS/Z. In the following sections are specifics on how to use the system.

In addition to this manual the following related documentation exists:

- Manual on 'DATABASE PREPARATION MANUAL (BUILD)',
- 'QUICK REFERENCE SHEETS',
- Manual for 'Danfoss-EMC DEALERS',
- Manual on 'NC25 OPERATIONS', and
- 'TECHNICAL INFORMATION BULLETINS'.
- 'COMM PLUS MANUAL'

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2.0 LOGGING ON/OFF THE EMS/Z

Entry to the EMS/Z (after connection by either modem or the first RS232 port) is via a four character password. The EMS/Z will prompt the operator with "AUTH", for authorization, upon connection. If the screen does not display the "AUTH", press the Return key. If after pressing Return several times, the prompt still has not appeared, the operator should hang up and call back in several minutes. If "AUTH" still does not come on the screen, the Danfoss Operations Center should immediately be contacted.

NOTE: Before contacting Danfoss Operations Department for communications problem, please determine the following:

- phone rings busy
- phone rings no answer
- computer answers but no 'AUTH'
- computer answers but response is unintelligible
- computer answers and immediately disconnects

2.1 LOG ON

Once the prompt is displayed on the screen, enter your password, in upper case letters only, followed by a Return. For security reasons, the password will not be displayed on the screen. If the password entered is valid, the system will respond by printing the skeleton ACTION MENU, which is discussed in the next section of this manual. If, after several tries with the password, the EMS/Z still refuses entry, make sure the shift key is locked in the upper case. Try the password again. If entry is still refused, follow previous instructions given in the above paragraph: hang up and call again. If entry is still refused, contact the Danfoss Operations Center.

Some authorization codes may require an account code. The authorization and account codes are specified when the database is generated. The use of account codes enable one authorization code to be assigned to a number of individuals. The AUDIT TRAIL report provides information on who has logged into the system and the action taken.

2.2 LOG OFF

Always use the following procedure to LOG OFF from an EMS/Z to force the EMS/Z system to hang up before you disconnect.

- '@ Return'
- [CTRL-D] (Holding the control key down while pressing the 'D' key)

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3.0 GENERAL INFORMATION

3.1 ABBREVIATIONS

Certain terminal keys have special functions in the EMS/Z. Abbreviations for these keys, such as 'RTN' for the Return key, are used in explaining these functions. If the operator is unfamiliar with computer terminology, it is strongly recommended that Appendix A be read at this time and referred to if any doubt arises as to the meaning of a term.

3.2 BOLD FACE TYPE

BOLD FACE TYPE is used for those characters the operator would enter, for major term headings and for field identification.

3.3 SCREENS

There are two types of screens in the EMS/Z, DATA screens and CHANGE screens.

Data screens allow the operator to observe how the EMS/Z is performing and what information it is using to determine its control actions. Change screens allow the operator to alter selected portions of the EMS/Z's database. These screens permit fine tuning of the system and adaptability to changing needs in the building, such as new building hours. (See Appendix B for a total listing of EMS/Z screens.)

The number of spaces in CHANGE screen prompts indicate the number of characters that can be entered; all of these spaces will not necessarily be needed.

All operator entered statements are terminated by pressing either the Return key or the Escape (ESC) key on the terminal. These keys are abbreviated 'RTN' and 'ESC'.

One or the other of these keys must be used to move the cursor to a new line on a screen or to change to a new screen.

At the end of each screen, there will be a prompt asking the operator for further direction - whether to review a point in greater detail, add or change a value, move on to the next page, or return to ACTION MENU.

If an entry error is made before pressing 'RTN', the operator may backspace and enter the correct information. The space bar will also erase incorrect information. If an entry error was made and 'RTN' has been entered, it is better to answer N to the CORRECT? (Y/N or SURE?) (Y/N) questions and use the 'ESC' key to go back around again.

By convention, only upper case letters are used in the EMS/Z.

3.4 RETURN KEY

Pressing the 'RTN' key alone has two functions. One is to retreat a screen and the other is to advance in a screen or one whole screen. The guidelines concerning these functions are as follows: In a data screen, pressing 'RTN' without entering any data at the prompt will retreat the screen one step to a former screen, e.g., from PHONE NUMBERS to ACTION MENU or ACTION MENU to AUTH, or will advance the screen to the next page if so stated in a prompt such as RETURN FOR NEXT PAGE. However, the 'RTN' key will advance from question to question in a change screen until a prompt occurs asking if the correct data has been entered.

3.5 ESCAPE KEY

The Escape key has a function similar to the 'RTN' key. In a data screen, if no data has been entered at the prompt and 'ESC' is pressed, the system will go back one screen. If data is entered and 'ESC' pressed, it functions as the 'RTN' key and enters the data. In a change screen, however, hitting 'ESC' will skip any remaining questions and take the operator directly to the prompt asking if the correct data has been entered. Pressing 'ESC' again repeats the change screen from the beginning. This allows an opportunity to verify any changes made or to make additional changes, if so desired, without changing screens.

3.6 OPTIONAL ENTRIES

In some cases where operator entry is requested, additional or optional parameters may be entered with the main value. This will be demonstrated in the text by the use of XX or in some cases XXX. If this option is not used, the EMS/Z will default to starting the display with the first used point, usually point #1.

3.7 SPACING

The operator must space between entering different pieces of data being entered. Examples: 2b15'RTN' or 2b15b15'RTN' where (b) is a space. It is not necessary to space before pressing 'RTN' or 'ESC' when finished entering all data. Example: 2'RTN'.

3.8 'Q' OPTION

Example:

For outside lights under EMS/Z control, the control point may be #27 in one unit and #36 in another unit. However, the control point system group number used to determine the system number would always be the same. (See Appendix D for standardized system numbers.)

The EMS/Z allows the operator to access a control point type without knowing the particular control point number. This is called the 'Q' Option. When communicating with a unit with which the operator is not familiar, data can be found without knowing the control point number or undertaking a cumbersome search for it. From the Menu prompt, enter 1 Q followed by the standard control point type and 'RTN'. When using the 'Q' Option, the display will be in ascending order by system number; normally the display is in ascending order by control point number. For example, when looking for the lighting control points, enter 1 Q300'RTN' and the control points starting at system number 300 will then be displayed. (It is not necessary to space after entering 'Q'.) The EMS/Z will search all control points for this number and will then proceed to display control points based on their system number. The 'Q' Option can also be used in conjunction with the @ Feature.

3.9 @ FEATURE

The @ symbol may be used at any screen prompt. Whenever the @ symbol is used, the operator is essentially placed at the bottom of the ACTION MENU and forced to respond to the prompt: SELECT 1 THRU 24: To do so, enter @XX'RTN' where XX designates the ACTION MENU item desired. This allows the operator to go from one function to another without having to go back to the ACTION MENU, thus saving a great deal of time. Throughout this manual, the use of the @ symbol will be demonstrated wherever possible.

3.10 MULTIPLE ENTRIES PER LINE

The operator may enter up to four different pieces of data prior to the 'RTN'.

Example:

@1 1 1 YRTN' - This will result in the change screen for control point number 1 being entered.

3.11 'X' FEATURE

The 'X' function is used when making a change in the DAYS ON listing of the SCHEDULE GROUPS change screen. In most circumstances, a schedule applies to a portion of the week and/or holidays. However, there are times when a schedule applies to all weekdays and holidays. In this instance, entering an 'X' for the DAYS ON prompt will instruct the EMS/Z to include all possible days for the schedule and will be displayed as ****ALL DAYS***. (See also "Changing a Schedule" in the SCHEDULE GROUPS section.)

3.12 MILITARY TIME

Each time listed and entered in the EMS/Z is military time. Military time is reported in 24 hour 'hundreds' format starting at midnight, i.e., 0000. Another example: 1355 = 1:55 P.M.

3.13 MACHINE TIME OUT (LOG OFF)

There is a time-out feature in the EMS/Z. If there is no keystroke for 15 minutes, the machine will automatically log off the operator. Trying to enter anything after these 15 minutes have elapsed will bring up the 'AUTH' prompt. The operator must then repeat the process of gaining entry to the system starting with the password. This is also called walking off the computer. If the operator is communicating with the EMS/Z over phone lines, walking off will cause the loss of communications and the unit will have to be re-dialed.

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4.0 MANUAL FORMAT

As various data and change screens in this manual are discussed, references will be made to one type of screen in sections concerning another. To inject consistency into the manual, the two separate types of screens are covered in two different sections, rather than as a flow from one screen to another.

Every attempt has been made to maintain the same text structure within each section. The structure is as follows:

- The screen title as seen when displayed on a CRT.
- How to display the screen from the standard prompt.
- A brief description of the screen.
- An example of the screen.
- A detailed description of the screen.
- All the possible methods to display the screen.
- The prompt displayed at the end of the screen and the operator entries that may be used.

If the operator is interested only in change screens, it is advisable to read the Change Screens introduction prior to proceeding to the sections concerning the actual change screens.

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5.0 ACTION MENU

Once properly logged on the system, as previously explained, the EMS/Z will display the select prompt as seen in Figure 1 (abbreviated ACTION MENU screen). This screen is the basic entry point for all other Data and/or Change screens in the EMS/Z system. If you wish to see the expanded ACTION MENU screen as seen in Figure 1A, enter 0 'RTN'. V10.04 and later provides the one screen 3 column menu as shown in Figure 1A. Prior releases of Version 10 will contain a two screen action menu.

NOTE: VERSION 10 allows the user to custom build the expanded Action Menu screen. This document is based upon the Action Menu shown in Figure 1A.

FIGURE 1

THU 02/15/90 TIME 1212:19	Danfoss-EMC, Inc. ZX/SYSTEM ACTION MENU COPYRIGHT 1990, Danfoss-EMC, Inc.	M1-M2-S1-S2-DB BUILDING #101
------------------------------	---	---------------------------------

SELECT 1 THRU 24, OR 0 FOR MENU:

V10.04 and later provides a one screen abbreviated menu. Typing '0 RTN' will display menu.

FIGURE 1A

THU 02/15/90 TIME 1212:19	Danfoss-EMC, Inc. ZX SYSTEM ACTION MENU COPYRIGHT 1990, Danfoss-EMC, Inc	M1-M2-S1-S2-DB BUILDING #101
------------------------------	--	---------------------------------

1 CONTROL POINTS	2 REFRIG STATUS	3 CONTROL ALARMS
4 UTILITY REPORT	5 HVAC STATUS	6 CONDITIONS LIST
7 HOLIDAY DATES	8 PHONE NUMBERS	9 SCHEDULE GROUPS
10 SENSOR AVERAGES	11 BUILDING HOURS	12 HISTORY POINTERS
13 DIGITAL SENSORS	14 ANALOG SENSORS	15 SENSOR ALARMS
16 BUILDING STANDARDS	17 CP MANUAL CHANGE	18 CLEAR OPTIONS
19 SWITCH OVERRIDE	20 NOT IMPLEMENTED	21 NOT IMPLEMENTED
22 NC-25 COMM	23 AUDIT TRAIL	24 NOT IMPLEMENTED

SELECT 1 THRU 24, OR 0 FOR MENU:

5.1 HEADING LINES

One of the key elements in the EMS/Z is the heading lines. Their specific format is seen in Figure 2.

FIGURE 2

System Day/Date System Time	Company Information, Machine System Screen Title	Screen ID #s Building ID #
--------------------------------	---	-------------------------------

FIGURE 3 is an example with an explanation of each item.

FIGURE 3

THU 02/15/90 TIME 1212:19	Danfoss-EMC, Inc. ZX SYSTEM ACTION MENU COPYRIGHT 1990, Danfoss-EMC, Inc	M1-M2-S1-S2-DB BUILDING #101
SELECT 1 THRU 24, OR 0 FOR MENU:		

5.1.1 System Day/Date/Time

This is the day, date and time that the EMS/Z maintains with it's own clock and uses for all schedule activities. One point that should be noted here: The day, shown as THU for Thursday in this example, may, on occasion, contain an unusual symbol. When the date matches one of the holidays filed in the EMS/Z, this field will contain H1, H2, ..., H8, depending on the type of holiday as explained in the HOLIDAY DATES and SCHEDULE GROUPS change section. This is for ease in deciphering schedule activity.

5.1.2 Company Information

This is the company name, address and the system type.

5.1.3 Screen Title

This descriptive title is a guide to the type of data being displayed and will become more apparent as the operator reads the information about the various screens. (See also Appendix B for a list of the screens and a brief description of each.)

5.1.4 Screen ID #s

The first set of digits, in this case 'M1' and the second set 'M2', indicates the monitor version. The third and fourth sets of digits, 'S1' & 'S2' indicates the applications, software version. The fifth set of digits 'DB' indicates the database revision number.

5.1.5 Building ID

This is a twelve character field used to identify the customer and place in which the machine is physically located, i.e. BUILDING # 101.

5.2 ACTION MENU ITEMS

The ACTION MENU is used by the operator to decide what data needs to be reviewed and/or changed. Below, in order of appearance on the ACTION MENU, are the names of the items and a synopsis of each. After each synopsis is the ACTION MENU prompt and the operator entry required to access each particular Menu item. The operator entry assumes that the default menu has not been rearranged. The actual structure of the Action Menu is determined when the database is built.

5.2.1 CONTROL POINT STATUS (Data Screen)

Displays the control points: their current status and pressure or temperature, pressure or temperature control parameters, system type identification, associated condition, if applicable, and maintenance run hours if applicable.

A single * appearing between the CP number and name denotes CP coming from NC10/20/25 devices and currently on-line. A ** denotes currently off-line.

Allows the operator entry to the EXPANDED STATUS of any control point which will, in turn, allow more detailed control point information to be reviewed. The EXPANDED STATUS also allows entry to a specific control point parameter change screen, SCHEDULR GROUPS change screen, associated conditions listing, associated digital sensor listing, associated analog sensor listing, maintenance control reset and access to the EXPANDED STATUS of another control point.

SELECT 1 THRU 24: 1'RTN'

5.2.2 REFRIG STATUS REPORT (Data Screen)

This screen is the same as the Control Point Status screen except it lists only Refrigeration Control points with the current value of selected analog (temperature, pressure, etc.) information. Following this each refrigeration control point is displayed along with its pressure control parameter and current value, system type identification, temperature setpoint and pressure adjustment factor, and the temperature sensor associated with the refrigeration rack. Allows the operator entry to the EXPANDED STATUS of any control point, with the same features described in the CONTROL POINT STATUS definition.

SELECT 1 THRU 24: 2'RTN'

5.2.3 CONTROL ALARMS (Data Screen)

Displays current system alarms and current control point alarms.

SELECT 1 THRU 24: 3'RTN'

5.2.4 UTILITY REPORT (Data Screen)

Displays utility consumption data in hourly format for current and previous day. Displays utility consumption data in summary format for current and previous weeks and month.

Displays peak demand values with associated time of occurrence for previous and current day, previous and current month, and for last (current) demand interval based on one minute increments up to 30 minutes.

Displays meter multipliers for up to 50 meters (of various types) which may be tracked in the ZX. The 1st five (5) are wired directly to the ZX CPU with the remaining 45 coming through NC10's.

SELECT 1 THRU 24: 4'RTN'

5.2.5 HVAC STATUS REPORT (Data Screen)(note: same type as #2)

Displays selected HVAC sensors, usually temperature and humidity, with their current value and previous hour's average.

Displays for each HVAC it's current HVAC control point status and temperature, temperature control parameters for certain control point types, system type identification, associated condition, if applicable, and maintenance run hours, if applicable.

Allows the operator entry to the EXPANDED STATUS of any control point with the same features as found in the CONTROL POINT STATUS definition.

SELECT 1 THRU 24: 5'RTN'

5.2.6 CONDITIONS LIST (Data/Change Screen)

Displays control conditions, including: current condition value, nested condition values, current sensor values and constant values, and associated control points.

Allows the operator to access the CONDITIONS LIST change screen.

SELECT 1 THRU 24: 6'RTN'

5.2.7 HOLIDAY DATES (Change Screen)

Displays holiday numbers, holiday dates and holiday types.

Allows the operator to change or add holiday dates and types.

SELECT 1 THRU 24: 7'RTN'

5.2.8 PHONE NUMBERS (Change Screen)

Displays the phone numbers the system will dial when predefined system alarms are generated.

Allows the operator to make phone number changes, and to view and change phone number schedules.

SELECT 1 THRU 24: 8'RTN'

5.2.9 SCHEDULE GROUPS (Change Screen)

Allows the operator entry to the change screen of a schedule group for a control point having a schedule group greater than zero.

Allows the operator entry to the change screen for a schedule group located in a condition. Version 10 supports up to 384 schedules. Schedules may be grouped.

SELECT 1 THRU 24: 9 XXX'RTN' where XXX designates the schedule group number.

5.2.10 TEMPERATURE AVERAGES (Data Screen)

Displays the averages for the current hour and previous 23 hours of the first 12 sensors located in the HVAC STATUS REPORT.

Allows the operator to display any of the other sensor temperature averages.

SELECT 1 THRU 24: 10'RTN'

5.2.11 BUILDING HOUR BASE (Change Screen)

Displays daily and holiday operating hours.

Allows the operator to change either daily or holiday building hours. Version 10 supports up to 16 Holidays.

SELECT 1 THRU 24: 11'RTN'

5.2.12 HISTORY POINTERS (Change Screen)

Allows the operator to display and change, if desired, the parameters controlling the collection of control point, digital sensor point, and analog sensor point data.

Version 10 allows 16 groups with 14 elements per group (224 elements). An element may be a digital input, analog input, control point or refrigeration targets.

SELECT 1 THRU 24: 12'RTN'

5.2.13 DIGITAL SENSOR REPORT (Data Screen)

Displays the digital sensors and their current status.

Allows the operator entry to the CHANGE DIGITAL SENSOR screen.

A single * appearing between the CP number and name denotes CP coming from NC10/20/25 devices and currently on-line. An ** denotes currently not communicating.

SELECT 1 THRU 24: 13'RTN'

5.2.14 ANALOG SENSOR REPORT (Data Screen)

Displays the analog sensors and their current status.

Allows the operator entry to the CHANGE ANALOG SENSOR screen.

A single * appearing between the AS number and name denotes AS coming from NC10/20/25 devices and currently on-line. An ** denotes currently not communicating.

SELECT 1 THRU 24: 14'RTN'

5.2.15 SENSOR ALARM REPORT (Data/Change Screen)

Displays the control point(s) and/or sensor points(s) and the category, program values, current values, actions to be taken, and time alarm occurred for each.

Allows the operator to enter the SENSOR ALARM REPORT change screen and review, add or change the sensor alarm parameters. V10 allows up to 384 sensor alarms to be defined.

SELECT 1 THRU 24: 15'RTN'

5.2.16 BUILDING STANDARDS LIST (Change Screen)

Displays the values used as setpoints in the conditions.

Allows the operator to enter the BUILDING STANDARDS LIST change screen. V10 allows up to 120 standards with up to 2 entries per standard

SELECT 1 THRU 24: 16'RTN'

5.2.17 GLOBAL MANUAL CHANGE

Allows the operator to globally change the control points mode (i.e. computer control, manual on or manual off). There is no change screen. Parameter following the '17' is the mode.

- Enter '0' - Computer Control
- Enter '1' - Manual On
- Enter '2' - Manual off

If no other parameters are used, all control points will be changed. A range of control points can be specified, following the mode, by entering the starting control point & the ending control point. All control points between and including the starting and ending will be affected.

SELECT 1 THRU 24: 17 mode Start End 'RTN'

5.2.18 GLOBAL MIN/MAX RESET

Allows the operator to globally reset the control points min/max values displayed in a DAT1, & a DAT2 (see Appendix K) are the lowest & highest values registered by the specific analog sensor associated with the control point.

SELECT 1 THRU 24: 18 'RTN'

5.2.19 SWITCH OVERRIDE REPORT (Data Screen)

Displays switches (located on I/O cards in ZX) which have been placed in override. Records up to 96 switch overrides.

SELECT 1 THRU 24: 19 'RTN'

5.2.20 NOT YET IMPLEMENTED

5.2.21 NOT YET IMPLEMENTED

5.2.22 NC25 COMMUNICATIONS (Change Screen)

Displays the NC25's that are connected to the ZX.

Allows pull back of NC25 names, setup of NC25 databases for pull back or down load and allows log in to an NC25 on the system. The ZX allows up to 60 NC25's per system. NC25's must be addressed between 1 and 60.

5.2.23 AUDIT TRAIL (Data Screen)

Displays based upon AUTH/account codes, each time that the system was entered, the length of time logged into the system, and if certain actions were performed (i.e. made changes or NC25 Communications) or attempted to make changes with the wrong AUTH code.

SELECT 1 THRU 24: 23 'RTN'

5.2.24 NOT YET IMPLEMENTED.

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SECTION 2
DATA SCREENS

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6.0 CONTROL POINT STATUS

To display the CONTROL POINT STATUS screen, enter "RTN" when prompted by the ACTION MENU.

The CONTROL POINT STATUS screen displays up to 16 control points at one time with their current status and a portion of their control parameters. Figures 4 & 5 show two pages of a typical CONTROL POINT STATUS screen for a supermarket with uneven multiple racks.

FIGURE 4 (1ST PAGE)

THU 02/15/90 TIME 1212:19		Danfoss-EMC, Inc. ZX/SYSTEM CONTROL POINTS				M1-M2-S1-S2-DB BUILDING #101		
CP NAME	STATUS	CURR VARR	TARG/ CUT-IN	CUT OUT	SYSTEM TYPE	COND #	RUN# HOURS	
1	SYS A1	OFF	49.0P	51	34	UR(A)-R #4 F	3	
2	SYS A2	ON					72	
3	SYS A3	OFF					26	
4	SYS B1	OFF	42.5P	39	24	UR(B)-R #4 F	49	
5	SYS B2	OFF					135	
6	SYS B3	ON					69	
7	SYS C1	OFF	12.0P	10	2	UR(C)-R #4 F	113	
8	SYS C2	OFF					117	
9	SYS C3	ON					133	
10	SYS D1	OFF	24.5P	14	1	MR(D)-R #4 F	123	
11	SYS D2	OFF					62	
12	SYS E1	ON	1.0P	5	1	SNGL-R #4 F	118	
13	STOCK	OFF X				LITE	27	
14	REDUC	ON X				LITE #1 T	31	
15	BALNC	ON X				LITE	104	
16	CASE	ON X *				LITE	102	

ENTER CP #, RTN FOR NEXT PAGE, OR 0 FOR MENU:

FIGURE 5 (2ND PAGE)

THU 02/15/90 TIME 1212:19		Danfoss-EMC, Inc. ZX/SYSTEM CONTROL POINTS								M1-M2-S1-S2-DB BUILDING #101	
Fields 1	2	3	4	5	6	7	8	9	10	11	12
CP	NAME	STATUS		CURR VARR	TARG/ CUT-IN	CUT OUT	SYSTEM TYPE	COND #	RUN# HOURS		
17	LOCLG	ON	X				LITE	#1 T		48	
18	PKDL	ON	X				LITE	#		102	
19	VEST	ON	X				LITE	#1 T		57	
20	DL/SL	ON	X				LITE			102	
21	FLWR	ON	X				LITE			102	
22	RDCTR	ON	X				LITE			111	
23	PROD	ON	X				LITE			111	
24	DL/BK	ON	X				LITE			104	
25	MEAT	ON	X				LITE			109	
26	VEST	ON	X				LITE	#1 T		56	
27	OUTSD	ON	X				LITE	#1 T		97	
28	UNTHT	ON					LITE	#3 T		210	
30	MTCT	ON	X				HVAL	#2 T		120	
32	DEF B 34	OFF		(OFF)			DEFR			57	
33	DEF C 35	OFF		S(OFF)			DEFR			9	
34	DEF D 36	OFF		S(OFF)			DEFR			19	

ENTER CP #, RTN FOR NEXT PAGE, OR 0 FOR MENU:

6.1 CONTROL POINT STATUS FIELDS

There are 12 general fields associated with the CONTROL POINT STATUS screen as seen in Figures 4 & 5. A description of each field is as follows:

6.1.1 Field 1: CP

The control point number. The EMS/Z can have up to 384 control points. In many instances there are control points designated as "dummy control points". These control points are not real (true) outputs for control, but are utilized by the database for other functions.

6.1.2 Field 2: NAME

The eight character name for the true or dummy control point. These names are usually standard for a controlled device or for each dummy control points.

6.1.3 Fields 3-6: STATUS

These four fields indicate on/off and control status of the control point.

Fields 3 & 4: CONTROL/MONITOR STATUS:

- ON - Indicates the controlled device is on.
- OFF - Indicates the controlled device is off
- ON X - Indicates that there is no monitor for the control point and the computer is calling for the control point to be on.
- OFF X - Indicates that there is no monitor for the control point and the computer is calling for the control point to be off.
- D - A "D" in the "X" field indicates that a circuit on a multiple rack is in defrost, or, in the event of a single compressor, that the cases associated with the compressor are in defrost. By displaying the DIGITAL SENSOR REPORT screen, the operator can determine which circuit on the multiple rack is in defrost, if the point is monitored.

Field 4a: DIGITAL INPUT MANUAL MODE:

The digital input associated with this control point has been placed into manual mode.

Field 5: CONTROL PT. SWITCH STATUS: BLANK or S

Blank indicates the control point switch is in computer control. S indicates that the control point switch is not in computer control. The switch can either be manual on or manual off. In either case, on/off actions by the computer will not be carried out.

Field 6 (Column 6): SOFTWARE CONTROL STATUS:

Blank indicates that the control point is in computer control. On/off actions as determined by the software will be carried out.

- (ON) - Indicates that the control point is software manual ON. On/Off actions by the computer will not be carried out. See Manual Modes below.
- (OFF) - Indicates that the control point is software manual OFF. On/Off actions by the computer will not be carried out. See Manual Modes below.
- (ON6) - Indicates that the control point has been placed in software manual ON by the software, due to one or more sensor alarms being true, and on/off actions by the computer will not be carried out. The sensor alarms used to generate the (ON6) will typically deal with abnormal rack pressure, case temperature, compressor run times, or a combination of the three. Abnormal means that the current operating value (pressure, temperature, etc.) is not within the "normal" operating constraints. As an example, if the pressure operating constraints for a rack are 20 to 60 PSI, then any PSI less than 20 or greater than 60 is considered abnormal, if it persists beyond the specified time.

6.2 SWITCH & SOFTWARE MANUAL MODES

A few words concerning switch and software manual modes. When the EMS interface controls are in series with the existing controls, switch or software manual ON will cause the controlled device to operate under its existing control. Switch or software manual OFF will cause the controlled device to stay off.

When the EMS controls are in parallel with the existing controls, switch or software manual ON will cause the controlled device to stay on; switch or software manual OFF will cause the controlled device to stay off. Parallel controls are only found in refrigeration and HVAC applications, whereas series control is found in all lighting applications, in some single compressor refrigeration applications, and, under some circumstances, in HVAC and refrigeration applications.

The exceptions to the switch and software manual modes are Automatic Temperature Control (ATC) and Customer Pressure Control (CPC) control points. When an ATC control point is switch or software manual ON, the EMS/Z device is in control. When an ATC control point is switch or software manual OFF, the existing HVAC temperature controls are in control. The converse is true in the case of the CPC. When a CPC control point is switch or software manual ON, the existing refrigeration pressure controllers are in control, while when the CPC control point is switch or software manual OFF, the EMS/Z is in control.

Whenever a control point is switched or out of computer control, the position of the switch has dominance over the software manual settings. When the control point is switched into computer control, the software manual ON/OFF settings dominate the computer's on/off decisions.

The control point will react to the computer on/off decisions only when the switch and the software control for the control point are in computer control.

6.2.1 Field 7: CURRENT VALUE

The current value for an analog sensor associated with the current point. The value is usually suction pressure for a refrigeration control point and is designated with a P. When dealing with multiple racks, the analog sensor value will be associated with the first machine. For HVAC, the value is usually temperature in degrees Fahrenheit and is designated with an F. A blank field indicates no associated analog sensor point.

6.2.2 Field 7a: ANALOG INPUT IN MANUAL MODE:

The analog input that is associated with this control point has been placed into manual mode.

6.2.3 Field 8: TARG/CUT-IN

A refrigeration control parameter. The target (TARG) value is used when controlling a refrigeration rack with Rate of Change and is noted by a -R following the system type, field 10. The target is the average suction pressure the rack is to maintain. The cut-in is used when controlling a refrigeration rack with cut-in and cut-out parameters. A single compressor will be turned on, providing the minimum off time has been exceeded, when the current pressure exceeds the cut-in. A multiple rack will have additional compressors, or capacity if an uneven rack, turned on as long as the current pressure is greater than the cut-in. Once the current pressure falls below the cut-in, but prior to reaching the cut-out value, the control status of the compressors on the rack will remain unchanged. Target values and cut-in values are similar in that each parameter is associated with an entire refrigeration rack regardless of how many compressors are on the rack. The targ/cut-in value will always line up with the first control point for a rack.

6.2.4 Field 9: CUT-OUT

A refrigeration control parameter. The cut-out value is an absolute cut-out value when controlling a rack using the standard cut-in and cut-out strategy. When the current pressure reaches the cut-out value, a single compressor will be turned off, providing the minimum on time has been exceeded, and compressors on a multiple rack will start to be turned off. As long as the current pressure remains below the cut-out value, the computer will continue to hold off a single compressor, and turn off additional compressors on a multiple rack until all compressors on the rack are off. When controlling a rack using the Rate of Change strategy, the cut-out

causes the EMS/Z to take an immediate action to reduce the current refrigeration capacity. For uneven racks, the number of compressors turned off depends upon the distance the current pressure is below the target pressure. For even racks, one compressor will be turned off. As long as the current pressure is less than or equal to the cut- out, the control action will be made at 15 second intervals.

6.2.5 Field 10: SYSTEM TYPE

There are nine different System Types associated with control points. They are:

Refrigeration Types

- SNGL - Indicates a single compressor rack.
- MR(X) - Indicates a MULTI rack with compressors of equal BTUH capacity.
- UR(X) - Indicates a MULTI rack with compressors of unequal BTUH capacity.

In both MR(X) and UR(X), the (X) indicates the rack identification and will always be an alpha character. An (R) to the right of the refrigeration system type indicates that the rack is being controlled by Rate of Change. The absence of an (R) indicates that the rack is being controlled by conventional cut-in and cut-out.

Defrost Types

- DEFR - Indicates a defrost control point.

Lighting Types

- LITE - Indicates a lighting control point.

Heating, Ventilation & Air Conditioning Types

- HVAC - Indicates a HVAC type control point controlled by schedules and conditions.

Special function

- CTRL - This system type is used primarily for special control points such as ATC or CPC. The CTRL type allows for the control point to be automatically placed in manual-on or off mode by the computer under defined conditions.

NC10 Types

- An NC10 type point can be considered to be similar to an ATC point. The NC10 point will always be a real control point but may or may not be tied to an actual switch. The NC10 type control point is used to define an NC10 with a specific address and various configurations of analog inputs, analog outputs, digital inputs, digital outputs, etc.

NC25 Types

- These control points actually reside on NC25's. Their status is retrieved and displayed.

MOTOR CONTROL

- This will be a display on the screen as MTR CNTRL. The Motor Control, at present, can be either an MC1, MC2, or the old type motor control board. The old type motor control board connects directly to the CPU using digital outputs and analog inputs, while the MC1 and MC2 will be controlled directly via an NC10.

6.2.6 Field 11: CONDITION

The condition number pointed to be the control point and the condition's current value [i.e., true (T) or false (F)]. When in this field, conditions will usually have to be true before the computer will turn on the control points. A blank field indicates that there is no condition associated with the control point. (See the CONDITIONS LIST section for a more detailed explanation.)

NOTE: The normal conditions statement appears on the left section of the control point screen and it will be a T/F type of condition. The condition which appears in the center of the screen is for refrigeration only and is used for night set up and is passing a variance number back to the refrigeration control point.

6.2.7 Field 12 (Column 12): RUN HOURS

Used as a maintenance hour log. Run hours are incremented based on a monitor input. However, when no monitor input exists, run hours are incremented based on the EMS/Z control output. Run hours can be zeroed for a new maintenance cycle. (Run hours are accumulated by day and rounded to lowest hour.) In Figure 6, the screen from Figure 4 has been altered to exemplify the above field possibilities.

FIGURE 6

THU 02/15/90 TIME 12:12:19		Danfoss-EMC, Inc. ZX/SYSTEM CONTROL POINTS						M1-M2-S1-S2-DB BUILDING #101					
Fields	1	2	3	4	5	6	7	8	9	10	11	12	
CP	NAME	STATUS		CURR		TARG/ VARR	CUT- IN	CUT OUT	SYSTEM TYPE	COND #	RUN # HOURS		
1	SYS A1	OFF	D				49.0P	51	34	UR(A)-R	#4	F	73
2	SYS A2	ON	(ON)										72
3	SYS A3	OFF											26
4	SYS B1	OFF					42.5P	39	24	UR(B)-R	#4	F	49
5	SYS B2	OFF											135
6	SYS B3	ON											69
7	SYS C1	OFF	(ON6)				54.0P	10	2	UR(C)-R	#4	F	113
8	SYS C2	OFF	(ON6)										117
9	SYS C3	ON	(ON6)										133
10	SYS D1	OFF					24.5P	14	1	MR(D)-R	#4	F	123
11	SYS D2	OFF											62
12	SYS E1	ON	S(ON6)				-27.0P	5	1	SNGL-R	#4	F	118
13	STOCK	OFF	X(OFF)							LITE			27
14	REDUC	ON	XS(ON)							LITE	#1	T	31
15	BALNC	ON	X							LITE			104
16	CASE	OFF	S(OFF)							LITE			102

ENTER CP #, RTN FOR NEXT PAGE, OR 0 FOR MENU:

There are two different (ON6) examples in Figure 6, Control point 7, 8 and 9 have been placed manually (ON6) due to an abnormally high pressure. Control point 12 has been placed manually (ON6) due to an abnormally low pressure. (ON6's only occur when the ZX is controlling refrigeration and predefined alarms are directly associated with them - see Alarm Section.)

6.3 ACCESS/PROMPT

In the beginning of this section, it was noted to enter 1'RTN' to display the CONTROL POINT STATUS screen when prompted by the ACTION MENU. There are other methods for gaining access to the CONTROL POINT STATUS screen.

From the ACTION MENU:

- 1 XX'RTN' - Where XX designates the control point with which the display will begin.
- 1 QXX'RTN' - Where XX designates the control point system number. (See the 'Q' Option for a more detailed discussion of this method.)

From any EXPANDED STATUS:

- XX N'RTN' - Where XX designates the control point with which the display will begin.

From any screen prompt:

- '@1 RTN' - Where XX designates the control point with which the display will begin. (See page 6 for a more detailed explanation of the @ symbol.)

At the end of the CONTROL POINT STATUS screen, the operator will be prompted with the following:

ENTER CP#, RTN FOR NEXT PAGE, OR 0 FOR MENU:

A variety of operator entries may be used.

- XX'RTN' - Displays the EXPANDED STATUS screen for control point XX.
- XX N'RTN' - Displays the CONTROL POINT STATUS screen starting at control point XX.
- 'RTN' - Displays the CONTROL POINT STATUS screen starting at the next control point just viewed in the EXPANDED STATUS. If all control points have been displayed, then the ACTION MENU will be displayed.
- O'RTN' - Displays the ACTION MENU. (See the ACTION MENU section.)
- '@XX RTN' - Displays Menu item XX.

A final note on the CONTROL POINT STATUS screen. Entering DAT1'RTN' when prompted by the AUTH will concisely display data from the CONTROL POINT STATUS along with the data from the CONTROL ALARMS, and UTILITY REPORT screens.

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7.0 EXPANDED STATUS

To display the EXPANDED STATUS screen, enter XX'RTN' when prompted at the end of the CONTROL POINT STATUS screen. XX designates the control point number of the EXPANDED STATUS to be reviewed.

There are five different EXPANDED STATUS screen displays: Refrigeration, Defrost, HVAC, Lighting, and NC10 types.

NOTES:

- A. If a particular control point is coming from a network device there will be an * displayed immediately following the control point number on the expanded status report to the left of the screen.
- B. If a device control point is in failure mode, there will be an * under the mode section of the expanded status report.
- C. For Version 10 the change screen display includes the letter L in addition to those shown. The alarms do not appear on the expanded status report and the L function on the change screen will pull up the alarms.

7.1 Refrigeration System Types

Refrigeration System Types (Figure 7) displays control point name, the temperature sensor associated with the rack, the current rack suction pressure and sensor temperature, the rack control parameters, the control and monitor status, the timing, the accumulated run time for all the compressors associated with the racks and conditions associated with the rack, if applicable.

FIGURE 7 REFRIGERATION SYSTEM TYPE

THU 02/15/90 TIME 1212:19		Danfoss-EMC, Inc., ZX System EXPANDED STATUS #4				M1-M2-S1-S2-DB BUILDING #101			
SYSA1-01		PSI = CURR: 56.0		TARG: 51	COUT: 34	4 10 33 2 0			
DYCS T04		TEMP = CURR: 32.5		TARG: 33	AVG: 30				
STATUS		TIMING			ACCUM	RUN TIME			
#	OUT MON	CODE	MODE	LAST ON	LAST OFF	CYCLES	TODAY	YESTERDAY	TOTAL
4	OFF OFF	1		1515	1520		0358	0533	73
5	ON ON	5		1618	1608		0819	1150	72
6	OFF OFF	1		1608	1618		0235	0357	26
CONDITION # 4 F									
ALARMS:									
CHANGE Y/N/S/M/C/A/D/L/R/CP#:									

7.2 HVAC & LITE System Types

HVAC & LITE System Types (Figures 8 & 9) displays the control point name, current temperature, control and monitor status, timing, accumulated run time, condition associated with control point, if applicable, usually schedule groups are associated only with lighting and defrost system types.

NOTE: If the control point that you are looking at is the control point for the NC10, the above examples where the field shows "HVAC" or "lighting" would then show "NC10".

FIGURE 8 HVAC SYSTEM TYPE

THU 02/15/90 TIME 2108:42	Danfoss-EMC, Inc., ZX SYSTEM EXPANDED STATUS # 25	M1-M2-S1-S2-DB BUILDING #101
HTRC2 74		HVAC
STATUS	TIMING	ACCUM RUN TIME
# OUT MON CODE MODE	LAST ON LAST OFF CYCLES	TODAY YESTERDAY TOTAL
25 ON ON 3	0735 2330	1333 1521 255
CONDITION # 7 T		
CHANGE Y/N/S/M/C/A/D/L/R/CP #:		

FIGURE 9 LITE SYSTEM TYPE

THU 02/15/90 TIME 2108:42	Danfoss-EMC, Inc., ZX SYSTEM EXPANDED STATUS # 15	M1-M2-S1-S2-DB BUILDING #101
PROD 55		LIGHTING
STATUS	TIMING	ACCUM RUN TIME-
# OUT MON CODE MODE	LAST ON LAST OFF CYCLES	TODAY YESTERDAY TOTAL
15 ON ON 3	0735 2200	1333 1600 162
SCHEDULE GROUP # 15		
ON/OFF	DAYS	CYCLE
1 0730 1900	1	-200 -0010
3 0600 2100	2	MTWRFA
CHANGE Y/N/S/M/C/A/D/L/R/CP #:		

7.3 EXPANDED STATUS FIELDS

There are several aspects of these three EXPANDED STATUS screen varieties that are similar. They are listed below:

7.3.1 STATUS OUT

On or off value representing what the computer is calling for.

7.3.2 MON

On, off or blank when no monitor, representing the state of the controlled device.

7.3.3 CODE

(Not used in Version 10). An indication of what the algorithm is calling for.

7.3.4 MODE CONTROL PT SWITCH STATUS: BLANK OR S

Blank indicates the control point switch is in computer control. S indicates that the control point switch is not in computer control. The switch can either be in manual on or in manual off. In either case, on/off actions by the computer will not be carried out.

7.3.5 SOFTWARE CONTROL STATUS

Blank indicates that the control point is in computer control. On/off actions as determined by the software will be carried out.

- (ON) - Indicates that the control point is software manual ON. On/off actions by the computer will not be carried out. See "Manual Modes" below.
- (OFF) - Indicates that the control point is software manual OFF. On/off actions by the computer will not be carried out. See "Manual Modes" below.
- (ON6) - Indicates that the control point has been placed in software manual ON by the software, due to one or more sensor alarms being true, and on/off actions by the computer will not be carried out. The sensor alarms used to generate the (ON6) will typically deal with abnormal rack pressure, case temperature, compressor run times, or a combination of the three. Abnormal means that the current operating value (pressure, temperature, etc.) is not within the "normal" operating constraints. As an example, if the pressure operating constraints for a rack are 20 to 60 PSI, then any PSI less than 20 or greater than 60 is considered abnormal, if it persists beyond the specified time.

7.3.6 INVERTED LOGIC

An "I" will appear on the first line of the expanded status if this control point is inverted.

7.3.7 TIMING

Last on, last off times. Remember, all times are shown in military time.

7.3.8 ACCUM RUN TIME:

The accumulated run time for today and yesterday.

7.3.9 TOTAL

Total maintenance hours since the last time the counter was reset. (Referred to on control point screen as "Run Hours" and is rounded daily to lowest hours).

When multiple racks are involved, all the data for the compressors associated with the control point EXPANDED STATUS appear in the STATUS, TIMING & ACCUM RUN TIME fields.

7.3.10 CONDITION

The condition number pointed to by the control point and current value - true (T) or false (F). Conditions associated with refrigeration system types will usually affect the control parameter values, while conditions associated with lighting or HVAC system types will usually have to be true before the computer will turn on the control points. Blank indicates that there is no condition associated with the control point. (See the CONDITIONS LIST section for a more detailed explanation.)

There are differences among the three EXPANDED STATUS screen varieties.

7.4 REFRIGERATION TYPES ONLY

7.4.1 PSI = CURR

Current suction pressure for the rack.

7.4.2 TARG or CUT-IN

A refrigeration control parameter. The target (TARG) value is used when controlling a refrigeration rack with Rate of Change. The target is the average suction pressure the rack is to maintain. The cut-in is used when controlling a refrigeration rack with cut-in and cut-out parameters. A single compressor will be turned on, providing the minimum off time has been exceeded, when the current pressure exceeds the cut-in. A multiple rack will have additional compressors, or capacity if an uneven rack, turned on as long as the current pressure is greater than the cut-in. Once the current pressure falls below the cut-in, but prior to reaching the cut-out value, the control status of the compressors on the rack will remain unchanged. Target values and cut-in values are similar in that each parameter is associated with an entire refrigeration rack regardless of how many compressors are on the rack.

7.4.3 CUT-OUT

A refrigeration control parameter. The cut-out value is an absolute cut-out value when controlling a rack using the standard cut-in and cut-out strategy. When the current pressure reaches the cut-out value, a single compressor will be turned off, providing the minimum on time has been exceeded, and compressors on a multiple rack will start to be turned off. As long as the current pressure remains below the cut-out value, the computer will continue to hold off a single compressor, and turn off additional compressors on a multiple rack until all compressors on the rack are off. When controlling a rack using the Rate of Change strategy, the cut-out causes the EMS/Z to make an immediate decision to reduce the current refrigeration capacity. For uneven racks, the number of compressors turned off depends upon the distance the current pressure is below the target pressure. For even racks, one compressor will be turned off. As long as the current pressure is less than or equal to the cut-out, the control action will be made at machine cycle (usually 15 seconds) intervals.

7.4.4 TEMP = CURR

Current case temperature associated with the rack. This is usually the refrigeration circuit with the lowest temperature requirements on the rack.

7.4.5 TARG

The case temperature the EMS/Z is attempting to maintain on the average. The value is recorded at the case discharge air grill.

7.4.6 AVG

The last hour's average temperature.

In addition, depending on the AUTH code used, there are six digits found in the upper right of the refrigeration type EXPANDED STATUS screens. From left to right they are as follows:

- 1st - Contents of the integration accumulator (varies from XX to +XX when XX is a value from 1 -99 and controlled by Rate of Change).
- 2nd - The pressure offset from the original target pressure. This number may be positive or negative and will vary based on the case temperature as seen in TEMP = CURR above. The target offset will vary to a maximum or minimum as allowed by PSI variance.
- 3rd - The pressure and temperature offset from the original target pressure based on a condition.
- 4th - Sensitivity counter. The sensitivity counter will decrease from X (with value X determined as a function of the current algorithm run-time) to a 0 at a speed determined by the sensitivity value found in the EXPANDED STATUS change screen. This decrease will only occur if the integration accumulator is positive and the current pressure is greater than the target pressure, or if the integration accumulator is negative and the current pressure is below the target pressure.
- 5th - Current operating compressor pattern. This value will be 0 or 1 when the rack is a single compressor. The value will indicate the current pattern number for even racks.
- 6th - Rotation factor. This number is always 1 for uneven parallel or single applications. The number indicates the compressor that has been on the longest, and will be the next turned off in the rotation for even parallel applications.

7.5 HVAC & LIGHTING TYPES

7.5.1 CURR

The current value of the temperature sensor associated with the control point, if one was declared in the database construction.

7.5.2 SCHEDULE GROUP NUMBER

This number indicates which set of schedules in the Schedules Table this point will use. In most cases, each control point will have its own schedules, and this group number will correspond to the control point number.

7.5.3 ON/OFF

Lighting & HVAC control points may be turned on or off by one or two methods, either by a standard schedule or by a Relative Building Hour. The on/off times associated with a standard schedule are based on the time of day. In other words, Schedule 1 of Figure 10 indicates that the produce lights will be turned on at 730 hours, or 7:30 AM, and turned off at 1900 hours, or 7:00 PM on Sunday and Holiday Number 1. An interesting feature is that the on time is based on time and the day whereas off time is independent of the day. For example, the schedule 2200 800 MWF will turn the control point on at 2200 Monday and off at 800 Tuesday, on at 2200 Wednesday and off at 800 Thursday, etc., even though there are no schedules for Tuesday, Thursday or Saturday. The on/off times associated with a Relative Building Hour schedule are based on the time of day the

building is open for business. Thus referring back to Figure 10, assume the building hours are 800 to 2200. Schedule 2 indicates that the produce lights will be turned on two hours (-0200) before the building opens (0800) and turned off ten minutes (0010) after the building closes (2200 or 10:00 PM). Displaying and/or changing Relative Building Hours is accomplished through the BUILDING HOURS screen.

7.5.4 DAYS

SMTWRFA12345678 equals Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Holiday #1, Holiday #2, etc. The control point will be scheduled on only those days for which a matching character appears, for instance: S T F 3 6 indicates a schedule used on Sunday, Tuesday, Friday and Holidays #3 and #6. However, there are times when a schedule applies to all weekdays and holidays. Entering an 'X' for the DAYS ON prompt will instruct the EMS/Z to include all possible days for the schedule. This will be indicated by '***ALL DAYS***'. (See "Changing a Schedule" in the SCHEDULE GROUPS section.)

7.6 ACCESS/PROMPT

In the beginning of this section, it was noted to enter XX'RTN'X to display the EXPANDED STATUS screen when prompted at the end of the CONTROL POINT STATUS screen. XX designates the control point number of the EXPANDED STATUS to be reviewed. There are other methods for gaining access to the EXPANDED STATUS screen.

From the CONTROL POINT STATUS:

- XX'RTN' - Where XX designates the control point number of the EXPANDED STATUS screen desired.

From another control point EXPANDED STATUS:

- XX'RTN' - Where XX designates the control point number of the EXPANDED STATUS screen desired.

From the ACTION MENU:

- 1 XX'RTN' - Where XX designates the control point number of the EXPANDED STATUS screen desired.

From any screen prompt:

- '@1 XX XX RTN' - Where XX designates the control point number of the EXPANDED STATUS screen desired. (See the General Information section for a more detailed explanation of the @ symbol.)

At the end of the EXPANDED STATUS screen, the operator will be prompted with the following:

CHANGE Y/N/S/M/C/A/D/L/R/CP # :

A variety of operator entries may be used.

- Y'RTN' - Allows the operator to review and change certain control point control parameters. (See EXPANDED STATUS, C.P. # change section.)

- N'RTN' - Displays the CONTROL POINT STATUS screen starting with the EXPANDED STATUS control points. (See CONTROL POINT STATUS section.)
- S'RTN' - Allows the operator to review and change schedules associated with the control point. If the control point has a schedule group of zero, the EXPANDED STATUS screen will be redisplayed. (See SCHEDULE GROUPS change section.)
- M'RTN' - Resets the maintenance total or run hours counter to zero and then re-displays the EXPANDED STATUS screen.
- C'RTN' - Displays in logical rather than sequential order the conditions associated with the control point. (See CONDITIONS LIST section.)
- A'RTN' - Displays the page of the ANALOG SENSORS screen starting with the first sensor associated with the EXPANDED STATUS control point. If no sensor is associated, the page starts with Sensor Number 1. (See ANALOG SENSORS section.)
- D'RTN' - displays a page of the DIGITAL SENSORS screen starting with the sensor associated with the EXPANDED STATUS control point. If no sensor is associated, the page starts with Sensor Number 1. (See the DIGITAL SENSORS section.)
- L'RTN' - Displays alarms which are associated with the EXPANDED STATUS control point but are not part of the EXPANDED STATUS screen.
- 'R'RTN' - Resets a non Danfoss-EMC network controller device. Only valid with a control point that is associated with a type 8 (Vilter) microprocessor.
- XX'RTN' - Displays the EXPANDED STATUS screen for control point number XX.
- 'RTN' - Same as N'RTN'.
- '@1 RTN' - Displays the CONTROL POINT STATUS screen starting at control point XX.

A final note on the EXPANDED STATUS screen. Entering DAT1'RTN' when prompted by the AUTH will display certain data from the EXPANDED STATUS, CONTROL ALARMS and UTILITY REPORT screens.

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8.0 REFRIGERATION STATUS REPORT

To display the REFRIGERATION STATUS screen, enter 2'RTN' when prompted by the ACTION MENU.

The REFRIGERATION STATUS combines analog sensor values with the CONTROL POINT STATUS screen for an easy view of a refrigeration system.

Figure 10 is an example of a REFRIGERATION STATUS screen.

FIGURE 10

THU 02/15/90		Danfoss-EMC, Inc., ZX SYSTEM				M1-M2-S1-S2-DB					
TIME 1621:59		REFRIG STATUS				BUILDING #101					
SENSOR NAME		CURR AVG		SENSOR NAME		CURR AVG		SENSOR NAME		CURR AVG	
FIELDS 1A				1B				1C			
11	DYCS T04	33.5F	30	13	MTCS T10	47.0F	25	16	FZVG T23	- 4.5F	-7
18	FZJC T19	-10.0F	-11	15	ICRM T25	-19.0F	-16	12	MTBX T09	37.0F	37
14	MTCS T11	30.0F	32	17	FZBX T24	17.0F	6				
CP NAME		STATUS		CURR	TARG/	CUT		SYSTEM	TEMP/PSI	TEMP	
#				VAL	CUTIN	OUT		TYPE	FACTORS	SENSOR	
1	SYSA1	OFF		55.5	51	34		UR(A)-R	33 1	DYCS T04	
2	SYSA2	ON									
3	SYSA3	OFF									
4	SYSB1	OFF		41.0P	39	24		UR(B)-R	22 -1	MTCS T10	
5	SYSB2	OFF									
6	SYSB3	ON									
7	SYSC1	OFF		17.0P	10	2		UR(C)-R	-12 -2	FZJC T19	
8	SYSC2	OFF									
9	SYSC3	ON									
10	SYSD1	OFF		8.5P	14	1		MR(D)-R	-7 4	FZVG T23	

ENTER CP#, RTN FOR NEXT PAGE, OR 0 FOR MENU:

8.1 REFRIGERATION STATUS REPORT FIELDS

The following fields are found in the REFRIGERATION STATUS screen.

8.1.1 Fields 1A, B & C

A total of 30 analog temperature sensors may be displayed with their current value and last one hour's average.

8.1.2 Field 2: CP

The control point number. The EMS/Z can have up to 96 control points in Version 2 and up to 384 in Version 8, 9, and 10. In many instances there are control points designated as "dummy control points". These control points are not real (true) outputs for control, but are utilized by the database for other functions.

8.1.3 Field 3: NAME

The eight character name for the refrigeration control point.

8.1.4 Fields 4-7: STATUS

These four fields indicate on/off and control status of the control point.

Fields 4 & 5: Control/Monitor status.

- ON - Indicates the controlled device is on.
- OFF - Indicates the controlled device is off.
- ON X - Indicates that there is no monitor for the control point and computer is calling for the control point to be on.
- OFF X - Indicates that there is no monitor for the control point and the computer is calling for the control point to be off.
- D - A "D" in the "X" field indicates that a circuit on a multiple rack is in defrost, or, in the event of a single compressor, that the cases associated with the compressor are in defrost. By displaying the DIGITAL SENSORS screen, the operator can determine which circuit on the multiple rack is in defrost.

Field 6: CONTROL PT SWITCH STATUS: BLANK OR S

Blank indicates the control point switch is in computer control. S indicates that the control point switch is not in computer control. The switch can either be manual on or manual off. In either case, on/off actions by the computer will not be carried out.

Field 7: SOFTWARE CONTROL STATUS

Blank indicates the control point is in computer control. On/off actions as determined by the software will be carried out.

- (ON) - Indicates that the control point is software manual ON. On/off actions by the computer will not be carried out.
- (OFF) - Indicates that the control point is software manual OFF. On/off actions by the computer will not be carried out.
- (ON6) - Indicates that the control point has been placed in software manual ON by the software, due to one or more sensor alarms being true, and on/off actions by the computer will not be carried out. The sensor alarms used to generate the (ON6) will typically deal with abnormal rack pressure, case temperature, compressor run times, or a combination of the three.

Abnormal means that the current operating value (pressure, temperature, etc.) is not within the "normal" operating constraints. As an example, if the pressure operating constraints for a rack are 20 to 60 PSI, then any PSI less than 20 or greater than 60 is considered abnormal, if it persists beyond the specified time.

8.1.5 Field 8: CURRENT VALUE

The current value for an analog sensor associated with the control point. The value is usually suction pressure for a refrigeration control point and is designated with a P. When dealing with multiple racks, the analog sensor value will be associated with the first machine. For a HVAC type refrigeration control point, the value is usually temperature in degrees Fahrenheit and is designated with an F.

8.1.6 Field 9: TARG/CUT-IN

A refrigeration control parameter. The target (TARG) value is used when controlling a refrigeration rack with Rate of Change. The target is the average suction pressure the rack is to maintain. The cut-in used when controlling a refrigeration rack with cut-in and cut-out parameters. A single compressor will be turned on, providing the minimum off time has been exceeded, when the current pressure exceeds the cut-in. A multiple rack will have additional compressors, or capacity if an uneven rack, turned on as long as the current pressure is greater than the cut-in. Once the current pressure falls below the cut-in, but prior to reaching the cut-out value, the control status of the compressors on the rack will remain unchanged. Target values and cut-in values are similar in that each parameter is associated with an entire refrigeration rack regardless of how many compressors are on the rack. The targ/cut-in value will always align with the first control point for a rack.

8.1.7 Field 10: CUT-OUT

A refrigeration control parameter. The cut-out value is an absolute cut-out value when controlling a rack using the standard cut-in and cut-out strategy. When the current pressure reaches the cut-out value, a single compressor will be turned off, providing the minimum on time has been exceeded, and compressors on a multiple rack will start to be turned off. As long as the current pressure remains below the cut-out value, the computer will continue to hold off a single compressor, and turn off additional compressors on a multiple rack until all compressors on the rack are off.

When controlling a rack using the Rate of Change strategy, the cut-out causes the EMS/Z to make an immediate action to reduce the current refrigeration capacity. For uneven racks, the number of compressors turned off depends upon the distance the current pressure is below the target pressure. For even racks, one compressor will be turned off. As long as the current pressure is less than or equal to the cut-out, the control action will be taken at 15 second intervals.

8.1.8 Field 11: SYSTEM TYPE

There are eight different System Types associated with control points. There are only four types seen in the REFRIG STATUS REPORT. They are listed below.

Refrigeration Types

- SNGL - Indicates a single compressor rack.
- MR(X) - Indicates a rack with compressors of equal BTUH capacity.
- UR(X) - Indicates a rack with compressors of unequal BTUH capacity.

In both MR(X) and UR(X), the (X) indicates the rack identification and will always be an alpha character. An (R) to the right of the refrigeration system types indicates that the rack is being controlled by Rate of Change. The absence of an (R) indicates that the rack is being controlled by conventional cut-in and cut-out.

8.1.9 Field 12: TEMP/PSI FACTORS

The temperature is the target temperature which the EMS/Z is attempting to maintain on the average in the most critical case on the rack. The PSI is the pressure offset, either positive or negative, that has been added by the EMS/Z to the original pressure target value in order to maintain the critical case temperature.

8.1.10 Field 13: TEMP SENSOR

The analog temperature sensor that is modifying the rack pressure. The temperature sensor is usually located in the refrigeration circuit having the lowest temperature requirements.

8.2 ACCESS/PROMPT

In the beginning of this section, it was noted to enter 2 'RTN' to display the REFRIG STATUS screen when prompted by the ACTION MENU. There are other methods for gaining access to the REFRIG STATUS screen.

From the ACTION MENU:

- 2 'XX'RTN' - Where XX designates the control point with which the display will begin.

From any screen prompt:

- '@2 'RTN' OR @2 'XX'RTN' - Where XX is the control point number with which the display will begin. (See the General Information section for a more detailed explanation of the @ symbol).

At the end of the REFRIG STATUS screen, the operator will be prompted with the following:

ENTER CP #, RTN FOR NEXT PAGE, OR 0 FOR MENU:

A variety of operator entries may be used.

- XX'RTN' - Displays the EXPANDED STATUS screen for control point XX. (See EXPANDED STATUS section.)
- 'RTN' - Displays the next page of refrigeration type control points. If all control points have been displayed, then the ACTION MENU will be displayed.
- 0'RTN' - Displays the ACTION MENU. (See the ACTION MENU section.)
- '@XX'RTN' - Displays the CONTROL POINT STATUS screen starting at control point XX.

A final note on the REFRIG STATUS screen. Entering DAT2'RTN' when prompted by the AUTH will display certain data from the REFRIG STATUS screens.

9.0 SWITCH OVERRIDE REPORT

To display the SWITCH OVERRIDE screen, enter 19'RTN' when prompted by the ACTION MENU.

The SWITCH OVERRIDE screen displays the last 96 switch overrides that have occurred during the past year.

Figure 11 is an example of a SWITCH OVERRIDE screen.

FIGURE 11

THU 02/15/90 TIME 1621:59				Danfoss-EMC, Inc., ZX SYSTEM SWITCH OVERRIDE				M1-M2-S1-S2-DB BUILDING #101			
Fields				1	2	3	4				
DATE	DAY	TIME	CP	DATE	DAY	TIME	CP	DATE	DAY	TIME	CP
10/31	THU	1736	AUTO55	10/31	THU	1736	DAY 53	10/29	TUE	0132	DAY 53
10/27	SUN	1316	AUTO55	10/27	SUN	1229	GARDEN54	10/29	SAT	0050	GARDE54
09/11	WED	1700	RTU585	09/04	WED	1517	PKLOT 58	10/29	MON	2335	PKLOT58
09/02	MON	2023	RTU787	09/02	MON	2023	RTU 4 84	09/02	MON	2023	RTU 383
09/02	MON	2023	RTU282	09/02	MON	2023	RTU 1 81	09/02	MON	2023	OFFICE8
09/02	MON	2023	RTU585	09/02	MON	2022	RTU 6 86	09/02	MON	0235	PKLOT58
08/08	THU	1403	OFCE80	08/08	THU	1403	AUTO 55	08/06	TUE	2350	AUTO 58
08/06	TUE	2320	OFCE80	08/01	THU	1149	OFFICE80	07/19	FRI	0202	RTU 484
07/02	TUE	0200	AREAB51	07/02	TUE	0158	DAY 53	07/02	TUE	0158	AREAC52

RTN FOR NEXT PAGE, 0 FOR MENU:

9.1 SWITCH OVERRIDE REPORT FIELDS

The following fields are found in the SWITCH OVERRIDE screen.

9.1.1 Field 1: DATE

Month and Date of Month Override took place.

9.1.2 Field 2: DAY

Day of Week Override occurred.

9.1.3 Field 3: TIME

Hour and Minute Override occurred.

9.1.4 Field 4: CP

Control Point Name of Item Placed in Override.

9.2 ACCESS/PROMPT

In the beginning of this section, it was noted to enter 19RTN' to display the SWITCH OVERRIDE screen when prompted by the ACTION MENU. There are other methods for gaining access to the SWITCH OVERRIDE screen.

From the ACTION MENU:

- 19'RTN'

From any screen prompt:

- '@19 RTN' - (See the General Information section for a more detailed explanation of the @ symbol.)

At the end of the SWITCH OVERRIDE screen, the operator will be prompted with the following:

RTN FOR NEXT PAGE, 0 FOR MENU:

A variety of operator entries may be used.

- 'RTN' - Displays the next page of switch override type control points. If all control points have been displayed, then the ACTION MENU will be displayed.
- 0 RTN' - Displays the ACTION MENU. (See the ACTION MENU section.)

10.0 CONTROL ALARMS

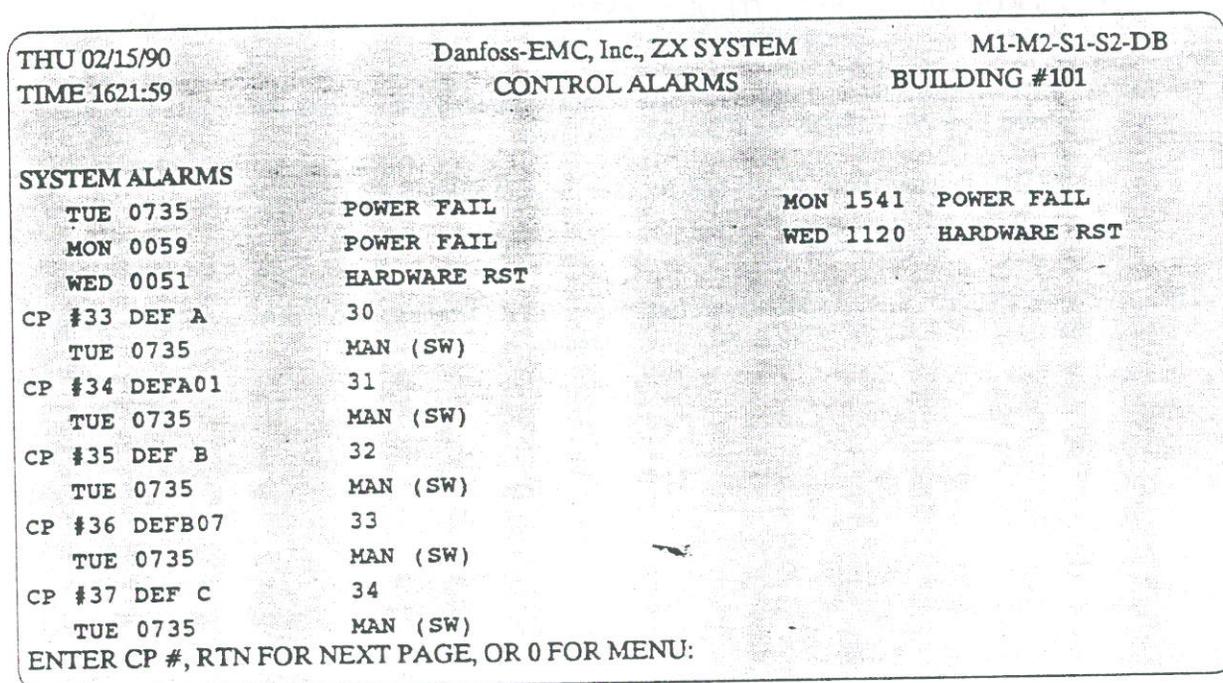
To display the CONTROL ALARMS screen, enter 3'RTN' when prompted by the ACTION MENU.

The CONTROL ALARMS (Figure 12) screen displays the current system alarms and control point alarms, along with the dates and times of their occurrence. (See Appendix C for a listing and explanation of alarms.) The EMS/Z will store up to twelve (12) system alarms and up to six (6) control point alarms for each control point.

Version 10, can store up to ten (10) alarms per control point in nonvolatile memory.

Version 10 has the capacity to display a sensor alarm where the last 4 characters displayed indicate the actual sensor alarm number and whether it was tripped from the high, the low or the cycle position of the alarm.

FIGURE 12



The newest system alarm or control point alarm is placed in the uppermost left hand position and then moves in a "Z" direction down the screen.

For Version 10 all alarms are retained for seven days and are not affected by machine resets.

10.1 ACCESS/PROMPT

In the beginning of this section, it was noted to enter 3'RTN' to display the CONTROL ALARMS screen when prompted by the ACTION MENU. There are other methods for gaining access to the CONTROL ALARMS screen.

From the ACTION MENU:

- 3 XX RTN' - Where XX designates the control point with which the display will begin.

From any screen prompt:

- '@3 RTN' - Where XX designates the control point with which the display will begin. (See the General Information section for a more detailed explanation of the @ symbol.)

At the end of the CONTROL ALARMS screen, the operator will be prompted with the following:

ENTER CP #, RTN FOR NEXT PAGE, OR 0 FOR MENU:

A variety of operator entries may be used.

- XX RTN' - Displays the CONTROL ALARMS screen status starting at control point XX. NOTE: Whenever XX = 1, the system alarms will also be displayed.
- 'RTN' - Displays the next page of control point alarms. If all control point alarms have been displayed, then the ACTION MENU will be displayed.
- 0 RTN' - Displays the ACTION MENU. (See the ACTION MENU section.)
- XX RTN' - Displays Menu item XX.

A final note on the CONTROL ALARMS screen. Entering DAT3'RTN' when prompted by the AUTH will display all the information found in the CONTROL ALARMS screens.

11.0 UTILITY REPORT

To display the UTILITY REPORT screen, enter 4'RTN' when prompted by the ACTION MENU.

The UTILITY REPORT screen (Figure 13) displays consumption and demand data for up to fifty utility meters. There are three standard units of measurement, KWH, BTU & GPM. Figure 13 represents the first UTILITY REPORT for a building. In the event that there is only one utility meter, the remaining four utility reports will be displayed with no data.

The ZX system has five utility meters as standard with the remaining coming in on NC10's.

An 8 character name is USER DEFINABLE and appears above 'THIS MONTH' (where the 'X's appear in Figure 13).

FIGURE 13

THU 02/15/90		Danfoss-EMC, Inc., ZX SYSTEM				M1-M2-S1-S2-DB			
TIME 1621:59		UTILITY REPORT 1				BUILDING #101			
KWH		KWH		KWH		XXXXXXXX			
HOUR	TODAY	YESTERDAY	HOUR	TODAY	YESTERDAY		THIS	LAST	
							MONTH	MONTH	
0000	12	12	1200	0	36				
0100	12	10	1300	0	36	KWH	59829	0	
0200	12	12	1400	0	36	PEAK DAY	16	0	
0300	12	12	1500	0	34	PEAK TIME	1322	0000	
0400	12	12	1600	0	34	PEAK 30 MIN	20	0	
0500	14	12	1700	0	28	LAST 30 MIN	10		
0600	20	16	1800	0	24		THIS	LAST	
0700	26	22	1900	0	18	DAILY	WEEK	WEEK	
0800	34	32	2000	0	12	SUN	276	274	
0900	8	34	2100	0	12	MON	510	526	
1000	0	34	2200	0	12	TUE	510	538	
1100	0	36	2300	0	10	WED	536	530	
			TOTAL	162	36	THU	162	552	
						FRI	524	364	
						SAT	324	356	
							MULT: 2.000		

PEAKS
0907 18
1144 20

RETURN FOR NEXT PAGE, OR 0 FOR MENU:

NOTE: 'WEEK OF KWH' on lower right of screen may be selected in the database as DAILY or THIS WEEK/LAST WEEK.

11.1 UTILITY REPORT FIELDS

The following information is found in the UTILITY REPORT screen.

11.1.1 KWH (BTU, GPM)

The total kilowatt (KWH) for today and yesterday by hour. Each day at midnight, the previous day's data is moved to yesterday's and today's hours are zeroed out.

11.1.2 PEAKS

Today's and yesterday's peaks. The peak is a sliding window from 1 to 30 minutes as set up during database preparation. The numbers reflect peak demand by minute for the window, i.e., if the peak is 102 and the window is 30 minutes, the KWH would be 204, if the demand stayed constant for the next 30 minutes.

11.1.3 TOTALS - MONTHLY

Reflects total KWH for previous month and includes peak demand day and time and KWH figures. The current 30 min. demand is shown for reference.

11.1.4 TOTALS - WEEKLY

Reflect totals for current and previous week. Set at midnight, the data is swapped with the current week being zeroed out.

11.1.5 TOTALS - DAILY

In Version 10 the daily or weekly totals may be specified when the database is built.

11.1.6 MULT

This field is the meter multiplier, which is defined in the database.

$$\text{KWH}(\text{current hour}) = \text{KWH}(\text{current hour}) + (\text{new pulse} \times \text{mult})$$

Utility Meter 1 can be selected in the database to roll into Utility 2, then into #3, then into #4, and then into #5, which is defined in the database.

11.2 ACCESS/PROMPT

In the beginning of this section, it was noted to enter 4'RTN' to display the UTILITY REPORT screen when prompted by the ACTION MENU. There are other methods for gaining access to the UTILITY REPORT screen.

From the ACTION MENU:

- 4 X RTN' - Where X designates the utility report number.

From any screen prompt:

- '@4 X RTN' - Where X designates the utility report number. (See the General Information section for a more detailed explanation of the @ symbol.)

At the end of the UTILITY REPORT screen, the operator will be prompted with the following:

RTN FOR NEXT PAGE, OR 0 FOR MENU:

12.0 HVAC STATUS REPORT

To display the HVAC STATUS REPORT screen, enter '5'RTN' when prompted by the ACTION MENU.

The HVAC STATUS REPORT is similar to the REFRIG STATUS REPORT, except that HVAC sensors are displayed, not case temperature sensors, and HVAC system type control points are displayed, not refrigeration system type control points. Figure 14 shows a typical HVAC STATUS REPORT.

FIGURE 14

THU 02/15/90		Danfoss-EMC, Inc., ZX SYSTEM				M1-M2-S1-S2-DB					
TIME 1621:59		HVAC STATUS				BUILDING #101					
SENSOR NAME CURR AVG		SENSOR NAME CURR AVG		SENSOR NAME CURR AVG							
FIELDS 1A		1B		1C							
30	INSD TMP	71.0F	71	31	OTSD TMP	41.0F	41	22	HUMIDITY	47.0%	47
21	SPLY AIR	79.0F	80	29	STCK TMP	61.5F	61	9	MTCT TMP	51.5F	51
2	3	4	5	6	7	8	9	10	11	12	
CP #	NAME	STATUS	CURR VAL	TARG/ CUTIN	CUT OUT	SYSTEM TYPE	COND #	RUN HOURS			
9	MTCT	OFF X	51.5F			HVAC	# 19	T 111			
21	AHU	ON	79.0F			HVAC	# 17	T 261			
22	COOL1	OFF				HVAC	# 1	F 0			
23	COOL2	OFF				HVAC	# 1	F 0			
24	HTRC1	ON				HVAC	# 6	T 256			
25	HTRC2	ON				HVAC	# 7	T 255			
26	HTRC3	ON				HVAC	# 8	T 255			
27	EDH 1	OFF				HVAC	# 12	F 0			
28	EDH 2	OFF				HVAC	# 12	F 0			
29	EDH 3	OFF				HVAC	# 12	F 0			
30	EDH 4	OFF				HVAC	# 12	F 0			

ENTER CP #, RTN FOR NEXT PAGE, OR 0 FOR MENU:

12.1 HVAC STATUS REPORT FIELDS

The following fields are found in the HVAC STATUS REPORT screen.

12.1.1 Fields 1A, B & C

Analog sensors, which can be temperature, pressure or humidity are displayed with their current value and last hour's average.

12.1.2 Field 2: CP

The control point number. The EMS/Z can have up to 384 control points. In many instances there are control points designated as "dummy control points". These control points are not real (true) outputs for control, but are utilized by the database for other functions.

12.1.3 Field 3: NAME

The eight character name for the true or dummy control point.

12.1.4 Fields 4-7: STATUS

These four fields indicate on/off and control status of the control point.

Fields 4 & 5 Monitor/control status.

- ON - Indicates the controlled device is on.
- OFF - Indicates the controlled device is off.
- ON X - Indicates that there is no monitor for the control point and the computer is calling for the control to be on.
- OFF X - Indicates that there is no monitor for the control point and the computer is calling for the control point to be off.

Field 6: CONTROL PT. SWITCH STATUS:

BLANK OR S: Blank indicates the control point switch is in computer control. S indicates that the control point switch is not in computer control. The switch can either be manual on or manual off. In either case, on/off actions by the computer will not be carried out.

Field 7: SOFTWARE CONTROL STATUS

Blank indicates that the control point is in computer control. On/off actions as determined by the software will be carried out.

- (ON) - Indicates that the control point is software manual ON. On/off actions by the computer will not be carried out.
- (OFF) - Indicates that the control point is software manual OFF. On/off actions by the computer will not be carried out.

12.1.5 Field 8: CURRENT VALUE

The current value for an analog sensor associated with the control point. The value is usually suction pressure for a refrigeration control point and is designated with a P. When dealing with multiple racks, the analog sensor value will be associated with the first machine. For HVAC, the value is usually temperature in degrees Fahrenheit and is designated with an F. A blank field indicates no associated analog sensor point.

12.1.6 Field 9: TARG CUT-OUT / CUT-IN

A refrigeration control parameter. These parameters are not used in HVAC applications.

A variety of operator entries may be used.

- 'RTN' - Displays the next UTILITY REPORT page. If all UTILITY REPORT pages have been displayed, then the ACTION MENU will be displayed.
- O RTN' - Displays the ACTION MENU. (See the ACTION MENU section.)
- '@XX RTN' - Displays Menu item XX.

A final note on the UTILITY REPORT screen. Entering DAT4'RTN' when prompted by the AUTH will display all current data from the five UTILITY REPORT screens.

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12.1.7 Field 10: SYSTEM TYPE

There are nine different System Types associated with control points. There are usually only four types normally seen in the HVAC STATUS REPORT, as listed below.

- HVAC - Indicates a HVAC type control point controlled by schedules and conditions.
- NC10 - An NC10 type point can be considered to be similar to an ATC type point. The NC10 point will always be a real control point but may or may not be tied to an actual switch. The NC10 type control point is used to define an NC10 with a specific address and various configurations of analog inputs, analog outputs, digital inputs, digital outputs, etc.
- NC25 - An NC25 type point resides on an NC25. Control is being executed by the NC25 with data such as on/off status, last on/last off, etc being retrieved from the NC25. Only the name of this type of control point can be changed.
- MOTOR CONTROL - This will show up on the display screen as MTR CNTRL. The Motor Control, at present, can be either an MC1, MC2, or the old type motor control board. The old type motor control board connects directly to the CPU using digital outputs and analog inputs, while the MC1 and MC2 will be controlled directly via an NC10.

12.1.8 Field 11: CONDITION

The condition number that points to the control point and current value - true (T) or false (F). Conditions associated with refrigeration system types will usually effect the control parameter values, while conditions associated with HVAC or lighting system types will usually have to be true before the computer will turn on the control points. A blank field indicates that there is no condition associated with the control point. (See the CONDITIONS LIST section for a more detailed explanation.)

12.1.9 Field 12: RUN HOURS

Used as a maintenance hour log. Run hours are incremented based on a monitor input. However, when no monitor input exists, run hours are incremented based on the EMS/Z control output (See EXPANDED STATUS Section for a detailed explanation). Run hours can be zeroed for a new maintenance cycle. (Run hours are accumulated by day and rounded to lowest hour.)

12.2 ACCESS/PROMPT

In the beginning of this section, it was noted to enter 5"RTN" to display the HVAC STATUS REPORT screen when prompted by the ACTION MENU. There are other methods for gaining access to the HVAC STATUS REPORT screen.

From the ACTION MENU:

- 5 XX RTN' - Where XX designates the control point with which the display will begin.

From any screen prompt:

- '@5 RTN - Where XX is the control point with which the display will begin. (See the General Information section for a more detailed explanation of the @ symbol.)

At the end of the HVAC STATUS REPORT screen, the operator will be prompted with the following:

ENTER CP #, RTN FOR NEXT PAGE, OR 0 FOR MENU:

A variety of operator entries may be used.

- **XX RTN'** - Displays the EXPANDED STATUS for control point XX.
- **'RTN'** - Displays the next HVAC STATUS REPORT page. If all the HVAC control points have been displayed, then the ACTION MENU will be displayed.
- **0 RTN'** - Displays the ACTION MENU. (See the ACTION MENU section.)
- **'@XX RTN'** - Displays Menu item XX.

A final note on the HVAC STATUS REPORT screen. Entering DAT5'RTN' when prompted by the AUTH will display certain data from the HVAC STATUS REPORT screen.

13.0 CONDITIONS LIST

NOTE: For more detailed information, please refer to the documentation describing the Danfoss-EMC Programming Processor in the Database Preparation Manual (Build) documentation.

To display the CONDITIONS LIST screen, enter 'RTN' when prompted by the ACTION MENU.

The CONDITIONS LIST can be used for numerous purposes in the EMS/Z. However, there are two principal uses:

- The conditions are used to turn a control point on or off as in the case with HVAC control points and photocell controlled lighting points.
- The conditions can be used to add or subtract a value to a control parameter, such as a target value in the case of refrigeration control points.

Version 10 allows a Sensor Alarm to use a condition, thus providing almost unlimited ability for Sensor Alarms.

Figures 15 & 16 show the first two pages of a CONDITIONS LIST.

FIGURE 15 1ST PAGE

THU 02/15/90 TIME 1621:59		Danfoss-EMC, Inc., ZX SYSTEM CONDITIONS LIST		M1-M2-S1-S2-DB BUILDING #101
Fields 1	2	3	4	5
NUMBER	BOOLEAN	SENSOR OR SCHEDULE	VALUE	C.P ASSOCIATION
1	F	LOGIC COND # 2		COOL1 COOL2
	or	LOGIC COND # 3		
	or	LOGIC COND # 5		
2		SCHEDULE GROUP # 97		NESTED
		0700 1900 S 1		
		0600 2200 MTWRFA 234567		
	and	(INSD TMP AIN [71.0]		
	>=	CONSTANT [76.0])	
3		LOGIC COND # 4		NESTED
	and	(INSD TMP AIN [71.0]		
	>=	CONSTANT [72.0])	

CHANGE Y/RTN/CONDITION #:

FIGURE 16 2ND PAGE

THU 02/15/90		Danfoss-EMC, Inc., ZX SYSTEM		M1-M2-S1-S2-DB	
TIME 1621:59		CONDITIONS LIST		BUILDING #101	
NUMBER	BOOLEAN	SENSOR OR SCHEDULE	VALUE	C.P. ASSOCIATION	
4		SCHEDULE GROUP #	97	NESTED	
		0700 1900 S	1		
		0600 2200 MTWRFA	234567		
	and	(OTSD TMP AIN	[11.5]		
	>=	CONSTANT	[70.0])	
				NESTED	
5		SCHEDULE GROUP #	98		
		0658 1855 S	1		
		0558 2155 MTWRFA	234567		
	and	(HUMIDITY AIN	[20.5]		
	>=	CONSTANT	[50.0])	
				HTRC1-73	
6	T	SCHEDULE GROUP #	99		
		0005 0008 *** ALL DAYS ***			
	or	CONDITION #	9		

CHANGE Y/RTN/CONDITION #:

How do conditions interface with control points? Within the CONTROL POINT STATUS screen is a heading marked COND # with a true (T) or false (F) value. Normally, whenever a control point has a condition associated with it, the condition must be true before the control point may be turned on by the computer. In Figure 15, Condition 1 must be true in order for the computer to turn on COOL1 and COOL2. In some instances, usually the lighting control points, there will be a schedule and a condition associated with the control point. In these instances, when the database is generated, it is specified whether both (this is an AND) or either (this is an OR) the condition or the schedule being true will allow the EMS/Z to turn a control point on.

Each condition can be comprised of several parts, each known as a statement. The statements are logically bound by a Boolean operator. The Boolean operator determines which statement(s) must be true for the condition to be true.

13.1 CONDITIONS LIST FIELDS

The following fields are found in the CONDITIONS LIST screen.

13.1.1 Field 1: NUMBER

The condition number and its current true/false, (T or F) will be displayed if this is the main condition and not a nested condition. If the condition is nested, the word "nested" will appear and the T or F indicator will only show on the main condition.

13.1.2 Field 2: BOOLEAN

The Boolean operator is what binds the statements of the condition together and indicates which of the statements must be true. For a condition to be true, that uses an "OR" only one of the statements linked together by "OR" must be true for the condition to be true. It is very important to note how parentheses segment the various statement and the Boolean operators within a condition. The Boolean operator ties the previous statement above to the adjacent statement, i.e., in Figure 15, Condition 1 has 3 statements: Conditions 2, 3 & 5. In order for the condition #1 to be true:

Condition 2 MUST BE TRUE
OR
Condition 3 MUST BE TRUE
OR
Condition 5 MUST BE TRUE.
Condition 3 represents an "AND" statement.
Condition 4 MUST BE TRUE
AND
inside temp MUST BE greater than or equal to 72 degrees.

The $> =$ symbol means greater than or equal to, and the $< =$ symbol means less than or equal to. These two symbols are commonly found throughout the conditions statements.

13.1.3 Field 3: SENSOR or SCHEDULE

The sensor or schedule group or other value of conditions comprising the statement.

13.1.4 Field 4: VALUE

Analog sensor's current value, digital sensor's on/off value.

13.1.5 Field 5: C.P. ASSOCIATION

The control point which the condition will be affecting. Nesting indicates that the condition is used by another condition as a statement. Conditions 2 and 3 are nested to Condition 1 in Figure 15.

13.2 NESTING

The following example should help the operator to understand the concept of nesting. For COOL1 and COOL2 to be turned on:

Condition 2 must be true, which states that the time must be satisfied within the schedule group and the inside temperature must be greater than or equal to 76 degrees OR Condition 3 must be true which states that Condition 4 must be true, i.e., the time must be satisfied by schedule group #97 and the outside temperature must be greater than or equal to 70 degrees, AND the inside temperature must be greater than or equal to 72 degrees OR Condition 5 must be true which states that the time must be satisfied by schedule group #98 and the humidity in the store must be greater than or equal to 50.0%.

Another way to view the same set of conditions would be as follows:

(time and inside temp > = 76 degrees)
OR
(time and outside temp > = 70 degrees and inside temp > = 72 degrees)
OR
(time and humidity > = 50%)

13.3 ACCESS/PROMPT

In the beginning of this section, it was noted to enter 6'RTN' to display the CONDITIONS LIST screen when prompted by the ACTION MENU. There are other methods for gaining access to the CONDITIONS LIST screen.

From the ACTION MENU:

- 6 XX RTN' - Where XX designates the condition where the display begins.

From any EXPANDED STATUS:

- C RTN' - Displays the logical rather than numerical order of the conditions associated with that control point as they affect the control point. Any condition not used in that control point will not be displayed.

From any screen prompt:

- '@6 XX RTN' - Where XX designates the condition with which the display will begin. (See the General Information section for a more detailed explanation of the @ symbol.)

At the end of the CONDITIONS LIST screen, the operator will be prompted with the following:

CHANGE Y/RTN/CONDITION # :

A variety of operator entries may be used.

- Y RTN' - Allows the operator to change a constant value in the condition. (See CONDITIONS LIST change section.)
- RTN' - Displays the next page of conditions. If all the conditions have been displayed, then the ACTION MENU will be displayed.
- XX RTN' - Displays a page of conditions starting with condition XX.
- O RTN' - Displays the ACTION MENU. (See the ACTION MENU section.)
- '@XX RTN' - Displays Menu item XX.

A final note on the CONDITIONS LIST screen. Entering DAT6 RTN' when prompted by the AUTH will display all the CONDITIONS LIST screens.

14.0 SENSOR AVERAGES

To display the SENSOR AVERAGES screen, enter 10'RTN' when prompted by the ACTION MENU.

The SENSOR AVERAGES screen will display the average of the past 24 hours for each sensor associated with the HVAC STATUS REPORT.

Figure 17 represents the SENSOR AVERAGES screen for Sensor #1, inside temperature, of the HVAC STATUS REPORT.

FIGURE 17

THU 02/15/90		Danfoss-EMC, Inc., ZX SYSTEM				M1-M2-S1-S2-DB	
TIME 1621:59		SENSOR AVERAGES 1				BUILDING #101	
AVERAGE VALUES FOR SENSOR #30, INSD TMP, FOR LAST 24 HOURS							
hour	value	hour	value	hour	value	hour	value
2100	66	1500	71	0900	69	0300	66
2000	71	1400	70	0800	68	0200	66
1900	71	1300	71	0700	66	0100	66
1800	71	1200	70	0600	66	0000	66
1700	71	1100	70	0500	66	2300	66
1600	71	1000	70	0400	66	2200	66
MAX 08/04 TUE 1423 71				MIN 08/04 TUE 1407 65.8			
RETURN FOR NEXT PAGE, OR 0 FOR MENU:							

Each sensor for the HVAC STATUS screen is numbered starting at the first line, the far left position. In a repeat of the HVAC STATUS REPORT, Figure 18 shows that temperature average #1 is 30 - INSD TMP, #2 is 31 - OTSD TMP, #3 is 22 - Humidity, #4 is 21 - SPLY AIR etc.

Additional averages may be requested. They are entered through the database preparation process.

FIGURE 18

THU 02/15/90		Danfoss-EMC, Inc., ZX SYSTEM				M1-M2-S1-S2-DB		
TIME 1621:59		HVAC STATUS				BUILDING #101		
SENSOR NAME		CURR	AVG	SENSOR NAME		CURR	AVG	
30	INSD TMP	71.0F	71	31	OTSD TMP	41.0F	41	
21	SPLY AIR	79.0F	80	29	STCK TMP	61.5F	61	
				22	HUMIDITY	47.0%	47	
				9	MTCT TMP	51.5F	51	
CP #	NAME	STATUS	CURR VAL	TARG/ CUTIN	CUT OUT	SYSTEM TYPE	COND #	RUN HOURS
9	MTCT	-09 OFF X	51.5F			HVAC	# 19 T	111
21	AHU	ON	79.0F			HVAC	# 17 T	261
22	COOL1	OFF				HVAC	# 1 F	0
23	COOL2	OFF				HVAC	# 1 F	0
24	HTRC1	ON				HVAC	# 6 T	256
25	HTRC2	ON				HVAC	# 7 T	255
26	HTRC3	ON				HVAC	# 8 T	255
27	EDH 1	OFF				HVAC	# 12 F	0
28	EDH 2	OFF				HVAC	# 12 F	0
29	EDH 3	OFF				HVAC	# 12 F	0
30	EDH 4	OFF				HVAC	# 12 F	0

ENTER CP#, RTN FOR NEXT PAGE, OR 0 FOR MENU:

14.1 ACCESS/PROMPT

In the beginning of this section, it was noted to enter 10'RTN' to display the SENSOR AVERAGES screen when prompted by the ACTION MENU. There are other methods for gaining access to the SENSOR AVERAGES screen.

From the ACTION MENU:

- 10 XX RTN' - Where XX is the sensor location in the HVAC STATUS screen.

From any screen prompt:

- '@10 XX RTN' - Where XX is the sensor location in the HVAC STATUS screen. (See the General Information section for a more detailed explanation of the @ symbol.)

At the end of the SENSOR AVERAGES screen, the operator will be prompted with the following:

ENTER CP #, RTN FOR NEXT PAGE, OR 0 FOR MENU:

- RTN' - Displays the next temperature average. If they have all been displayed, then the ACTION MENU is displayed.

- **0 RTN'** - Displays the ACTION MENU. (See the ACTION MENU section.)
- **XX RTN'** - Displays the SENSOR AVERAGES screen for sensor XX, where XX is the sensor location in the HVAC STATUS screen.
- **'@XX RTN'** - Displays Menu item XX.

A final note on the SENSOR AVERAGES screen. Entering DATA'RTN' when prompted by the AUTH will display all the SENSOR AVERAGES screens.

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15.0 DIGITAL SENSOR REPORT

To display the DIGITAL SENSORS screen, enter 13'RTN' when prompted by the ACTION MENU.

The DIGITAL SENSORS screen displays up to 48 digital sensors per screen along with their current value (on or off) as seen in Figure 19.

*NOTE: If the information for the particular digital sensor is coming from a Network Control device there will be an * displayed immediately following the digital sensor number on the display screen. If the Network Control device that the digital sensor is coming from is currently in failure mode there will be a second * following the digital sensor number.*

FIGURE 19

THU 02/15/90 TIME 1621:59			Danfoss-EMC, Inc., ZX SYSTEM DIGITAL SENSORS			M1-M2-S1-S2-DB BUILDING #101		
NO	NAME	VALUE	NO	NAME	VALUE	NO	NAME	VALUE
1	SYSA1	OFF	17	OPMON D2	OFF	33	DEF A 30	OFF
2	SYSA2	ON M	18	SPARE	OFF	34	DEFA0131	OFF
3	SYSB1	OFF	19	SPARE	OFF	35	DEF B 32	OFF
4	SYSB2	ON	20	SPARE	OFF	36	DEFB0733	OFF
5	SYSC1	OFF	21	AHU	ON	37	DEF C 34	OFF
6	SYSC2	ON	22	COOL1	OFF	38	DEFC1335	OFF
7	SYSD1	ON	23	COOL2	OFF	39	DEF D 36	OFF
8	SYSD2	ON	24	HTRC1	ON	40	DEFD1737	OFF
9	SPARE	OFF	25	HTRC2	ON	41	SPARE	OFF
10	OPMON A1	OFF	26	HTRC3	ON	42	DEFA0238	OFF
11	OPMON A2	OFF	27	EDH 1	OFF	43	DEFA0239	OFF
12	OPMON B1	OFF	28	EDH 2	OFF	44	DEFA0440	OFF
13	OPMON B2	OFF M	29	EDH 3	OFF	45	DEFA0541	OFF
14	OPMON C1	OFF	30	EDH 4	OFF	46	DEFA0642	OFF
15	OPMON C2	OFF	31	UNTHT	OFF	47	DEFA0843	OFF
16	OPMON D1	OFF	32	SPARE	OFF	48	DEFB1044	OFF

CHANGE = Y/SENSOR #/NEXT PAGE = RTN/0 = MENU:

In the event a sensor has been placed in a manual mode, an M will appear next to the value as is the case with Sensors #2 & #13 in Figure 19.

15.1 ACCESS/PROMPT

In the beginning of this section, it was noted to enter 13'RTN' to display the DIGITAL SENSORS screen when prompted by the ACTION MENU. There are other methods for gaining access to the DIGITAL SENSORS screen.

From the ACTION MENU:

- 13 XX'RTN' - Where XX indicates the sensor with which the display will begin.

From any EXPANDED STATUS:

- D RTN' or D XX RTN' - Where XX indicates the sensor with which the display will begin. Entering D'RTN' will start the display with the digital sensor associated with the EXPANDED STATUS control point.

From any screen prompt:

- '@13 XX RTN' - Where XX indicates the sensor with which the display will begin. (See the General Information section for a more detailed explanation of the @ symbol.)

At the end of the DIGITAL SENSOR REPORT screen, the operator will be prompted with the following:

CHANGE = Y/SENSOR #/NEXT PAGE = RTN/0 = MENU:

A variety of operator entries may be used.

- Y RTN' or XX Y RTN' - Displays the change screen for the first sensor on the screen or sensor XX.
- XX RTN' - Where XX indicates the sensor with which the display will begin.
- RTN' - Displays the next page of digital sensors. If they have all been displayed, then the ACTION MENU is displayed.
- 0 RTN' - Displays the ACTION MENU except when the operator reached the screen from an EXPANDED STATUS screen. Then the 0 places the operator back into the EXPANDED STATUS screen.
- '@XX RTN - Displays Menu item XX.

A final note on the DIGITAL SENSORS screen. Entering DATD'RTN' when prompted by the AUTH will display all digital sensors and their current values.

16.0 ANALOG SENSOR REPORT

To display the ANALOG SENSORS screen, enter 14'RTN' when prompted by the ACTION MENU.

The ANALOG SENSORS screen displays up to 48 analog sensors per screen along with their current values as seen in Figure 20.

*NOTE: If the information for the particular analog sensor is coming from an Network Control device there will be an * displayed immediately following the analog sensor number on the displayed screen. If the Network Control device that the analog sensor is coming from is currently in failure mode, there will be a second * following the analog sensor number.*

If the analog is a 'false' analog, that is its value is developed by executing a condition statement, there will be a + displayed immediately following the analog sensor number.

FIGURE 20

THU 02/15/90		Danfoss-EMC, Inc., ZX SYSTEM				M1-M2-S1-S2-DB		
TIME 1621:59		ANALOG SENSORS				BUILDING #101		
NO	NAME	VALUE	NO	NAME	VALUE	NO	NAME	VALUE
1	RACK A	44.0P	17	PRBX T11	33.0F	33	SPARE	0.0
2	MTCS T01	23.5F	18	ICRM T14	-18.0F	34	SPARE	0.0
3	RACK B	43.0P	19	FZJC T15	-18.0F	35	SPARE	0.0
4	MTBX T07	36.5F	20	FZDT T16	-13.0F	36	SPARE	0.0
5	RACK C	8.0P	21	SPLY AIR	79.5F	37	SPARE	0.0
6	ICRM T13	-20.5F	22	HUMIDITY	46.5%	38	SPARE	0.0
7	RACK D	11.0P	23	FZDN T18	3.0F	39	SPARE	0.0
8	FZDN T17	12.5F	24	FZPO T20	-11.0F	40	SPARE	0.0
9	MTCT TMP	52.5FM	25	FZPO T20	3.5F	41	SPARE	0.0
10	MTCS T02	23.0F	26	FZFH T21	-4.0F	42	SPARE	0.0
11	DYCS T03	29.0F	27	FZBX T22	-10.5F	43	SPARE	0.0
12	DYCS T04	31.0F	28	DLCS T23	32.5F	44	SPARE	0.0
13	CHEZ T05	33.0F	29	STCK TMP	62.0FM	45	SPARE	0.0
14	DLCS T06	31.0F	30	INSD TMP	71.0F	46	SPARE	0.0
15	HDBX T08	28.5F	31	OTSD TMP	41.0F	47	SPARE	0.0
16	DYBX T10	34.0F	32	FZFH T24	-11.0F	48	SPARE	0.0

CHANGE = Y/ANALOG #/NEXT PAGE - RTN/0 = MENU:

In the event a sensor has been placed in the manual mode, an M will appear next to the value. (See inputs #9 and #29.) The value will not change. Only when the sensor point is placed back into computer control will the EMS/Z read the true analog value being sent back by the sensor.

16.1 ACCESS/PROMPT

In the beginning of this section, it was noted to enter 14'RTN' to display the ANALOG SENSORS screen when prompted by the ACTION MENU. There are other methods for gaining access to the ANALOG SENSORS screen.

From the ACTION MENU:

- 14 XX RTN' - Where XX designates the analog sensor with which the display will begin.

From any EXPANDED STATUS:

- A RTN' or A XX RTN' - Where XX designates the analog sensor with which the display will begin. Entering A'RTN' will start the display with the sensor associated with the EXPANDED STATUS control point.

From any screen prompt:

- '@14 RTN' or @14 XX'RTN' - where XX designates the analog sensor with which the display will begin. (See the General Information section for a more detailed explanation of the @ symbol.)

At the end of the ANALOG SENSORS screen, the operator will be prompted with the following:

CHANGE = Y/ANALOG #/NEXT PAGE = RTN/O = MENU:

A variety of operator entries may be used.

- Y RTN' or XX Y RTN' - Displays the change screen for the first sensor on the screen or sensor XX.
- XX RTN' - Indicates the sensor with which the display will begin.
- RTN' - Displays the next page of analog sensors. If they have all been displayed, then the ACTION MENU is displayed.
- O RTN' - Displays the ACTION MENU except when the operator reached the screen from an EXPANDED STATUS screen. Then the O places the operator back into the EXPANDED STATUS screen.
- '@XX RTN' - Displays Menu item XX.

A final note on the ANALOG SENSORS screen. Entering DATE'RTN' when prompted by the AUTH will display all analog sensors and their current values.

17.0 SENSOR ALARM REPORT

To display the SENSOR ALARMS, enter '15'RTN' when prompted by the ACTION MENU.

The SENSOR ALARMS screen is similar in nature to the SYSTEM CONTROL ALARMS. However, they differ in that they are user defined. The system holds up to 384 different sensor alarms based on switch, digital & analog inputs or conditions. Figure 21 is an example of a SENSOR ALARMS screen.

FIGURE 21

THU 02/15/90		Danfoss-EMC, Inc., ZX SYSTEM			M1-M2-S1-S2-DB	
TIME 1621:59		SENSOR ALARMS			BUILDING #101	
Fields 1	2	2a	3	4	5	6 7
#	SENSOR	CATEGORY	PROG VALUES	COND	CURR VAL	ACTION OCCURRED
1	AI 8 SYSA 08	P >	22.0/0115	1/F		ALM
		P <	3.0/0030			ALM
2	AI 62 ICRM TA1	F >	0.0/0045		3.0/0002	CRIT
		F <	-30.0/0100			LOG
3	AI 63 ICRM TA2	F >	0.0/0115			ALM THU 0309
		F <	-30.0/0100			LOG
4	SW 1 SYS A 01	ON >	0320		0255	ALM
		CYC >	4/0015		0/0007	ALM
5	DI 38 HTRC 3/1	ON >	0010			CRIT
6	DI 14 DEF A 01	ON >	0110			LOG
		OFF >	1300		0131	LOG WED 2121

CHANGE = Y/ALM #/NEXT PAGE = RTN/O = MENU:

17.1 SENSOR ALARM REPORT FIELDS

The following fields are found in the SENSOR ALARMS screen.

17.1.1 Field 1: SENSOR

This field consists of an identifier of the sensor as follows:

- AI - For Analog sensor alarms. This alarm will trip when the specified analog input exceeds its specified range for a specified time period.

- DI - For Digital sensor alarms. This alarm will trip when the specified digital input is on or off longer than its specified time period or if it has cycled more than its specified amount. Hi indicates alarm for ON greater than time period, low indicates alarm for OFF greater than time period.
- CN - For Condition alarms. This alarm will trip when the condition specified (as sensor alarm #) is true or false longer than its specified time period or if it has cycled more than its allotted amount. Hi indicates true condition, low indicates false condition.
- SW - Switch alarms will trip when the control point specified is switched out of computer control past its specified time period, or if it has cycled more than its allotted amount.

17.1.2 Field 2: CATEGORY

This field has four possible entries:

Single character denoting the type of analog value, such as:

- % - Indicates humidity.
- F - Indicates temperature for an analog.
- P - Indicates pressure for an analog.
- ON - Indicates on value for a digital, switch or condition.
- OFF - Indicates off value for a digital, switch or condition.
- CYC - Indicates cycling from on to off or off to on state.

17.1.3 Field 2a:

Type of test being performed.

- '>' - Indicates greater than.
- '<' - Indicates less than.

17.1.4 Field 3: PROG VALUES

Program Values. The parameters on which an alarm is based. For a SW or DI, there will only be a time value. P, F or % will have a set point in pressure, temperature or percent and a time value, see #2 in Figure 21.

17.1.5 Field 4: COND

Enable condition (See SENSOR ALARMS change screen for more details). The condition # will display along with its result.

17.1.6 Field 5: CUR VAL

Current Values. Once the alarm condition becomes true, a current PSI or temperature, or number of cycles will display with a counter. As long as the alarm parameters are true, the current values will track these figures. At each alarm interval, as defined in the program values, the counter will reset to zero. If an alarm becomes true, the alarm actions will take place.

17.1.7 Field 6: ACTION (ACT)

- REPT - Repeating. When a repeating alarm is requested, the system will continue to dial out for as long as the alarm exists and the minimum time between alarms is satisfied.
- CRIT - Critical alarm. A system alarm will be generated causing the EMS/Z to generate an outbound telephone call. Different than the ALM alarm a critical alarm will continue to generate additional outbound telephone calls if the alarm reoccurs. It should be noted that the alarm must go false and come true again for this to occur. If it remains true, no new system alarm/dial out will be generated.
- ALM - Alarm. A system alarm will be generated causing the EMS/Z to generate an outbound telephone call. This alarm will cause a dial out until it has reached the appropriate telephone numbers and will not redial out the same alarm unless someone has called into the system and cleared the alarm by doing a DAT(X). Where X is a specific collect function.
- ALT - Alert. In Version 10, the alarm will go to a local printer which is located on the ZX port.
- LOG - log. The EMS/Z will log the day and time the event occurred.

17.1.8 Field 7: OCCURRED

The last day and time the sensor alarm became true.

Below are some examples of Sensor Alarms from Figure 21.

Example #1 - Analog input Temperature sensor alarm. For an ice cream display, the alarm will start a countdown when the temperature becomes greater than 0 degrees and the event will be logged if the temperature stays above 0 degrees for 45 minutes. The current temperature is 3 degrees and has been above 0 degrees for 2 minutes.

Example #2 - Switch alarm for control point. Sensor #1, named SYSA1-01, is compressor 1 on rack A. There are two categories with associated program values.

- ON 320 ALM - Indicates that if the switch for CP #1 is taken out of computer control for more than 3 hours 20 minutes, an alarm will be generated and the EMS/Z will dial out.
- CYC 4/0015 ALM - Indicates that if the switch is taken from computer control (off) to a manual position (on) more than four times in 15 minutes, an alarm will be generated and the EMS/Z will dial out.

17.2 ACCESS/PROMPT

In the beginning of this section, it was noted to enter 15'RTN' to display the SENSOR ALARMS screen when prompted by the ACTION MENU. There are other methods for gaining access to the SENSOR ALARMS screen.

From the ACTION MENU:

- 15 XX'RTN' - Where XX designates the sensor alarm number with which the display will begin.

From any screen prompt:

- '@15'RTN' - or '@15 XX'RTN' - Where XX designates the sensor alarm number with which the display will begin. (See the General Information section for a more detailed explanation of the @ symbol.)

At the end of the SENSOR ALARMS screen, the operator will be prompted with the following:

CHANGE = Y/ALM #/NEXT PAGE = RTN/0 = MENU:

A variety of operator entries may be used.

- Y RTN' or XX Y RTN' - Displays the change screen for the first alarm on the screen or alarm XX.
- XX RTN' - Displays the SENSOR ALARMS screen starting with alarm XX.
- RTN' - Displays the next page of sensor alarms. If they have all been displayed, then the ACTION MENU will be displayed.
- O RTN' - Displays the ACTION MENU. (See the ACTION MENU section.)
- '@XX RTN' - Displays Menu item XX.

A final note on the SENSOR ALARMS screen. Entering DATF RTN' when prompted by the AUTH will display all the sensor alarms.

SECTION 3
CHANGE SCREENS

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18.0 GENERAL INFORMATION

Below are some general rules that apply to nearly all the change screens.

18.1 DATA BASE CHANGED

One data item will appear at a time. The line will contain the description of the data item, its current setting, followed by the 'change' prompt and then the change line.

18.2 ENTRY LIMITS

Whenever there is a prompt for data, a line will be displayed that is the length of the total number of characters which may be entered although not all of these spaces need to be used. However, any entries beyond the limit will not be entered as data. Typically, there are restrictions for data inputs, other than "Names". If unacceptable input is entered, the entry will be erased and the prompt will be repeated until a correct value is entered.

18.3 UNCHANGED DATA

There are many instances when not all the data within a change screen needs to be altered. By entering 'RTN' at the change prompt, the next data change prompt will be displayed. Thus, through the use of the Return key, the operator can change only those parameters desired.

18.4 ESCAPE FUNCTION

The 'ESC' function is especially useful when making changes. By entering 'ESC', instead of 'RTN', any time prior to the last prompt, the operator may skip all other data change prompts and proceed immediately to the CORRECT? (Y/N) or SURE? (Y/N) prompt. None of the skipped data will be altered.

18.5 CORRECT? (Y/N) OR SURE? (Y/N)

This prompt will appear at the end of every change screen, with the exception of CONDITIONS LIST and BUILDING STANDARDS LIST. When the EMS/Z displays this prompt, the change data is stored in Random Access Memory (RAM). Unless Y'RTN' is entered, the change data will not be stored in on the Expanded Memory Device (EMD). The operator should review one last time the input entered, and then enter Y'RTN' to make the data permanent.

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19.0 EXPANDED STATUS, CONTROL POINT

To display and/or enter the EXPANDED STATUS, C.P. # change screen, enter Y'RTN' when prompted from the control point EXPANDED STATUS screen.

The EXPANDED STATUS, C.P.# change screen allows the operator to change the control parameters for that control point. There are four different change screens based on System Types. They are listed below. (See the CONTROL POINT STATUS section for a detailed explanation of System Types.)

- Refrigeration (Figure 22)
- Defrost (Figure 23))
- HVAC (HVAC)
- Lighting (Figure 24)

Refrigeration change screen. Figure 22 depicts a typical refrigeration type control point change screen. Listed below are the possible operator changes which can be made to a refrigeration type control point.

FIGURE 22 REFRIGERATION

THU 02/15/90	Danfoss-EMC, Inc., ZX SYSTEM	M1-M2-S1-S2-DB
TIME 1621:59	CHANGE CTRL PT #1	BUILDING #101
NAME: SYSA1-	01	CHANGE : _____
OFF TIME (MIN) =	0	CHANGE : _____
ON TIME (MIN) =	0	CHANGE : _____
RATE OF CHNG(Y/N)=	Y	CHANGE : _____
PSI TARGET VALUE =	37	CHANGE : _____
CUT-OUT VALUE =	15	CHANGE : _____
TEMP SENSOR # =	2	CHANGE : _____
TEMP TARGET VALUE=	24	CHANGE : _____
TEMP VAR ALLOWED =	1	CHANGE : _____
PSI VAR ALLOWED =	4	CHANGE : _____
SENSITIVITY =	5	CHANGE : _____
MAN (COM/ON/OFF) =	COM	CHANGE : _____
CORRECT? (Y/N) :		CHANGE : _____

19.1 REFRIGERATION OPERATOR CHANGES

The following information is found in the refrigeration type EXPANDED STATUS, C.P.# screen.

19.1.1 NAME

The eight character name for the refrigeration control point. These names are usually standard for a controlled device.

19.1.2 OFF TIME (MIN)

Indicates the minimum time, in minutes, a compressor MUST stay off, regardless of the suction pressure, before the refrigeration algorithm will allow it to turn back on. Not used for rate of change.

19.1.3 ON TIME (MIN)

Indicates the minimum time, in minutes, a compressor MUST stay on, regardless of the suction pressure, before the refrigeration algorithm will allow it to turn back off. Not used for rate of change.

19.1.4 RATE OF CHNG (Y/N)

When Y, the refrigeration rack will run under Rate of Change. N will cause the rack to run under cut-in and cut-out parameters.

19.1.5 PSI TARGET VALUE

The initial suction pressure the computer is attempting to maintain on the average. When the rack is being controlled by temperature modified Rate of Change, or has a night set back condition, the target value will be changed by the computer. However, the initial value will always remain in this screen.

19.1.6 CUT-OUT VALUE

The cut-out value is an absolute cut-out value when controlling a rack with Rate of Change. If the suction pressure reaches this value, the EMS/Z will turn off all the compressors associated with the rack at a much faster rate than it would otherwise. The cut-out value is a setpoint at which the computer will start to turn compressors off when the rack is controlled by cut-in and cut-out parameters. If in cut-in cut-out mode, temp mode will move this value as it does target.

19.1.7 TEMP SENSOR #

The temperature sensor number associated with the rack, usually of the most critical case on the rack. If a sensor is associated with the rack, the rack will operate under temperature modified control, otherwise the rack will operate under present parameters. Temporary entry of zero here will clear temp mod back to zero and then reenter.

19.1.8 TEMP TARGET VALUE

The case temperature to be maintained on the average.

19.1.9 TEMP VAR ALLOWED

The temperature variance that may occur from the temperature target value without the EMS/Z taking corrective action by altering the target pressure.

19.1.10 PSI VAR ALLOWED

The maximum amount of pressure that may be added or subtracted from the original target value in order to meet case temperature target requirements.

19.1.11 SENSITIVITY

The sensitivity is best explained as how quickly the computer will react in turning a compressor on or off when attempting to meet the PSI target value. 1 is the most sensitive and 10 is the least sensitive.

19.1.12 MAN (COM/ON/OFF)

This field allows the operator to:

- place a control point in MAN (ON) or MAN (OFF)
- place a control point back into computer control from a MAN (ON) or MAN (OFF) condition, or
- place a control point back into computer control after being placed into an alarm condition (ON6). (See CONTROL POINT STATUS for a description of control point manual states.)
Remember, the EMS/Z will be unable to take control actions when a control point is in manual on or manual off mode.

19.1.13 CORRECT? (Y/N)

This prompt will appear at the end of every change screen, with the exception of CONDITIONS LIST. When the EMS/Z prints this prompt, the change data is stored in Random Access Memory (RAM). Unless Y'RTN' is entered, the change data will not be stored in Expanded Memory Device (EMD). The operator should review one last time the input entered, and then enter Y'RTN' to make the data permanent.

Defrost change screen. Figure 23 depicts a typical defrost type control point change screen. Listed below are the possible operator changes which can be made to a defrost type control point.

FIGURE 23 DEFROST

THU 02/15/90	Danfoss-EMC, Inc., ZX SYSTEM	M1-M2-S1-S2-DB
TIME 1621:59	DEFROST CHANGE SCREEN	BUILDING #101
NAME: DEF B 34	CHANGE : _____	
MIN HRS BTWN DEF = 2	CHANGE : _____	
MAN (COM/ON/OFF) =OFF	CHANGE : _____	
CORRECT? (Y/N):	CHANGE : _____	

19.2 DEFROST OPERATOR CHANGES

The following information is found in the defrost type EXPANDED STATUS, C.P.# screen.

19.2.1 NAME

The eight character name for the true or dummy control point.

19.2.2 MIN HRS BTWN DEF

Minimum hours between defrost. The minimal time the EMS/Z must wait before initiating a rack defrost. If defrost is not being controlled by the EMS/Z, the defrost type of control point can be used in the recording of defrost run times.

19.2.3 MAN (COM/ON/OFF)

Refer to refrigeration type control point.

19.2.4 CORRECT? (Y/N)

Refer to refrigeration type control point.

HVAC & Lighting change screen. Figure 24 depicts a typical HVAC or lighting type control point change screen. Listed below are the possible operator changes which can be made to a HVAC control point.

FIGURE 24 HVAC

THU 02/15/90	Danfoss-EMC, Inc., ZX SYSTEM	M1-M2-S1-S2-DB
TIME 1621:59	CHANGE CTRL PT # 9	BUILDING #101
NAME: MTCT -09	CHANGE : _____	
PRE-DELAY (MIN) = 2	CHANGE : _____	
POST DELAY (MIN) = 2	CHANGE : _____	
MAN (COM/ON/OFF) = COM	CHANGE : _____	

19.3 HVAC & LIGHTING OPERATOR CHANGES

The following information is found in the HVAC & Lighting type EXPANDED STATUS, C.P.# screen.

19.3.1 NAME

Refer to the defrost type control point.

19.3.2 PRE-DELAY (MIN)

When all other parameters, such as schedules and conditions, are satisfied for a HVAC/Lighting control point, a timer will be started with this value as its counter. Once the counter has reached the pre-delay value, the control point will be turned on. Should any of the parameters turn false during the interval of the count, the counter will be reset and will be started over at the next true occurrence. The pre-delay prevents abnormal conditions from turning on and off heavy equipment within a short period of time.

19.3.2 POST DELAY (MIN)

This parameter has the same effect on turn off times that the pre-delay has on turn on times. It should be noted that the post delay does not take effect until pre-delay has finished counting and the control point has been turned on.

19.3.3 MAN (COM/ON/OFF)

Refer to the refrigeration type control point.

19.3.4 CORRECT? (Y/N)

Refer to the refrigeration type control point.

19.4 ACCESS/PROMPT

In the beginning of this section, it was noted to enter Y'RTN' to display and/or enter the EXPANDED STATUS, C.P.# change screen when prompted from the control point EXPANDED STATUS screen. There are other methods for gaining access to the EXPANDED STATUS, C.P. # change screen.

From the ACTION MENU:

- 1 XX XX Y RTN' - Where XX designates the control point number change screen to be entered.

From any screen prompt:

- '@1 XX XX Y RTN"' - Where XX designates the control point number change screen to be entered. (See the General Information section for a more detailed explanation of the @ symbol.)

NOTE: The action menu can be rearranged with Version 10, the proper option number must be specified.

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20.0 CONDITIONS LIST

To display and/or enter the CONDITIONS LIST change screen, enter XXX Y'RTN', where XXX is the condition to be changed, when prompted by the CONDITIONS LIST data screen.

This screen will allow the operator to change only constant values used in the conditions. The constant values are usually associated with temperature control setpoints for cooling and heating, lighting controlled by photocell and, at times, refrigeration night set back pressures.

Figure 25 is an example of a CONDITIONS LIST change screen using Condition #2 from the example found in the CONDITIONS LIST data screen section.

FIGURE 25

THU 02/15/90	Danfoss-EMC, Inc., ZX SYSTEM		M1-M2-S1-S2-DB
TIME 1621:59	CONDITIONS LIST		BUILDING #101
NUMBER	BOOLEAN	SENSOR OR SCHEDULE VALUE	
2	F	SCHEDULE GROUP # 97	
		0700 1900 S 1	
		0600 2200 MTWRFA 234567	
	and	(INSD TMP AIN [71.0])	
	>=	CONSTANT [76.0]	CHANGE TO: _____

By entering a value in the prompt and then 'RTN', the change takes effect.

NOTE: There is no CORRECT? (Y/N) prompt. If an incorrect numeric value is placed in the prompt, the operator must go back into the change screen and place in the corrected value. (See the Escape Key Feature in the General Information section and the Change Screens introduction for an easy way to verify any changes.)

20.1 ACCESS/PROMPT

In the beginning of this section, it was noted to enter the CONDITIONS LIST change screen, enter XXX Y'RTN', where XXX is the condition to be changed, when prompted by the CONDITIONS LIST. There are other methods for gaining access to the CONDITIONS LIST change screen.

From the ACTION MENU:

- 6 XX Y RTN' - Where XX designates the number of the condition to be changed.

From any EXPANDED STATUS:

- C XX Y RTN' - Where XX designates the condition to be changed.

The only condition that can be accessed by this method is the condition associated with the EXPANDED STATUS control point. Otherwise, the entry will take the operator into the EXPANDED STATUS, C.P.# change screen.

From any screen prompt:

- '@6 XX Y RTN' - Where XX designates the number of the condition to be changed. (See the General Information section for a more detailed explanation of the @ symbol.)

21.0 SCHEDULE GROUPS

To display and/or enter the SCHEDULE GROUPS change screen, enter 9 XXX'RTN', where XXX designates the schedule group number, when prompted by the ACTION MENU. A second method is to enter S'RTN' when prompted by the control point EXPANDED STATUS screen.

There are four general statements that can be made concerning schedule groups.

- A schedule group number for a control point usually matches the control point number.
- Condition schedule groups have no control point numbers associated with them.
- Refrigeration type control points usually do not have schedule groups associated with them. HVAC type control points usually have schedules contained in conditions. These schedules usually have numbers of 513 or higher.
- In the event an operator attempts to enter a SCHEDULE GROUPS change screen for a non-existent schedule group, the screen from which the request was made will be re- displayed.

The SCHEDULE GROUPS change screen first displays all the schedules associated with the schedule group and a prompt requesting the schedule number to be changed, as seen in Figure 26.

FIGURE 26

```

THU 02/15/90                Danfoss-EMC, Inc., ZX SYSTEM                M1-M2-S1-S2-DB
TIME 1621:59                SCHED GROUPS 13                BUILDING #101

STOCK
SCHEDULE GROUP # 13
[ * = TIME RELATIVE TO STORE HOURS, WHICH ARE 0800 TO 2200 TODAY]
      ON/OFF      DAYS      CYCLE                ON/OFF      DAYS      CYCLE
1*-0015 1100 S          1                2 2015 2100 S          1
3 .0500 0800 M                4 2215 2400 MTWRF 2345
5 2215 2300 A                6 0600 0800 T

SCHEDULE TO CHANGE: _

```

If an additional schedule is to be added to the schedule group, enter a number 1 greater than the highest schedule number displayed, i.e., in Figure 26, enter 7'RTN'.

Once the schedule number has been entered (Figure 27), the operator will be prompted with the following:

FIGURE 27

```

SCHED TYPE =      RELATIVE      CHANGE : _
TIME ON =         0800          CHANGE : _
TIME OFF =        0900          CHANGE : _
DAYS ON =         S 1           CHANGE : _
CORRECT (Y/N) =   CHANGE : _

```

21.1 OPERATOR CHANGES

The following information is found in the SCHEDULE GROUPS screen.

21.1.1 SCHED TYPE

- S - Standard Schedule. The standard schedule allows the control point to turn on or off based on the time of day.
- R - Relative Schedule. The relative schedule allows the control point to turn on or off based on the Building Hour Base for the day.

21.1.2 TIME ON

The time of day, if a standard schedule, or the time before or after the building opening hour, if a relative schedule, that the control point will be turned on. (Assuming that no conditions or predelays also affect the control point.)

Both standard and relative times are entered in military time. For a relative schedule, enter '-' preceding the time entry if the schedule is to take effect prior to the building opening or closing hour (Refer to Building Standards)

21.1.3 TIME OFF

The time of day, if a standard schedule, or the time before or after the building opening hour, if a relative schedule, that the control point will be turned off. (Assuming that no conditions or predelays also affect the control point.)

21.1.4 DAYS ON

Looks for one or more of eight letters and eight numbers in the input data. SMTWRFA12345678 equals Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, and Holiday #1, Holiday #2, etc. X is a special character that equals ALL DAYS. X does override all other days. The actual input order is not important. (See also the 'X' Feature in the General Information section and Changing a Schedule)

21.1.5 CORRECT (Y/N)

This prompt will appear at the end of every change screen, with the exception of CONDITIONS LIST. When the EMS/Z displays this prompt, the change data is stored in RAM. Unless Y'RTN' is entered, the change data will not be stored in EMD. The operator should review the input entered one last time, and then enter Y'RTN' to make the data permanent.

21.2 CHANGING A SCHEDULE

Times are entered in military time. TIME ON should be earlier than TIME OFF.

EXAMPLE: A schedule from 2200 to 0300 Sunday should be entered as two separate schedules: 2200 2400 S and 0000 0300 M. Schedules turn on by time and days, but turn off by time alone. As an example, a schedule from 2200 to 0800 Sundays would turn on at 10:00 PM Sunday (time & day) and turn off at 8:00 AM Monday (time alone).

DAYS ON looks for one or more of eight letters and eight numbers in the input data. SMTWRFA12345678 equals Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday, Holiday #1, Holiday #2, etc. The point will be scheduled on only those days for which a matching character appears, for instances: S T F 3 6 indicates a schedule used on Sunday, Tuesday, Friday and Holidays type 3 and type 6. The actual input order is not important. X is a special character that equals all days and will be printed out as *** ALL DAYS ***. X does override all other days. (See also the "X" Feature in the General Information section and also refer to "Holiday Dates".)

If a schedule is to be deleted, only one entry is important. If the entry for days is one or more spaces only, the schedule is obviously null. The EMS/Z will erase the schedule pointer in this case, freeing the space this schedule was using for reallocation. Be cautious, though, since entering a 'RTN' alone will leave the field at the previous value, not erase it.

This screen is the best place for use of the Escape key. Quite often, more than one schedule must be changed at a time. Entering 'ESC' allows the operator to stay in the change screen until all the changes are finished. (See also the ESCAPE feature in the General Information section of this manual.)

21.3 ACCESS/PROMPT

In the beginning of this section, it was noted to enter 9 XXX'RTN', where XXX designates the schedule group number, to access the SCHEDULE GROUPS change screen when prompted by the ACTION MENU. There are other methods for gaining access to the SCHEDULE GROUPS change screen.

From the ACTION MENU:

- 1 XX XX S RTN' - Where XX designates the control point for which schedule the operator would like to change. Note: If the control point has no schedule groups, the ACTION MENU will be displayed.

From any screen prompt:

- '@9 XX RTN' - Where XX designates the control point
- '@1 XX XX S RTN' - Where XX designates the control point for which schedule the operator would like to change. Note: if the control point has no schedule groups, the ACTION MENU will be displayed. (See the General Information section for a more detailed explanation of the @ symbol.)

A final note concerning the SCHEDULE GROUPS change screen. Entering DAT9'RTN' when prompted by the AUTH will display all schedule groups and their associated schedules.

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22.0 HOLIDAY DATES

To display the HOLIDAY DATES screen, enter 'RTN' when prompted by the ACTION MENU.

The purpose of the HOLIDAY DATES (Figure 28) change screen is to allow the operator to select certain days of the year to be denoted as "HOLIDAYS". Without reentering a massive schedule change for each EMS/Z, the operator can predetermine which points will be active during certain times on certain days of the year.

FIGURE 28

THU 02/15/90		Danfoss-EMC, Inc., ZX SYSTEM				M1-M2-S1-S2-DB		
TIME 1621:59		HOLIDAY DATES				BUILDING #101		
DESCRIPTION	#	DATE	TYPE	DESCRIPTION	#	DATE	TYPE	
SCHEDULED HOLIDAY	# 1	1 01	8	SCHEDULED HOLIDAY	# 2	12 24	1	
SCHEDULED HOLIDAY	# 3	12 25	8	SCHEDULED HOLIDAY	# 4	0 00	0	
SCHEDULED HOLIDAY	# 5	0 00	0	SCHEDULED HOLIDAY	# 6	0 00	0	
SCHEDULED HOLIDAY	# 7	0 00	0	SCHEDULED HOLIDAY	# 8	0 00	0	
SCHEDULED HOLIDAY	# 9	0 00	0	SCHEDULED HOLIDAY	# 10	0 00	0	
SCHEDULED HOLIDAY	# 11	0 00	0	SCHEDULED HOLIDAY	# 12	0 00	0	
SCHEDULED HOLIDAY	# 13	0 00	0	SCHEDULED HOLIDAY	# 14	0 00	0	
SCHEDULED HOLIDAY	# 15	4 29		SCHEDULED HOLIDAY	# 16	10 28		

ENTER ITEM # TO ALTER : 'RTN'

MONTH = 1 CHANGE: ___

DAY = 1 CHANGE: ___

TYPE = 8 CHANGE: ___

SURE (Y/N): CHANGE: ___

The Holiday Types refer to two areas:

- In a standard schedule, number 1 - 8 may be entered for "days". This number is a holiday type.
- In a relative store hour schedule, the Store Hour Base numbers 8 - 15 are set up for holidays H1 - H8, where H1 equals type 1 to H8 which equals type 8.

Thus the EMS/Z is able to accommodate both standard and relative hour base holiday schedules simultaneously.

22.1 ACCESS/PROMPT

In the beginning of this section, it was noted to enter 'RTN' to display the HOLIDAY DATES screen when prompted by the ACTION MENU. There are other methods for gaining access to the HOLIDAY DATES change screen.

From any screen prompt:

- '@7'RTN' - Displays the Holiday Dates screen. (See the General Information section for a more detailed explanation of the @ symbol.)

A final note on the HOLIDAY DATES change screen. Entering DAT@7'RTN' when prompted by the AUTH will display the current holiday dates.

23.0 PHONE NUMBERS

To display the PHONE NUMBERS screen, enter 8'RTN' when prompted by the ACTION MENU.

THE PHONE NUMBERS change screen allows the operator to change or add phone numbers and their schedules. The screen first displays the current phone numbers and a prompt for which item to change, as seen in Figure 29. (See Appendix I 'ALARM ARMING')

FIGURE 29

THU 02/15/90 TIME 1621:59	Danfoss-EMC, Inc., ZX SYSTEM PHONE NUMBERS	M1-M2-S1-S2-DB BUILDING #101
1 3219407		
2		
3		
4		
5		
ENTER ITEM # TO ALTER : 1'RTN'		

If a position has no phone number, one can be entered by entering the position number at the prompt. The phone number of the item entered at the prompt is displayed next (Figure 30) with 12 spaces available for changes.

FIGURE 30

PHONE # = : 3219407 CHANGE : _____

At this point the operator may either change an existing phone number, delete an existing phone number, add a phone number to a currently empty position, or proceed to the phone number's schedule.

- To **CHANGE** an existing phone number: enter phone number and 'RTN'.
- To **DELETE** an existing phone number: enter one space and 'RTN'.
- To **ADD** a new phone number: enter phone number and 'RTN'.
- To **PROCEED** to schedule and also change: enter 'RTN'.

Finally, the schedules associated with the phone numbers are displayed (Figure 31).

FIGURE 31

```

SCHEDULES GROUP # 901

ON/OFF      DAYS      CYCLE      ON/OFF      DAYS      CYCLE
1 0000 2400 *** ALL DAYS ***

ENTER NUMBER OF SCHEDULE TO CHANGE : 1'RTN'

TIME ON      =      0000      CHANGE :
TIME OFF     =      2400      CHANGE :
DAYS ON      =      *** ALL DAYS *** CHANGE :
CORRECT (Y/N):

```

To change a schedule for a phone number, refer to the SCHEDULE GROUPS section of this manual.

The order of calling priorities is as follows: Phone numbers 1 - 5 will be posted to make an outbound phone call based on an active schedule and a valid phone number and alarm arming.

When calling the phone numbers 2 through 5 the call will be made for up to five times each as long as the schedule is active and then will default to phone number 1 which will call every 15 minutes for as long as it takes to finally transmit the alarm to phone number 1's logging equipment. Therefore, phone number 1 should be a default number which is available 24 hours a day, seven days a week. Version 10 software has the ability to designate by alarm use type which phone numbers(s) will be called.

23.1 ACCESS/PROMPT

In the beginning of this section, it was noted to enter 8'RTN' to enter the PHONE NUMBERS screen when prompted by the ACTION MENU. There are other methods for gaining access to the PHONE NUMBERS change screen.

From the ACTION MENU:

- 8 X'RTN' - Where X is the phone number position to be changed.

From any screen prompt:

- '@8'RTN' or @8 X'RTN' - Where X is the position of the phone number to be changed. (See the General Information section for a more detailed explanation of the @ symbol.)

A final note concerning the PHONE NUMBERS screen. Entering DAT8'RTN' when prompted by the AUTH will display all the current phone numbers.

24.0 BUILDING HOURS

To display the BUILDING HOURS screen, enter 11'RTN' when prompted by the ACTION MENU.

The BUILDING HOURS change screen allows the operator to alter the basic building operating hours for any day of the week. Normally, all schedules for control points will use the Building Hour Base with minor adjustments, depending on the exact times the specific control point is to operate. For instance, if the stocking lights are to come on three hours prior to building opening on Monday, the schedule would reflect Building Hour Base minus three hours for Monday. Figure 32 represents a typical Building Hours screen.

FIGURE 32

THU 02/15/90		Danfoss-EMC, Inc., ZX SYSTEM				M1-M2-S1-S2-DB	
TIME 1621:59		BUILDING HOURS				BUILDING #101	
#	DAY	TIME ON	TIME OFF	#	DAY	TIME ON	TIME OFF
1	SUN	0900	1900	2	MON	0700	2200
3	TUE	0700	2200	4	WED	0700	2200
5	THU	0700	2200	6	FRI	0700	2200
7	SAT	0700	2200	8	H1	1200	1800
9	H2	0000	0000	10	H3	0000	0000
11	H4	0000	0000	12	H5	0000	0000
13	H6	0000	0000	14	H7	0000	0000

ENTER # TO ALTER:

To change a time, enter XX'TRN' where XX designates the entry # for the day or week or holiday, and the following will be displayed, as seen in Figure 33.

FIGURE 33

TIME ON = 0000	CHANGE: _____
TIME OFF = 0000	CHANGE: _____
SURE (Y/N):	

24.1 OPERATOR CHANGES

The following information is found in the BUILDING HOURS screen.

24.1.1 TIME ON

The time the building opens its doors for business.

24.1.2 TIME OFF

The time the building closes its doors for business.

24.1.3 SURE (Y/N)

This prompt will appear at the end of every change screen, with the exception of CONDITIONS LIST . When the EMS/Z prints this prompt, the change data is stored in RAM. Unless Y'RTN' is entered, the change data will not be stored in EMD. The operator should review one last time the input entered, and then enter Y'RTN' to make the data permanent.

24.2 ACCESS/PROMPT

In the beginning of this section, it was noted to enter 11"RTN" to display the BUILDING HOURS screen when prompted by the ACTION MENU. There are other methods for gaining access to the BUILDING HOURS screen.

From any screen prompt:

- '@11 RTN' - Displays the Building Hours screen. (See the General Information section for a more detailed explanation of the @ symbol.)

A final note on the BUILDING HOURS screen. Entering DATB RTN' when prompted by the AUTH will display all the Building Hours times.

25.0 HISTORY POINTERS

To display and/or enter the HISTORY POINTERS (Figure 34) change screen, enter 12"RTN" when prompted by the ACTION MENU.

The HISTORY POINTERS change screen allows the operator to gather data for either control points, digital input monitor points, analog sensors, or current refrigeration target. For analog sensors points, the actual value of the sensor is stored whereas for control points and digital sensor points and digital sensor points either a 1 or a 0 (1 = ON, 0 = OFF) is stored. The operator is asked to select the interval between data collection times (in minutes and/or seconds). Intervals can be from 0 - 480 minutes but only in system cycle increments. On Version 10 the system cycle increment is normally 15 seconds.

NOTE: Version 10 has been modified to treat history collection information in groups. Version 10 provides 4, 8 or 16 groups with up to 14 elements per group. The number of groups can be specified when the database is built. If the number of groups are not specified they will default as follows:

- 96 CP or less = 4 groups
- 97 - 256 CP = 8 groups
- > 256 = 16 groups

Each group name is up to eight characters to identify the group. Within a group the same interval in minutes and seconds for storing information is used. In addition, a scaling factor of from 1 to 10 is available by group to scale the input. The history collection function allocates one byte of storage per same per element. This limits values to the range of -127 to +127. For values greater than +127 you use the scaling factor to store the number. A scaling factor of one will do no scaling at all. A scaling factor of two will divide the incoming value by two for storage purposes and re-multiply that number by two for output purposes. Therefore, you will have introduced an error equal to the size of the scaling factor depending on the input value. Since the scaling factor is selectable by group it is suggested to utilize one group for all values that require a scaling factor so it will not distort any of the other values.

Within a group there are up to 14 elements which could be control points, digital inputs, analog inputs, refrigeration targets or 'none' = no element option.

FIGURE 34

THU 02/15/90 TIME 1621:59		Danfoss-EMC, Inc., ZX SYSTEM HISTORY POINTERS		M1-M2-S1-S2-DB BUILDING #101	
# 1	SYS1 PTS	# 2	SYS1 ANL	# 3	SYS2 ANL
# 5	SYS4 P/A	# 6	SYS5 P/A	# 7	SYS6 PTS
# 9	SYS7 PTS	#10	SYS7 ANL	#11	SYS8 PTS
#13	SYS9 PTS	#14	SYS9 ANL	#15	SYS10 PT
# 4	SYS3 ANL	# 8	SYS6 ANL	#12	SYS8 ANL
				#16	SYS10 AL
GROUP # TO ALTER		=		CHANGE :	1
GROUP NAME IS SYS1 PTS				CHANGE :	
INTERVAL (MIN)		= 2		CHANGE :	
INTERVAL (SEC)		= 0		CHANGE :	
SCALING FACTOR (1 - 10)		= 1		CHANGE :	
PNT/SENSOR(PDATN) 1		= P 97		CHANGE :	
PNT/SENSOR(PDATN) 2		= D 97		CHANGE :	
PNT/SENSOR(PDATN) 3		= D101		CHANGE :	
PNT/SENSOR(PDATN) 4		= P 98		CHANGE :	
PNT/SENSOR(PDATN) 5		= D 98		CHANGE :	
PNT/SENSOR(PDATN) 6		= D102		CHANGE :	
PNT/SENSOR(PDATN) 7		= P 99		CHANGE :	
PNT/SENSOR(PDATN) 8		= D 99		CHANGE :	
PNT/SENSOR(PDATN) 9		= P100		CHANGE :	
PNT/SENSOR(PDATN) 10		= D100		CHANGE :	
PNT/SENSOR(PDATN) 11		= A101		CHANGE :	
PNT/SENSOR(PDATN) 12		= A102		CHANGE :	
PNT/SENSOR(PDATN) 13		= A103		CHANGE :	
PNT/SENSOR(PDATN) 14		= A104		CHANGE :	
CORRECT? (Y/N): _____					

Entering anything but 'Y'RTN' will be ignored and will return the operator to the ACTION MENU.

By answering 'Y'RTN' to CORRECT? (Y/N):", the operator will zero out all previous data that had been collected.

25.1 ACCESS/PROMPT

In the beginning of this section, it was noted to enter '12'RTN' to display and/or enter the HISTORY POINTERS change screen when prompted by the ACTION MENU. There are other methods for gaining access to the HISTORY POINTERS change screen.

From any screen prompt:

- '@12 RTN' -Displays the History Pointers screen. (See the General Information section for a more detailed explanation of the @ symbol.)

A final note on retrieving HISTORY POINTERS. For Version 10 enter DATC X Y ZU D HO'RTN', where X is the group no., Y is the desired element within the group to start with, ZU is the number of samples desired, D is the day to start with (1-7, sun = 1), and HO is the starting hour within that day. The defaults are 1, 1, 150, current day/time.

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26.0 CHANGE DIGITAL SENSORS

To display and/or enter the CHANGE DIGITAL SENSORS screen, enter XX Y'RTN' when prompted by the DIGITAL SENSORS screen, where XX designates the digital sensor to be changed.

The CHANGE DIGITAL SENSORS screen allows the operator to place a digital sensor either into computer control or into a manual mode. When in computer control, the EMS/Z will be able to detect on or off status of a digital sensor. When in a manual ON mode, the EMS/Z will always read the digital sensor as on; when in a manual OFF mode, the EMS/Z will always read the digital sensor as off.

Figure 35 repeats a display of the DIGITAL SENSORS screen.

Note that Sensors #2 and #13 have an M next to the value field.

FIGURE 35

THU 02/15/90			Danfoss-EMC, Inc., ZX SYSTEM			M1-M2-S1-S2-DB		
TIME 1621:59			DIGITAL SENSORS			BUILDING #101		
NO	NAME	VALUE	NO	NAME	VALUE	NO	NAME	VALUE
1	SYSA1-01	OFF	17	OPMON D2	OFF	33	DEF A 30	OFF
2	SYSA2-02	ON M	18	SPARE	OFF	34	DEFA0131	OFF
3	SYSA2-03	OFF	19	SPARE	OFF	35	DEF B 32	OFF
4	SYSB2-04	ON	20	SPARE	OFF	36	DEFB0733	OFF
5	SYSC1-05	OFF	21	AHU 70	ON	37	DEF C 34	OFF
6	SYSC2-06	ON	22	COOL1 71	OFF	38	DEFC1335	OFF
7	SYSD1-07	ON	23	COOL2 72	OFF	39	DEF D 36	OFF
8	SYSD2-08	ON	24	HRTC1 73	ON	40	DEFD1737	OFF
9	SPARE	OFF	25	HTRC2 74	ON	41	SPARE	OFF
10	OPMON A1	OFF	26	HTRC3 75	ON	42	DEFA0238	OFF
11	OPMON A2	OFF	27	EDH 1 76	OFF	43	DEFA0339	OFF
12	OPMON B1	OFF	28	EDH 2 77	OFF	44	DEFA0440	OFF
13	OPMON B2	OFF M	29	EDH 3 78	OFF	45	DEFA0541	OFF
14	OPMON C1	OFF	30	EDH 4 79	OFF	46	DEFA0642	OFF
15	OPMON C2	OFF	31	UNTHT 80	OFF	47	DEFA0843	OFF
16	OPMON D1	OFF	32	SPARE	OFF	48	DEFB1044	OFF

CHANGE = Y/SENSOR #/NEXT PAGE = RTN/0 = MENU:

The M indicates that the sensor point is in a manual mode. Sensor #2 is manual on and Sensor #13 is manual off. Figure 36 shows the change screen for Digital Sensor #2. The sensor is currently in manual on and the operator is placing the sensor point in computer control.

FIGURE 36

THU 02/15/90 TIME 0842.43	Danfoss-EMC, INC., ZX SYSTEM CHANGE DIGITAL #2	M1-M2-S1-S2-DB BUILDING #101
NAME: SYSA2-02	CHANGE : _____	
MANUAL (COM/ON/OFF) = ON	CHANGE : COM'RTN' _____	
CORRECT? (Y/N) :	CHANGE : Y'RTN' _____	

26.1 OPERATOR CHANGES

The following information is found in the CHANGE DIGITAL SENSORS screen.

26.1.1 NAME

The eight character name for the true digital sensor.

26.1.2 MAN (COM/ON/OFF)

This field allows the operator to:

- place a digital input in MAN (ON) or MAN (OFF)
- place a digital input point back into computer control from a MAN (ON) or MAN (OFF) condition, or

26.1.3 CORRECT? (Y/N)

This prompt will appear at the end of every change screen, with the exception of CONDITIONS LIST. When the EMS/Z displays this prompt, the change data is stored in RAM. Unless Y'RTN' is entered, the change data will not be stored in EMD. The operator should review one last time the input entered, and then enter Y'RTN' to make the data permanent.

26.2 ACCESS/PROMPT

In the beginning of this section, it was noted to enter XX Y'RTN' to display and/or enter the CHANGE DIGITAL SENSORS screen when prompted by the DIGITAL SENSORS screen. There are other methods for gaining access to the CHANGE DIGITAL SENSORS screen.

From the ACTION MENU:

- 13 XX Y'RTN' - Where XX designates the digital sensor to be changed.

From any EXPANDED STATUS:

- D XX Y'RTN' - Where XX designates the digital sensor to be changed.

From any screen prompt:

- '@13 XX Y'RTN' - Where XX designates the digital sensor to be changed. (See the General Information section for a more detailed explanation of the @ symbol.)

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27.0 CHANGE ANALOG SENSORS

To display and/or enter the CHANGE ANALOG SENSORS screen, enter XX Y'RTN' when prompted by the ANALOG SENSORS screen, where XX indicates the analog sensor to be changed.

The CHANGE ANALOG SENSORS screen is very similar to the CHANGE DIGITAL SENSORS screen. It allows the operator to place an analog sensor either into computer control or into a manual mode. When in computer control, the EMS/Z will be able to detect actual temperatures, pressures, etc. When in the manual mode, the EMS/Z will always read a fixed value which can be altered by the operator.

NOTE: Version 10 allows for calculated analog points. One example would be to calculate dew point from an R.H. analog input and a temperature analog input, using the conditions processor. Another example would be an analog point which is the average of two or more analog inputs as calculated by the conditions processor. A calculated analog has a '+' preceding the name field.

Figure 37 repeats a display of the ANALOG SENSORS screen.

FIGURE 37

THU 02/15/90 TIME 1621:59			Danfoss-EMC, Inc., ZX SYSTEM ANALOG SENSORS			M1-M2-S1-S2-DB BUILDING #101		
NO	NAME	VALUE	NO	NAME	VAULE	NO	NAME	VAULE
1	RACK A	44.0P	17	PRBX T11	33.0F	33	SPARE	0.0
2	MTCS T01	23.5F	18	ICRM T14	-18.0F	34	SPARE	0.0
3	RACK B	43.0P	19	FZJC T15	-18.0F	35	SPARE	0.0
4	MTBX Y07	36.5F	20	FZDT T16	-13.0F	36	SPARE	0.0
5	RACK C	8.0P	21	SPLY AIR	79.5F	37	SPARE	0.0
6	ICRM T13	-20.5F	22	HUMIDITY	46.5%	38	SPARE	0.0
7	RACK D	11.0P	23	FZDN T18	3.0F	39	SPARE	0.0
8	FZDN T17	-12.5F	24	FZVG T19	-11.0F	40	SPARE	0.0
9	MTCT TMP	52.5F	25	FZPO T20	3.5F	41	SPARE	0.0
10	MTCS T02	23.0F	26	FZFH T21	-4.0F	42	SPARE	0.0
11	DYCS T03	29.0F	27	FZBX T22	-10.5F	43	SPARE	0.0
12	DYCS T04	31.0F	28	DLCS T23	32.5F	44	SPARE	0.0
13	CHEZ T05	-33.0F	29	STCK TMP	62.0F	45	SPARE	0.0
14	DLCS T06	31.0F	30	INSD TMP	71.0F	46	SPARE	0.0
15	HDBX T08	28.5F	31	OTSD TMP	41.0F	47	SPARE	0.0
16	DYBX T10	34.0F	32	FZFH T24	-11.0F	48	SPARE	0.0

CHANGE = Y/SENSOR #/NEXT PAGE = RTN/O = MENU:

Figure 38 shows the change screen for Analog Sensor #2. The sensor is currently in computer control and the operator is placing the sensor point in manual with a fixed value of 45.2 degrees.

FIGURE 38

THU 02/15/90 TIME 1621:59	Danfoss-EMC, Inc., ZX SYSTEM CHANGE ANALOG #2	M1-M2-S1-S2-DB BUILDING #101
NAME: MTCS-T01	CHANGE :	
ADJUSTMENT OFFSET	= 0 CHANGE :	
MANUAL (COM,MAN) COM	CHANGE : MAN'RTN'	
MANUAL VALUE = 33	CHANGE : 45.2'RTN'	
CORRECT? (Y/N):	CHANGE : Y'RTN'	

When returning the sensor point to the computer mode, there will be no manual value prompt as seen in Figure 39.

FIGURE 39

THU 02/15/90 TIME 1621:59	Danfoss-EMC, Inc., ZX SYSTEM CHANGE ANALOG #2	M1-M2-S1-S2-DB BUILDING #101
NAME: MTCS-T01	CHANGE :	
ADJUSTMENT OFFSET	= 0 CHANGE :	
MANUAL (COM,MAN) MAN	CHANGE : COM'RTN'	
CORRECT? (Y/N):	CHANGE : Y'RTN'	

27.1 OPERATOR CHANGES

There are two differences between the CHANGE DIGITAL SENSORS and CHANGE ANALOG SENSORS screen. The first is the ability to assign a fixed value to the analog sensor. The second is the ability to assign an adjustment offset to an analog point. The offset may range from -126.9 to +126.9. The EMS/Z will take the incoming analog value and adjust it by the offset value.

27.2 ACCESS/PROMPT

In the beginning of this section, it was noted to enter XX Y'RTN' to display and/or enter the CHANGE ANALOG SENSORS screen when prompted by the ANALOG SENSORS screen. There are other methods for gaining access to the CHANGE ANALOG SENSORS screen.

From the ACTION MENU:

- 14 XX Y'RTN' - Where XX designates the analog sensor to be changed.

From any EXPANDED STATUS:

- A XX Y RTN' - Where XX designates the analog sensor to be changed.

From any screen prompt:

- '@14 XX Y RTN' - Where XX designates the analog sensor to be changed. (See the General Information section for a more detailed explanation of the @ symbol.)

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28.0 SENSOR ALARMS CHANGE SCREEN

To display and/or enter the SENSOR ALARMS change screen, enter 'XX Y'RTN' where XX designates the desired sensor to be changed, when prompted by the SENSOR ALARMS screen.

It is highly recommended that the operator read the SENSOR ALARMS section prior to the SENSOR ALARMS change screen section. The SENSOR ALARMS change screen allows the operator to set up Switch Control Points, Digital Inputs or Analog Inputs alarms. The type of sensor alarm being set up will determine the type of change displays. There are two basic change displays, one for switches and digital inputs and one for analog inputs.

Figure 40 is a repeat of the SENSOR ALARMS screen.

FIGURE 40

THU 02/15/90		Danfoss-EMC, Inc., ZX SYSTEM				M1-M2-S1-S2-DB	
TIME 1621:59		SENSOR ALARMS				BUILDING #101	
#	SENSOR	CATEGORY	PROG	VALUES	COND	CURR VAL	ACT OCCURRED
1	A1	1 SYSA3-03	P	>	57.0/0030	1/F	ALM
2	A1	2 SYSBI-04	P	>	41.0/0030		ALM TUES 1134
			P	<	20.0/0005		
3	SW	1 SYSA1-01	ON	>	0004		LOG MON 1547
			OFF	>	0005	0001	LOG WED 0920
4	SW	1 SYSA1-01	ON	>	0020		LOG TUES 1030
			OFF	>	0025	0016	LOG WED 0905
			CYC	>	10/0030	0/0027	LOG
5	DI	1 SYSA1-01	ON	>	0025		LOG WED 0902
			OFF	>	0025		LOG
			CYC	>	10/0030	0/0010	LOG

CHANGE = Y/ALM #/NEXT PAGE = RTN/0 = MENU:

Sensor Alarm #2 represents an analog alarm with all the options.

Figure 41 shows the change screen for this sensor.

FIGURE 41

THU 02/15/90 TIME 1621:59		Danfoss-EMC, Inc., ZX SYSTEM SENSOR ALARMS 2		M1-M2-S1-S2-DB BUILDING #101	
TYPE SENSOR (A/D/S/C)	AI	CHANGE:			
ON LVL (N/L/T/A/R)	LOG	CHANGE:			
OFF LVL (N/L/T/A/R)	ALM	CHANGE:			
SENSOR NUMBER	= 2	CHANGE:			
HMM HI LIMIT	= 4	CHANGE:			
HMM LOW LIMIT	= 5	CHANGE:			
HIGH LIMIT	= 41.0	CHANGE:			
LOW LIMIT	= 20.0	CHANGE:			
MIN HRS BTWN ALMS	= 0	CHANGE:			
ENABLE CONDITION	= 1	CHANGE:			
CORRECT? (Y/N):		CHANGE:			

28.1 OPERATOR CHANGES

The following information is found in the SENSOR ALARMS change screen.

28.1.1 TYPE SENSOR (A/D/S/C)

The sensor type is

- N - N'RTN' will delete the alarm.
- A - A'RTN' will set the sensor as an Analog Inputs (AI).
- D - D'RTN' will set the sensor as a Digital Inputs (DI).
- S - S'RTN' will set the sensor as a Switch (SW).
- C - CONDITION NUMBER.

28.1.2 ON LVL (N/L/T/A/C/R)

The 'ON' is synonymous with greater than. An entry of N'RTN' will deactivate the 'ON' SENSOR ALARMS. The available levels of response to 'ON' are:

- N - None; This entry deactivates the on (greater than).
- L - Log; When an alarm condition exists, the event will be logged in the Occurred field.
- T - Alert; When an alert condition exists, the event will be logged and a system alarm will ensue resulting in the EMS/Z initiating the local error logger.

- **A - Alarm;** When an alarm condition exists, the event will be logged and a system alarm will ensue resulting in the EMS/Z initiating the dial out procedure, if it does not currently hold an alarm.
- **C - Critical;** When a critical condition exists, the event will be logged and a system alarm will ensue resulting in the EMS/Z initiating the dial out procedure, regardless of prior alarms.
- **R - Repeating;** When a repeating alarm is requested. The system will continue to dial out for as long as the alarm exists and the minimum time between alarms is satisfied. "GREAT CARE SHOULD BE TAKEN WHEN USING THIS STRUCTURE".

28.1.3 OFF LVL (N/L/T/A/C/R)

The 'OFF' is synonymous with less than. An entry of 'N'RTN' will deactivate the 'OFF'. The available levels of response are exactly the same for the 'ON' level.

28.1.4 CYC LVL (N/L/T/A/C/R)

The 'CYC' counts the times a digital sensor came on. An entry of 'N'RTN' will deactivate the 'OFF'. The available levels of response are exactly the same as for the 'ON' level.

28.2 SENSOR NUMBER

The sensor number chosen from the CONTROL POINT STATUS screen for Switch alarms, from the DIGITAL SENSOR REPORT screen for Digital Inputs alarms, and from the ANALOG SENSOR REPORT screen for Analog Input alarms.

28.2.1 HHMM HI LIMIT

The time that must elapse in military time after a high limit is reached before the alarm will take action. Applies only to Analog Sensor Alarms.

28.2.2 HHMM LOW LIMIT

The time that must elapse in military time after a low limit is reached before the off alarm will take action. Applies only to Analog Sensor Alarms.

28.2.3 HIGH LIMIT

The ON LEVEL setpoint, for Analog Alarms.

28.2.4 LOW LIMIT

The OFF LEVEL setpoint, for Analog Alarms.

If 'N'RTN' is chosen for the ON LEVEL, neither TIME HI LIMIT nor HIGH LIMIT prompts will appear.

If 'N'RTN' is chosen for the OFF LEVEL, neither TIME LOW LIMIT nor LOW LIMIT prompts will appear.

28.2.5 ON TIME (HHMM)

The amount of time a switch may be out of computer control (on) or a digital sensor is on before the event will cause an alarm condition. OFF TIME (HHMM) The amount of time a switch may be in computer control (off) or a digital sensor is off before the event will cause an alarm condition.

28.2.6 CYCLE COUNT

The amount of time in a cycle.

- If 'N'RTN' is chosen for the ON LEVEL, then the ON TIME prompt will not appear.
- If 'N'RTN' is chosen for the OFF LEVEL, then the OFF TIME prompt will not appear.
- If 'N'RTN' is chosen for the CYCLE LEVEL, then CYCLE TIME and CYCLE COUNT will not appear.

28.2.7 'MIN HOURS BETWEEN ALARMS'

The minimum # of hours between a repeating alarm. If this is zero, the minimum time will be the Alarm Time.

28.2.8 ENABLE CONDITION - CONDITION NUMBER

Is used only for Analog Sensor Alarms in Version 10 software. The condition must be true enabling the alarm to occur. The condition will be tested with both the "HI LVL" and "LO LVL" action.

28.2.9 CORRECT? (Y/N)

This prompt will appear at the end of every change screen, with the exception of CONDITIONS LIST. When the EMS/Z displays this prompt, the change data is stored on the RAM. Unless 'Y'RTN' is entered, the change data will not be stored in EMD. The operator should review one last time, the input entered and then enter 'Y'RTN' to make the data permanent.

Referring back to Figure 40, sensor numbers 4 and 5 represent a Switch (SW) and a Digital Input (DI) sensor alarm, respectively.

Figure 42 shows the change screen for sensor alarm #4.

FIGURE 42

THU 02/15/90	Danfoss-EMC, Inc., ZX SYSTEM	M1-M2-S1-S2-DB
TIME 1621:59	SENSOR ALARM REPORT 4	BUILDING #101
TYPE SENSOR (A/D/S/C)	SW	CHANGE:
ON LEVEL (N/L/T/A/C/R)	=LOG	CHANGE:
OFF LEVEL (N/L/T/A/C/R)	=LOG	CHANGE:
CYCLE LEVEL (N/L/T/A/C/R)	=LOG	CHANGE:
SENSOR NUMBER	= 1	CHANGE:
ON TIME (MINS)	= 20	CHANGE:
OFF TIME (MINS)	= 25	CHANGE:
CYCLE TIME (MINS)	= 30	CHANGE:
CYCLE COUNT	= 10	CHANGE:
MIN HRS BETWN ALMS	= 0	CHANGE:
CORRECT? (Y/N)		CHANGE:

28.3 ACCESS/PROMPT

In the beginning of this section, it was noted to enter XX Y'RTN' to display and/or enter the SENSORS ALARMS screen when prompted by the SENSORS ALARMS screen. There are other methods for gaining access to the SENSORS ALARMS screen.

From the ACTION MENU:

- 15 XX Y RTN' - Where XX designates the sensor alarm to be changed.

From any screen prompt:

- '@15 XX Y RTN' - Where XX designates the sensor alarms to be changed. (See the General Information section for a more detailed explanation of the @ symbol.)

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29.0 BUILDING STANDARDS

To display the BUILDING STANDARDS (Figure 43), enter 16 'RTN' when prompted by the ACTION MENU.

The BUILDING STANDARDS provides an easy method for changing condition constants without getting involved with the CONDITIONS LIST change screen. For example, within the conditions, there may be numerous statements involving the inside temperature for controlling cooling. The operator can access the inside temperature setpoint from the BUILDING STANDARDS instead of potentially spending a lot of time searching the conditions for the setpoint. Whether or not a condition will point to a constant setpoint or the BUILDING STANDARDS is determined at the time of database generation. If a change made through the building standards alters a condition's setpoint, then the conditions are associated with the building standards. Elsewhere, the operator must alter condition setpoints through the CONDITIONS LIST change screen.

The Building Standards allows 120 entries and allows both a high and low value for each. They are grouped for convenience but can be used independently.

FIGURE 43

THU 02/15/90				Danfoss - EMC, INC., ZX SYSTEM				M1-M2-S1,S2,DB			
TIME 1212:19				BUILDING STANDARDS 1				BUILDING #101			
#	NAME	HIGH	LOW	#	NAME	HIGH	LOW	#	NAME	HIGH	LOW
1	DEF TERM	60.0	60.0	2	SI,2 OFS	0.0	2.0	3	S3,4 OFS	2.0	0.0
4	S5, 6 OFS	0.0	2.0	5	S7,8 OFS	2.0	0.0	6	S9,10 OFS	0.0	2.0
7	ICRM 01	-22.0	-26.0	8	ICRM 02	-22.0	-26.0	9	ICRM 03	-22.0	-26.0
10	ICRM 04	-22.0	-26.0	11	FZFD 05	-11.0	-15.0	12	FZFD 06	-11.0	-15.0
13	FZFD 07	-11.0	-15.0	14	FZFD 08	-11.0	-15.0	15	FZFD 09	-11.0	-15.0
16	FZFD 10	-11.0	-15.0	17	FZFD 11	-11.0	-15.0	18	FZFD 12	-11.0	-15.0
19	FZBX 13	-10.0	-12.0	20	FZBX 14	-10.0	-12.0	21	FZBX 15	-10.0	-12.0
22	FZBX 16	-10.0	-12.0	23	DYCS 17A	28.0	26.0	24	DYCS 17B	28.0	26.0
25	DYCS 18A	28.0	26.0	26	DYCS 18B	28.0	26.0	27	DYCS 18C	28.0	26.0
28	DYCS 19A	32.0	28.0	29	DYCS 19B	32.0	28.0	30	MTCS 20A	26.0	22.0
STANDARD TO ALTER?			= CHANGE:1								
DEF TERM HIGH VALUE			= CHANGE:								
DEF TERM LOW VALUE			= CHANGE:								
CORRECT? (Y/N) :			CHANGE:								

29.1 ACCESS/PROMPT

In the beginning of this section, it was noted to enter 16 'RTN' to display the BUILDING STANDARDS when prompted by the ACTION MENU. There are other methods for gaining access to the BUILDING STANDARDS screen.

From any screen prompt:

- '@16 RTN' -Displays the Building Standards screen (See the General Information section for a more detailed explanation of the @ symbol).

A final note on the BUILDING STANDARDS screen. Entering DATG'RTN' when prompted by the AUTH will display the current BUILDING STANDARDS.

30.0 CP MANUAL CHANGE

This option will change the mode of one or a range of control points. This option is executed by entering the command as follows at the Action Menu: 17 W X Y

- 17 = Command option global control point manual change
- W = Mode 0 = computer mode
- 1 = Manual on mode
- 2 = Manual off mode
- X = Beginning control point
- Y = Ending control point

The indicated action will be taken and the Action/Option screen will appear. Note, the system must have been entered with an AUTH Code of 7 or greater.

If the mode of all control points are to be changed, enter only the new mode, e.g. 170 [RTN] will change all control points to computer mode.

30.1 CLEAR OPTIONS

One of the following two actions can be executed with this option:

Option #1

Reset the minimum and maximum analog values that are associated with one or a range of control points as it appears in a DAT1 or DAT2 report. This option is executed by entering the command as follows at the Action Menu: 18 A X Y

- 18 = Option number 18
- A = 1 to indicate this action
- X = Beginning control point
- Y = Ending control point

EXAMPLE: To reset analog value associated with control point number 21 enter: 18 1 21 'RTN'

EXAMPLE: To reset the analog values associated with control points 10 thru 198, enter: 18 1 10 198 'RTN'

Option #2

Reset to zero the maintenance run hours for one or a range of control points. This option is executed by entering the command as follows at the Action Menu: 18 A X Y

- 18 = Option number 18

- A = 2 to indicate this action
- X = Beginning or only control point
- Y = Ending control point.

EXAMPLE: To reset the maintenance run hours for control point 9, enter: 18 2 9 [RTN]

EXAMPLE: To reset the maintenance run hours for control points 33 thru 58, enter: 18 2 33 58 [RTN]

For both of these actions:

- If all control points are to be effected, enter only the action indicator. e.g., if the maintenance run hours for all control points are to be reset, enter: 18 2 [RTN]
- The Action Menu/Option screen will appear after execution has been completed.
- The system must have been entered with an AUTH code of 7 or greater.

31.0 NC25 COMMUNICATIONS

To display the NC25 COMMUNICATIONS (Figure 44) screen, enter 22'RTN' when prompted by the ACTION MENU. This screen provides two functions, 1 - User communications to NC25s on the RS485 two wire, bus; 2 - Download, pullback, and storage of 8 NC25 databases.

FIGURE 44

THU 02/15/90		Danfoss - EMC, INC., ZX SYSTEM		M1-M2-S1,S2,DB			
TIME 1212:19		NC25 COMM.		BUILDING #101			
#	NAME	DATE	TIME	#	NAME	DATE	TIME
1	CHILLER	05/02	0208	2	METER PULSE	05/02	0208

P/D/N/C/Y/RTN = MENU/# to COMM:

A variety of operator entries may be used.

- #'RTN' - # being a number 1 thru 63. This number is denoted by the dip switches 1-7 on the NC25. This will log the user into NC25 #.
- N'RTN' - Will pullback all NC25 Database names from the NC25s on the, RS485, two wire, bus.
- C'RTN' - Will erase all NC25 Database names from the ZX memory.
- Y'RTN' - Will allow the user to select which NC25 databases are to be pull-backed to the ZX's EMD.

EXAMPLE

SECTION # 1	CHANGE : ___
SECTION # 2	CHANGE : ___
SECTION # 3	CHANGE : ___
SECTION # 4	CHANGE : ___
SECTION # 5	CHANGE : ___
SECTION # 6	CHANGE : ___
SECTION # 7	CHANGE : ___
SECTION # 8	CHANGE : ___
ARE YOU SURE (Y/N)? :	

- P RTN' - Selects the NC25 pullback option. This option allows the user to pullback the NC25's databases, selected using the Y option, to the ZX's EMD.

WHICH UNIT TO PULLBACK(1-63, A = ALL)? :A

- D RTN' - Selects the NC25 download option. This option allows the user to download the NC25's databases selected using the Y option, from the ZX's EMD.

WHICH UNIT TO DOWNLOAD(1-63, A = ALL)? :A

ARE YOU SURE (Y/N)? :N

- RTN' - Displays the ACTION MENU. (See the ACTION MENU section.)

32.0 AUDIT TRAIL

The purpose of the Audit Trail report is to provide key information concerning the last 96 entries into the system.

The report is structured so that the most current entry, not including the present entry, is displayed first. The most current 48 entries are displayed on page one with page two containing the oldest 48 entries.

- Date/Time stamp of when the log on, entry occurred.
- Relative position of the AUTH code that was used for logging on. AUTH codes are used to limit entry to the system; therefore, the actual code is not displayed. To relate this number to an AUTH code, the positioning of entries within the AUTH code must be known. For example, 4, in the field would indicate the fourth AUTH code in the table was entered at the log on point. AUTH codes are entered when the database is created.
- Account code. This can be a number from 1 to 63. It is a method of assigning an AUTH code to multiple individuals and still be able to identify who has entered the system. This way, the same account code can be assigned to multiple AUTH codes without losing identification. The AUTH code is user definable and is entered when the database is created.
- Indication of action taken while logged into the system. The following codes are used:
 - 'view only' activities were executed.
 - 'c' a change screen was entered and exited with a 'y' indicating to make the entered changes.
 - 'u' a change was attempted without the correct AUTH code level.
 - 'n' activity with an NC25 was initiated.

A high level AUTH code of 8 or greater is required to display these screens.

- Duration of the log on. This is expressed in whole minutes

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SECTION 4
APPENDICES

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APPENDIX A: SPECIAL KEY SUMMARY

KEY	DESCRIPTION
'RTN'	Carriage Return (normally labeled as Return or 'RTN'), functions as a terminator of a line of input on the EMS/Z. (See also the General Information section for a more detailed explanation).
'ESC'	Escape. Has the same function as the 'RTN' except inside a change screen, where it allows skipping unchanging items, and terminating a Y/N question at the end of a change screen, where it will restart the same screen for further changes. (See also the General Information section for a more detailed explanation).
BACKSPACE	Allows the operator to erase incorrect input.
'CTRL' C	Discontinues DATC
'CTRL' D	Causes EMS/Z to terminate telephone communication.
'CTRL' F	Stops automatic refresh of data screens.
'CTRL' O	Starts automatic refresh of data screens.
'CTRL' K	Stops the EMS/Z output until either a control L or five minutes has elapsed.
'CTRL' L	Restarts output function.
'@'	Whenever the @ sign is entered, the operator is essentially placed at the bottom of the ACTION MENU and forced to respond to the prompt: SELECT 1 THRU 24: (See also the General Information section for a more detailed explanation).

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APPENDIX B:

SCREEN ID #	DESCRIPTION
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APPENDIX C: ALARM DEFINITIONS

ALARM	DEFINITION
HARDWARE RESET	Unit Reset. Reset switch on main system board thrown, or power supply monitor board detects an AC power supply problem but no power failure ensues.
POWER FAIL	Power failure to EMS/Z. Can be caused by utility power failure, EMS/Z power switch being turned off, circuit breaker feeding power to EMS/Z tripping or being turned off, or any other power interruption to the EMS.Z. On the Z-55 Version 5 power fail will be to the last hour. On Z-30/60 Version 5, and Versions 3, 6 and 8 it is correct to the last minute.
POWER RETURN	The time that power was restored to the EMS/Z. The difference between power fail and power return is the time the EMS/Z was out of service. Remember that the out of service is only stored to the last minute in Versions 3, 6 and 8. On the other Versions it will be to the last hour.
OPERATOR RESET	Performed by operator at either a local terminal or a remote terminal.
SOFTWARE RESET	Software reset. Performed by EMS/Z, can be caused by either software problems or hardware problems.
RELAY POWER*	Loss of 15 VDC power supply to the EMS/Z relays.
UNIT DOWN*	Indicates a refrigeration compressor is not functioning properly.
UNIT LOST*	Indicates that a Network Device is currently not communicating properly. The indication is that it has been out of communication for more than the time specified in the database. This is usually set at 15 minutes unless otherwise requested by the user.

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APPENDIX D: SYSTEM NUMBERS

Usually a standard turnkey database will utilize the following system numbers.

SYSTEM NUMBER/CONTROL POINT TYPE

1 - 99	REFRIGERATION
100 - 299	DEFROST
300 - 399	LIGHTING
400 - 499	HEATING, VENTILATION AND AIR CONDITIONING (HVAC)
800 - 899	AUTOMATIC TEMPERATURE CONTROL (ATC)
900 - 999	CUSTOMER PRESSURE CONTROL (CPC)

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APPENDIX E: FIGURE NUMBERS

FIGURE #	TITLE
1	SELECT PROMPT
1A	EXPANDED ACTION MENU
2	Heading Lines Format
3	Heading Lines Titles
4	CONTROL POINT screen, 1st page
5	CONTROL POINT screen, 2nd page
6	CONTROL POINT screen, Altered
7	Refrigeration System Type, EXPANDED STATUS
8	HVAC System Type, EXPANDED STATUS
9	Lighting System Type, EXPANDED STATUS
10	REFRIGERATION STATUS
11	SWITCH OVERRIDE
12	CONTROL ALARMS
13	UTILITY REPORT
14	HVAC STATUS
15	CONDITIONS LIST, 1st page
16	CONDITIONS LIST, 2nd page
17	SENSOR AVERAGES 1
18	HVAC STATUS
19	DIGITAL SENSORS
20	ANALOG SENSORS
21	SENSOR ALARMS
22	Refrigeration Type EXPANDED STATUS, Change
23	Defrost Type EXPANDED STATUS, Change
24	HVAC EXPANDED STATUS, Change
25	CONDITIONS LIST, Change
26	SCHEDULE GROUPS, Change
27	Schedule Changes
28	HOLIDAY DATES
29	PHONE NUMBERS
30	PHONE NUMBERS, Change
31	PHONE NUMBERS, Schedule Change
32	BUILDING HOURS, Change
33	BUILDING HOURS, Change
34	HISTORY POINTERS
35	DIGITAL SENSORS
36	DIGITAL SENSORS, Change
37	ANALOG SENSORS, Change
38	ANALOG SENSORS, Change
39	ANALOG SENSORS, Change
40	ANALOG SENSORS, Change

FIGURE #	TITLE
40	SENSOR ALARMS
41	SENSOR ALARMS, AI Change
42	SENSOR ALARMS, SW AND DI change
43	BUILDING STANDARDS, Change
44	NC25 COMMUNICATIONS, Change Screen

APPENDIX F: GLOSSARY

AHU	Air Handling Unit
ALGORITHM	An involved, repetitious, step-by-step procedure which each control point and all input/output data must run through before control decisions are made.
ALM	Alarm.
ALPHANUMERIC	Any valid character: alpha, numeric, special characters, etc. (and sometimes punctuation marks or mathematical symbols).
ANALOG SENSOR	A continuous measuring device, which can represent temperature, pressure, humidity, etc.
ATC	Automatic Temperature Control. This point interfaces with the EMS/Z and, when activated, will override DMC's control of an entire HVAC system back to local control.
AUTH	Authorization. Usually a request for operator's password.
BOOLEAN OPERATOR	A conditional operator used for evaluation of existing conditions resulting in a true or false result.
BTU	British Thermal Unit. The quantity of heat required to raise the temperature of one pound of water one degree Fahrenheit (at or near 39.2 degrees F).
CP #	Control Point Number. A computer output point controlling all or part of some energy system.
CPC	Customer Pressure Control.
CPU	Central Processing Unit. The Central Processor and memory system of the computer.
CRT	Cathode Ray Tube. The television screen type terminal that supports communication with the computer.
CUT-IN	A pressure setting at which a refrigeration compressor will begin to function.
CUT-OUT	A pressure setting at which a refrigeration compressor will cease to function.
CTRL	Control key.
DIGITAL SENSOR	Can only report two situations: ON and OFF.
EAROM	Electrically Alterable Read Only Memory.
ECHO	Repeats information entered for operator verification.
EMD	Expanded Memory Device

Version 10 Operator's Guide

EMS/Z	Energy Management System; Z is the designation of the machine series. The microcomputer system which controls energy using devices in a building.
ESC	Escape key.
HVAC	Heating, ventilation and air conditioning.
MENU	A list of the items that supply the operator with all of the available options from which a choice can be made to have the system perform a task, provide further data, and/or change data.
MILITARY TIME	Time reported in 24 hour "hundreds" format, i.e., 1355 = 1:55 p.m.
MODEM	Device used to change data from computer form to a form suitable for transmission, and vice versa, usually via telephone wires/satellite. The modem is also used at the receiving end to reverse the process.
NESTED	Used in CONDITIONS LIST screens, indicates that the condition is used by another condition as a statement.
NETWORK CONTROLLER	<p>(NC10) An NC10 is a microprocessor based two wire communication system. It is capable of performing digital outputs, digital inputs, analog inputs, analog outputs, etc. A Z55 with Version 8, 9 & 10 or a ZX with Version 8 can handle up to 127 NC10's. A Z55 or a ZX running Version 5 will support up to 30 NC10's. Version 6 is a specialized case for handling NC10's motor control only.</p> <p>(NC25) The NC25 (Network Controller 25) is both an intelligent, stand-alone microprocessor as well as a two wire long distance differential transmission system. As a controller it is capable of controlling up to 48 digital outputs, 48 digital inputs, and 48 analog inputs. (32 analog outputs are also available.) It utilizes the same HVAC, Refrigeration, Lighting, and various control algorithms as its parent ZX system. The NC25 may be connected to a ZX via the two wire RS485 differential interface that allows long distance transmission at high speeds</p>
OPTIONAL PARAMETERS	Additional information that can be entered in a screen prompt to start a screen with a specific control point, analog point, digital point, etc.
PASSWORD	A secret set of characters used for obtaining entrance into the EMS/Z.
PCB	Pressure Control Box used in supermarkets as an interface to existing refrigeration systems.
PCI	Pressure Control Interface used to reverse the logic of the EMS/Z when interfacing to existing refrigeration systems.
POWER UNIT UP/DOWN	Turn the computer on/off.
PROMPT	Statement or question seen at the bottom of a screen to cue the operator with directions for further movement.
PSI	Pounds per square inch.
'Q' OPTION	Allows operator to access a specific type control point without knowing the particular control point number by entering 'Q' and the system number.

RATE OF CHANGE	The name given to DMC's specialized refrigeration algorithm, for efficient control of refrigeration compressors, utilizing as a basis, a mathematical integration technique. Replaces the traditional approach of using fixed cut-in and cut-out. RS232 PORT Standard signal configuration of communication cable between computer and terminal. RTN Return key.
RTU	Roof Top Unit.
SENSOR	Device reading or 'sensing' a store or system condition.
SYSTEM NUMBER	Basically used when applying the 'Q' Option. See Appendix D.
TERMINAL	Connecting device to the computer, includes a keyboard and a television type screen.
TIME OUT	After 15 minutes of non-use, the operator is logged off the machine which resets the communications mode. The operator must use the password to reenter the system.
WALKING OFF	Computer returns to a non-communicating state. Same as Time Out.
X	Special feature used in making a change in the 'DAYS' listing of a change screen. SMTWRFA12345678 equals Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Holiday #1, Holiday #2, etc. To include all the days, just enter X. X overrides all other days and will print out as ***ALL DAYS***.
'> ='	Symbol means preceding number or term is greater than or equal to the following number or term. Example: INSD TEMP = 72.
'< ='	Symbol means preceding number or term is less than or equal to the following number or term. Example: INSD TEMP < = 72.

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APPENDIX G: MESSAGE STORAGE CAPABILITIES

The EMS/Z has a message storage feature that allows the user to enter up to 25 messages, with up to a total of 128 lines. It also allows the editing of new or old messages, and the retrieval of the messages by number.

Access it from the 'AUTH' level, by entering MESH XX'RTN', where 'XX' is the number of message to edit.

FIGURE 1-G

```

THU 02/15/90          Danfoss-EMC, INC., ZX SYSTEM          M1-M2-S1-S2-D
TIME 2058:16          DATA RETRIEVAL                      BUILDING #101

MSG #1   01/23/90   MESSAGE STORAGE AND RETRIEVAL CAPACITY OF 25 TOTAL
                MESSAGES WITH A TOTAL OF 100 LINES, EACH 64 CHARACTERS LONG.

MSG #2   01/23/90   MESSAGES DATED ON ENTRY, FOR TRACKING PURPOSES.

MSG #3   01/23/90   EXTENSIVE EDIT FUNCTIONS FOR MESSAGE UPDATING.

MSG #5   01/23/90   PULLBACK OF ALL MESSAGES USING THE 'DATM' FUNCTION.

CURRENT: 01/23/90   MESSAGE STORAGE AND RETRIEVAL CAPACITY OF 25 TOTAL

EDITED:  01/24/90   MESSAGES, WITH A TOTAL OF 100 LINES, EACH 64
                CHARACTERS LONG

EDIT: _____

```

The following control characters are used for editing messages:

- 'CTRL' S - Copies the character under the cursor from the old line into the new line. This is used to allow changing only a few characters without typing the entire line over.
- 'CTRL' X - Copies characters from where the cursor is to the end of the line, from the old line to the new line, and then goes to the next line. The usage is the same as that for 'CTRL' S.
- 'CTRL' Z - Ends the edit function without altering the rest of the message
- BACKSPACE DELETE - Back up the cursor one space if it is not already at the beginning of the line.
- LINE FEED 'CTRL' J - Line feed takes all succeeding line of the message and erases them, freeing them for use in future messages. If the cursor is on the first character of the line, this will include the current line, too.
- RETURN - If entered as the first key in the edit mode, return ends the edit session without changes, allowing the user to simply view the message. If entered at some point on an edit line, return will 'pad' out the rest of the line with spaces, store the line, and go to the next page.

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APPENDIX H

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APPENDIX I: ALARM ARMING

General Description - Version 10 Software has 20 different alarm types. In addition, there are five distinct telephone numbers, a local printer and a local alarm for call outs with individual schedules, etc. Each alarm type may be armed such that it will either call or not call when the condition occurs. It can then specify which phone numbers and/or local devices it is armed to dial out to. Please contact your DMC representative for additional information.

This alarm arming is specified when the database is generated, for more information refer to the database preparation system's manual.

If a system will not dial out alarms, after the alarm, phone number and schedules have been properly verified; it must be determined if that alarm is armed for the given output device.

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APPENDIX J

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APPENDIX K: INTERPRETING DAT'S

The term "DAT" refers to a data retrieval. A DAT can be run for any one of the EMS-Z's basic items listed on the Action Menu. The available data for any particular screen can be retrieved and displayed. To accomplish this, one simply types, at the AUTH prompt, DATX (no spaces) followed by one return, where "X" represents the number of the screen to be retrieved. Since the EMS-Z's programming is written in Hex code, screens 1 through 9 can be retrieved by typing DAT1, DAT2, DAT3, etc. Retrieval of screens greater than 9 require using the alphabetic equivalents A, B, C, etc. Hence, Screen 10 is retrieved by typing DATA, Screen 11 by DATB, Screen 12 (History Pointer) by DATC, and so on.

The most commonly used dat is the DATC which returns history information stored as requested by the user.

DAT1

The next most commonly used data retrieval is the DAT1 (Figure 1-K) which provides one to two lines of information for every point listed in Screen 1 Control Point Status report. On the following page is a sample DAT1, where column headings (i.e., A, B, C, D, etc.) have been added for explanatory purposes.

At the beginning of the report on the left side will be displayed the day of the week and the current date. The line below this will show the current EMS-Z time. It is prudent to routinely check the accuracy of this information since many of the system's control strategies are in some way time and day of week driven. At the top right of the report will be displayed a string of unit identifiers. These represent, in order, the monitor # (##-##) the software version and the database revision number (##-##). Directly below the unit identifiers is displayed the unit's name consisting of up to 12 characters.

Following are the explanations for the column headings that were added to the print out:

- **Column A "CP #"** - The number of the individual control point for which data is being displayed.
- **Column B "SYSTEM NAME"** - The name assigned to each control point consisting of up to 8 characters including spaces.
- **Column C "PRESENT STATUS"** - The first digit describes the type of control point using the following codes:
 - 1 = Refrigeration control point
 - 2 = Defrost control point
 - 3 = Lighting control point
 - 4 = HVAC control point or a Refrigeration point controlled by a temperature probe only
 - 5 = Network override control point

FIGURE 1-K

THU 02/15/90 TIME 0616:11		Danfoss-EMC, INC., ZX SYSTEM DATA RETRIEVAL										M1-M2-S1-S2-D BUILDING #101			
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
CP	SYSTEM	PRESENT	LAST TIME	RUN	TIME	TOTL	MODE	CYC	MAX	MIN	SC	DC	RC	MC	
#	NAME	STATUS	ON	OFF	TDY	YST	HRS								
ALARMS (TYPE, DAY, TIME)															
1	OPN OFFC 3		0745	1900	0212	0501	78	0	1	0.1	0.0				
	(2) SAT 1519	(1)	SAT 0939												
2	TRAINING 3		0745	1730	0212	0532	67	0	1	0.2	0.0				
	(2) MON 1909	(1)	MON 1358	(2)	MON 1358	(1)	MON 1353	(2)	MON 1352	(1)	MON 1236				
3	FRNTOFFC 3		0745	1830	0212	0431	74	0	1	0.3	0.0				
	(2) SAT 1519	(1)	SAT 0939												
4	ACCNTING 3		0745	1830	0212	0632	74	S0	1	0.4	0.0				
	(1) TUE 0638	(2)	MON 1909	(1)	MON 1358	(2)	MON 1358	(1)	MON 1353	(2)	MON 1352				
5	MANUFACT 3		0745	1900	0212	0702	78	S0	1	0.5	0.0				
	(1) TUE 0638	(2)	MON 1909	(1)	MON 1358	(2)	MON 1358	(1)	MON 1353	(2)	MON 1352				
6	STOCK RM 3		0745	1900	0212	0702	78	S0	1	0.6	0.0				
	(1) TUE 0638	(2)	MON 1909	(1)	MON 1358	(2)	MON 1358	(1)	MON 1353	(2)	MON 1352				
7	OUTSIDE 3		2033	0640	0640	1008	114	0	0	94.9	0.0				
8	HOT ROOM 4		1530	1541	0000	0011	13	0	0	120.8	0.0				
10	AHU1 NCB 5		1358	0000	0957	2347	263	0	0	1.0	0.0				
11	AHU2 NCB 5		1358	0000	0957	2347	263	0	0	1.1	0.0				
12	AHU3 NCB 5		1358	0000	0957	2347	263	0	0	1.2	0.0				
13	AHU4 NCB 5		1358	0000	0957	2347	263	0	0	1.3	0.0				
14	AHU5 NCB 5		1358	0000	0957	2347	263	0	0	1.4	0.0				

15	AHU6	NCB	5	1358	0000	0957	2347	263	0	0	1.5	0.0
16	AHU7	NCB	5	1358	0000	0957	2347	263	0	0	1.6	0.0
17	AHU8	NCB	5	1358	0000	0957	2347	263	0	0	1.7	0.0
18	SPRNKLR	S	5	1358	0000	0957	2347	263	0	0	1.8	0.0

- 7 = CTL control points such as PCO, Fire or Burglar Alarm, or ATC point that is placed in a manual mode as a result of a sensor alarm.
- 9 = NC25 control point (monitoring purposes only)
- **Column D "LAST ON"** - Indicates the last time of day that the EMS-Z called for the point to turn on. This time can be from a day prior to the current day if the point has been on constantly since before midnight.
- **Column E "LAST OFF"** - Indicates the last time of day that the EMS-Z called for the point to turn off.
- **Column F "RUN TDY"** - The accumulated run time in hours and minutes for the device since midnight. For monitored points, this run time is accumulated from the point's monitor digital input. For non-monitored points, it is based upon the accumulated time that the EMS-Z has been calling for the point to operate.
- **Column G "TIME YST"** - Shows the accumulated run time for the point from 00:00 to 23:59 hours the day before.
- **Column H "TOTL HRS"** - Indicates the total accumulated run time for the device in whole hours, based on whether the monitor input or the control output code, since the last time the maintenance hours were zeroed out. This counter is reset to zero by typing M (return) at the end of the Expanded Status screen for any individual control point, or by using menu item 18.

Although the minutes associated with this counter are truncated and are not displayed, they are retained by the system. As an example, a point with a total run time of 17 hours and 56 minutes will be displayed as 17 hours. If the device were running and another DAT1 was run 6 minutes later, the total hours would be displayed as 18 with the additional minute being truncated for display purposes.

- **Column I "MODE"** - This column indicates the points control mode. It will display an "S" if the hardware toggle switch on the I/O board has been taken out of computer control. An "O" is displayed for points that are under EMS-Z control (a very favorable condition, indeed); a point that has been placed manual "ON" through the software will show a 1 (see CP #5 on the sample DAT); a 2 is displayed for points placed manual "OFF" through the software (see CP #4); and for those points that have automatically been placed manual "ON" by the software as the result of a sensor alarm, a 3 is displayed in the mode column.

Version 10 Operator's Guide

- **Column J "CYC"** - This counter indicates the number of times, since midnight to the current computer time, that the device has transitioned from an on to an off status.
- **Column K "MAX/MIN" (in level 8)** - These columns display, for those points controlled by specific analog sensor, the highest and lowest values registered by each sensor since the last time the counters were reset. Level 10 displays these values to the nearest tenth for all primary analog sensors (i.e., pressure transducers, box probes, air supply and zone temperature probes, etc.) that are displayed on Screen 1 Control Point Status. To reset these values, type 18 (return) at the Action Menu prompt "select 1 through 24." Unless this reset is performed, the unit will continue to retain readings from the initial system start-up. The Max/Min counters with resets at the appropriate intervals can be extremely useful during system fine tuning and for establishing existing settings of mechanical controls.
- **Column L "SC"** - This counter indicates the number of times since midnight that the point's monitor point transitioned to ON as a result of the EMS-Z's ON output but then transitioned to OFF prior to meeting its minimum on time or the EMS-Z's OFF output. Short cycles are tracked only for type 1 refrigeration control points. Excessive short cycles typically indicate equipment problems such as low gas levels or mechanical interference.
- **Column M "DC"** - This counter indicates the number of defrost cycles since midnight. For multiple compressor racks, the total number of defrosts for the refrigerated circuits in total fed by the rack is re-posted by each compressor on the rack. Hence, Rack A on the sample DAT has experienced a total of 4 defrosts since midnight, not 12 as might be erroneously inferred. Defrost counters are tracked only for type 1 refrigeration control points.
- **Column N "RC"** - This counter indicates for type 1 control points the number of time since midnight that the EMS-Z has sent an ON output without receiving a corresponding ON digital input from the monitor point. Relay counters typically result from mechanical interference such as mechanical time delays and can significantly impair the operational efficiency of the system. These problems should be corrected at the earliest opportunity.
- **Column O "MC"** - This counter tracks the number of times since midnight that the EMS-Z has detected an "invalid" monitor input for each monitored control point. A monitor input is deemed invalid if the digital input has consistently read ON for 4 passes of the algorithm after the EMS-Z has turned the point off. Monitor counters can indicate mechanical interference as well as a problem with the monitor module failing to transition properly.

In addition to all the preceding data, the DAT1 will also display on the line below each control point up to 6 alarms for the point (see heading P, CP #4). A code describing the alarm is shown in parentheses followed by the day of the week and the time it occurred. Alarms are retained for either one week or until the point's alarm storage capacity is exceeded, in which case the oldest alarm will be dropped and the new alarm will be stored. The most recent alarm is displayed on the far left side of the line, working backward in time to the oldest alarm on the far right.

The alarm description codes are defined as follows:

1. Point placed in switch override.
2. Switch reset to EMS-Z control.
3. Point's digital input constantly read OFF longer than its permissible off interval as established in sensor alarm; unit is down.
4. Point placed manual (ON) through a CRT keyboard.
5. Point placed manual (OFF) through a keyboard.

6. Point reset to EMS-Z control (COM) through a keyboard.
7. Defrost monitor point not on when unit was placed in defrost by EMS-Z.
8. Defrost point placed manual (ON) through a keyboard.
9. Defrost point placed manual (OFF) through a keyboard.
10. Point's digital input constantly read ON for longer than its permissible on time as established in sensor alarm; constant run.
11. (Not in use.)
12. Point's transducer is invalid; pressure reading has been -8 or lower for at least 5 minutes.

Following the data for each of the system's control points, the DAT1 will then display the current and past hour's average for the analog sensors found at the top of the HVAC Status Report screen followed by the sensors from the top of the Refrigeration Status Report screen. Below this the DAT1 next displays a section of up to 12 system alarms followed by the utility report for the first five of the possible fifty utility meters monitored by the system. Messages for level 10 systems are retrieved by typing DATM (return) at the AUTH prompt.

Other frequently used DATs are for the Refrigeration Status Report and for the HVAC Status Report. Data for the appropriate control points is displayed using a format virtually identical to that of the DAT1. Data retrievals for all of the remaining EMS-Z screens are identical in appearance to the way in which they are presented when selected through the Action Menu. At the completion of any DAT, the system automatically returns to the AUTH prompt security lockout.

The DAT is an extremely efficient means by which the system can be quickly interrogated for detailed information. The DAT1 in particular enables the user to succinctly ascertain how the system is operating and whether or not there are mechanical items in need of attention. It is recommended that a DAT1 be routinely retrieved for each system once a week.

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APPENDIX L: MISCELLANEOUS INFORMATION

1. When you enter the AUTH code with the proper response and all you get back is AUTH you have one of the following problems:

- You are not using the right AUTH code.
- Your phone line may have a problem.
- Your Z may have a problem.
- You are not in upper case. (NC25 only)

2. When you do a DAT1 and see 0.0 under minimum on the AHU you know:

- Nobody has responded "18 RETURN" at the bottom of the MENU screen since the last time the system was loaded.

3. When you do a DAT4 and see 5 weekly totals instead of 14 daily totals you know:

- That the system is storing meter data by day. This can be changed to store data by week. This is a database change.

4. When you do a DAT8 and no phone numbers appear you know:

- No phone numbers have been set in the system.
- ALM & CRIT alarms won't be getting to anyone---put an error logger number in.

5. When you do a DATC and nothing appears you know that:

- Someone reloaded the data base without the History Pointers.
- No history pointers were entered.

6. When you do a DATN and the error counts are high. (more then three times the day of the month)

- They are problems with the communication RS485 line (two wire buss). This will require immediate attention.

7. When you do a DAT3 and see lots of resets you know that:

- You should call Danfoss-EMC, Inc. because you have potential problems. (You also could have experienced legitimate power outages or single phasing, so check with the store first.)

8. When you do a DAT1 and see a large number in the RC counter and you know that:

- The computer has told a device to turn on and has not received an indication that the monitor is on within 15 seconds. Something is interfering with your control strategy.

9. When you display the control point list and an S appears next to the control point you know that:

- The store has switched the point out of computer control again.

10. When you do an expanded status on a compressor and you see "STATUS OUT" says ON and "STATUS MON" says OFF or "STATUS OUT" says OFF and "STATUS MON" says ON you know that:

- Something is interfering with computer control like a time delay or the relay has been wired out.
- Potentially, the monitor has failed either OFF or ON.
- You can verify the monitor by turning the rest of the compressors on the rack off, turn the one you are concerned about on and watch the suction pressure.
- All of the above may be appropriate.

11. When you look at an expanded status on a compressor and you see 432 cycles under CYC you know that:

- The compressor is cycling too often and you will soon get to replace it.
- The compressor is low on Freon.
- The safety cut out is too high and is interfering with the TMROC strategy.
- Back up controls are not set out of the way if the compressors are controlled in series.
- Potentially, any or all of the above.

12. When you do an expanded status report and you see run time today and yesterday around 23 hours for each compressor you know that:

- The rack is over loaded.
- The condensers aren't working properly.
- The valving on the rack is messed up
- The monitors are wrong.
- The transducer is feeding incorrect signals to the system.
- Potentially, any or all of the above.

13. When the outside or sign lights don't come on or go off when you want them to you know that:

- You've got a bad contactor.
- You've got a bad relay.
- The system isn't controlling them.
- You've change the back up schedule in the condition away from 2100 and it is forcing the lights on.
- You forgot about pre and post delays on the point.

- Your photocell is shot.
- You can track what's going on by using History Pointers.
- You've changed the schedule on the control point, thus messing up the strategy.
- Potentially, any or all of the above.

14. When you want to see if things go off and come on when they're supposed to you know that:

- You can change schedules.
- You can turn control points Manual (ON).
- You can set analog values for things like temperatures or pressures or light indications to any values that you want.
- You can do all of the above.

15. When you dial up a store and you don't get an AUTH response from the system you know that:

- You should try "CTL L", followed by RETURN, to see if that will get you started.

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APPENDIX M: COMMANDS KEYS

CTL O	Starts the Z screen scrolling.
CTL F	Stops the Z scrolling. Useful for watching changes every cycle.
CTL K	Stops data flowing from the Z.
CTL L	Restarts data flowing from the Z. Useful, for example, in stopping DAT1;s to look at min/max.
CTL C	Terminates some DAT's.
MESG XX RTN	Gets you into the edit mode for message # XX when entered at AUTH prompt.
'@'	Convenient way to bypass the ACTION MENU when you want to go directly to another screen on the Z.
CTL D	Hangs the Z up properly. Should be preceded by any DAT to make sure ALL alarms are active.
ESCAPE	Takes you to the bottom of any change screen. Also, when used in place of RETURN, provides exactly the same results as RETURN except that it takes you back to the top of the screen you were on.
For Editing Messages:	
CTL S	Copies one character from the old line to the new line.
CTL X	Copies all characters to the end of the line.
CTL Z	Ends the edit function without any further changes.
CTL J	Erases all succeeding lines of the message including the one the cursor is on, if it is on the first character.
RETURN	If entered as the first key in edit mode, the edit session is ended and the AUTH prompt will appear.

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APPENDIX N: SAMPLES OF SOME TYPICAL CHANGES

This appendix will walk you through some typical changes that you may want to make while working with the system. Changes for:

- Compressor Settings
- Condition Targets and Building Standards
- Holiday Dates
- Phone Numbers
- Lighting Schedules
- Building Hour Base
- History Pointers
- Digital Sensors
- Analog Sensors
- Sensor Alarms
- Messages

Each in will turn be examined in detail. In each case, a word description of the current situation will be given first, followed by a practical reason for a change, and then a step by step explanation on how to make the desired change. Hopefully, this appendix will give you a ready reference when you need to change "something" and aren't yet comfortable with the process.

N.1 COMPRESSOR SETTINGS

You have "A" rack running at 14 PSI with a target case discharge temperature of 22, an allowable target PSI variation of 3, and a sensitivity setting of 5. The expanded status report and change screens for "A" rack look like the following:

FIGURE 1-N

THU 02/15/90		Danfoss-EMC, Inc., ZX SYSTEM				M1-M2-S1-S2-DB				
TIME 1212:19		EXPANDED STATUS # 65				BUILDING #101				
COMP A 1	PSI:	CURR= 14.4P	TARG=11	COUT= 8	25	-3	0	2	1	2
SDMT T02	TEMP	CURR= 26.3F	TARG=22	AVG =26						
#	STATUS		TIMING			ACCUM RUN TIME				
	OUT	MON	MODE	LST ON	LST OFF	CYC	TODAY	YESTERDAY	TOTAL	
13*	RACK	A&B	ON	0000	0000	0	1215	2400	2933	
65*	COMP A 1	OFF	OFF	1139	1201	18	0628	1339	2322	
66*	COMP A 2	ON	ON	1159	1142	18	0644	1442	2098	
67*	COMP B 1	ON	ON	1154	1145	34	0448	0915	1240	
68*	COMP B 2	OFF	OFF	1145	1155	34	0513	1127	1925	
69*	MTPR B 3	OFF		1443	1502	0	0000	0019	482	
CONDITION # 23 T		CONDITION # 17 0								
CHANGE Y/N/S/M/C/A/D/L/ BCP # : Y										

FIGURE 2-N

THU 02/15/90		Danfoss-EMC, Inc., ZX SYSTEM		M1-M2-S1-S2-DB	
TIME 12:12:19		CHANGE CTRL PT # 65		BUILDING #101	
NAME:	COMP A 1	CHANGE:	_____		
OFF TIME (MIN)	= 0	CHANGE:	___		
ON TIME (MIN)	= 0	CHANGE:	___		
RATE OF CHNG(Y/N)	= Y	CHANGE:	___		
PSI TARGET VALUE	= 14	CHANGE:	___		
CUT-OUT VALUE	= 3	CHANGE:	___		
TEMP SENSOR #	= 34	CHANGE:	___		
TEMP TARGET VALUE	= 22	CHANGE:	___		
TEMP VAR ALLOWED	= 0	CHANGE:	___		
PSI VAR ALLOWED	= 3	CHANGE:	___		
SENSITIVITY	= 5	CHANGE:	___		
MAN (COM/ON/OFF)	= COM	CHANGE:	___		
CORRECT? (Y/N):		CHANGE:	___		

The meat manager calls you and says "My fresh meat is too cold".

You go to the change screen and decide to raise the target suction pressure by 2 PSI and raise the sensitivity from 5 to 4. (1 = most sensitive, 10 = least sensitive) You also decide to raise the case discharge temperature by 2 degrees F to conform to standards. When you get to the bottom of the change screen you key in "Y" as shown below.

FIGURE 3-N

THU 02/15/90		Danfoss-EMC, Inc., ZX SYSTEM		M1-M2-S1-S2-DB	
TIME 12:12:19		CHANGE CTRL PT # 65		BUILDING #101	
NAME:	COMP A 1	CHANGE:	_____		
OFF TIME (MIN)	= 0	CHANGE:	___		
ON TIME (MIN)	= 0	CHANGE:	___		
RATE OF CHNG(Y/N)	= Y	CHANGE:	___		
PSI TARGET VALUE	= 14	CHANGE:	<u>16</u>		
CUT-OUT VALUE	= 3	CHANGE:	___		
TEMP SENSOR #	= 34	CHANGE:	___		
TEMP TARGET VALUE	= 22	CHANGE:	<u>24</u>		
TEMP VAR ALLOWED	= 0	CHANGE:	___		
PSI VAR ALLOWED	= 3	CHANGE:	___		
SENSITIVITY	= 5	CHANGE:	<u>4</u>		
MAN (COMM/ON/OFF)	= COM	CHANGE:	___		
CORRECT? (Y/N):		CHANGE:	<u>Y</u>		

FIGURE 4-N

THU 02/15/90		Danfoss-EMC, Inc., ZX SYSTEM		M1-M2-S1-S2-DB	
TIME 1212:19		CHANGE CTRL PT # 65		BUILDING #101	
NAME:	COMP A 1	CHANGE:	_____		
OFF TIME (MIN)	= 0	CHANGE:	_____		
ON TIME (MIN)	= 0	CHANGE:	_____		
RATE OF CHNG(Y/N)	= Y	CHANGE:	_____		
PSI TARGET VALUE	= 16	CHANGE:	_____		
CUT-OUT VALUE	= 3	CHANGE:	_____		
TEMP SENSOR #	= 34	CHANGE:	_____		
TEMP TARGET VALUE	= 24	CHANGE:	_____		
TEMP VAR ALLOWED	= 0	CHANGE:	_____		
PSI VAR ALLOWED	= 3	CHANGE:	_____		
SENSITIVITY	= 4	CHANGE:	_____		
MAN (COMM/ON/OFF)	= COM	CHANGE:	_____		
CORRECT? (Y/N):		CHANGE:	_____		

N.2 CONDITION TARGETS

The store calls and says "We're too cold. The check out people are ready to quit and all of our customers have a decidedly blue tinge." Suspecting that "action" is called for you decide to turn heat reclaim on at 1 degree F higher than it is currently being turned on. You call the store and pull up the "5" screen which looks like the following:

FIGURE 5-N

THU 02/15/90		Danfoss-EMC, Inc., ZX SYSTEM		M1-M2-S1-S2-DB				
TIME 1212:19		HVAC STATUS						
SENSOR NAME	CURR AVG	SENSOR NAME	CURR AVG	SENSOR NAME	CURR AVG			
54 INSD TMP	71.4F 71.0	9 HUMIDITY	29.3% 30.2	11 OTSD TMP	40.7F 40.4			
55 SPLY TMP	88.3F 82.1	12 COMP TMP	69.2F 70.6	13 STOCK 1	67.7F 67.2			
56 RETN TMP	59.1F 59.4	14 STOCK 2	65.5F 65.1	15 STOCK 3	76.0F 73.2			
CP	NAME	STATUS	CURR VAL	TARG/ CUTIN	CUT OUT	SYSTEM TYPE	COND #	RUN HOURS
17	AHU	ON	87.8F			HVAC	#1 T	3397
18	COOL1	OFF				HVAC	#2 F	0
19	COOL2	OFF				HVAC	#3 F	86
20	HTRC1	ON				HVAC	#4 T	2736
21	HTRC2	OFF				HVAC	#5 F	1787
22	GDB 1	OFF				HVAC	#7 F	405
23	SPARE	OFF				HVAC	#8 F	404
24	ATC	ON X				HVAC		3615
25	UNITHT1	OFF X	67.5F			HVAC	#10F	285
26	UNITHT2	OFF X	65.7F			HVAC	#11F	1376

Keying in "20 RETURN" you bring up the Expanded Status Report for HTRC 1 which appears as follows:

FIGURE 6-N

```

THU 02/15/90          Danfoss-EMC, Inc., ZX SYSTEM          M1-M2-S1-S2-DB
TIME 1212:19          EXPANDED STATUS #20                   BUILDING #101

HTRC 1                HVAC      CTL

      STATUS          TIMING          ACCUM RUN TIME
#     OUT MON MODE  LST ON LST OFF  CYC TODAY YESTERDAY TOTAL
20  HTRC 1         ON   ON          0924  0911      5   1134    2157   2736

SCHEDULE GROUP # 20
  ON/OFF          DAYS    CYCLE          ON/OFF          DAYS    CYCLE
1  0005    008 *** ALL DAYS **

CONDITION # 4 T
CHANGE Y/N/S/M/C/A/D/L/CP # : C
    
```

By entering "C RETURN" you bring up the conditions that control heat reclaim which appears as follows:

FIGURE 7-N

```

THU 02/15/90          Danfoss-EMC, INC., ZX SYSTEM          M1-M2-S1-S2-DB
TIME 1212:19          CONDITIONS LIST                                           BUILDING #101

NUMBER BOOLEAN  SENSOR OR SCHEDULE  VALUE          C P ASSOCIATION
4              ( INSD TMP AIN      [71.4]         HTRC 1
  <=          HTRC1 NT HSTD      [70.0]         )
or           (( INSD TMP AIN      [71.4]
  <=          HTRC1 DY HSTD      [72.0]         )
and          LOGIC COND # 6

6              SCHEDULE GROUP #* 602          NESTED
  * = BASED ON 0700 TO 2400 TODAY
  *-0200 0000 *** ALL DAYS ***
or           ( SCHEDULE GROUP #* 603
  * = BASED ON 0700 TO 2400 TODAY
  *-0300 0000 *** ALL DAYS ***
and          ( OTSD TMP AIN      [41.0]
  <=          HTRC WTR HSTD      [50.0]         ))

CHANGE Y/RTN/CONDITION #:
    
```

Looking at Condition #4 you note that the HTRC1 day high standard is 72 which means you want to raise it to 73. Since the value for "HTRC1 DAY HIGH STANDARD" is held in building standards, you enter "@16 RETURN" to bring up the building standards screen which appears as follows:

FIGURE 8-N

THU 02/15/90 TIME 1212:19			Danfoss-EMC, Inc., ZX SYSTEM BUILDING STANDARDS 1			M1-M2-S1-S2-DB BUILDING #101		
#	NAME	HIGH LOW	#	NAME	HIGH LOW	#	NAME	HIGH LOW
1	COOL1 DY	72.0 0.0	2	COOL1 HM	53.0 0.0	3	COOL2 DY	74.0 0.0
4	COOL2 HM	55.0 0.0	5	HTRC1 DY	72.0 0.0	6	HTRC1 NT	70.0 0.0
7	HTRC2 DY	71.0 0.0	8	HTRC2 NT	70.0 0.0	9	HTRC WTR	50.0 0.0
10	GDH 1 DY	70.0 0.0	11	GDH 1 AM	69.0 0.0	12	GDH 1 NT	68.0 0.0
13	GDH 2 DY	64.0 0.0	14	GDH 2 AM	62.0 0.0	15	GDH 2 NT	60.0 0.0
16	GDH LOCK	45.0 0.0	17	UNITHT 1	65.0 0.0	18	UNITHT 2	65.0 0.0
19	UNITHT 3	72.0 70.0	20	UHT OTSD	55.0 40.0	21	MTPR BOB	55.0 50.0
22	A SETBK	2.0 0.0	23	B SETBK	2.0 0.0	24	C SETBK	2.0 0.0
25	D SETBK	2.0 0.0	26	E SETBK	2.0 0.0	27	25 SETBK	2.0 0.0
28	SPARE	0.0 0.0	29	SPARE	0.0 0.0	30	SPARE	0.0 0.0

STANDARD #/RTN/0-MENU? CHANGE: 5
HTRC1 DY HIGH VALUE = 72.0 CHANGE: 73
HTRC1 DY LOW VALUE = 0.0 CHANGE:
CORRECT? (Y/N): CHANGE: Y

You enter the changes noted at the bottom and entered "Y ESCAPE". That displays the Building Standards list with the changes you just made and appears as follows:

FIGURE 9-N

THU 02/15/90 TIME 1212:19			Danfoss-EMC, Inc., ZX SYSTEM BUILDING STANDARDS LIST 5			M1-M2-S1-S2-DB BUILDING #101		
#	NAME	HIGH LOW	#	NAME	HIGH LOW	#	NAME	HIGH LOW
5	HTRC1 DY	73.0 0.0	6	HTRC1 NT	70.0 0.0	7	HTRC2 DY	71.0 0.0
8	HTRC2 NT	70.0 0.0	9	HTRC WTR	50.0 0.0	10	GDH 1 DY	70.0 0.0
11	GDH 1 AM	69.0 0.0	12	GDH 1 NT	68.0 0.0	13	GDH 2 DY	64.0 0.0
14	GDH 2 AM	62.0 0.0	15	GDH 2 NT	60.0 0.0	16	GDH LOCK	45.0 0.0
17	UNITHT 1	65.0 0.0	18	UNITHT 2	65.0 0.0	19	UNITHT 3	72.0 70.0
20	UHT OTSD	55.0 40.0	21	MTPR BOB	55.0 50.0	22	A SETBK	2.0 0.0
23	B SETBK	2.0 0.0	24	C SETBK	2.0 0.0	25	D SETBK	2.0 0.0
26	E SETBK	2.0 0.0	27	25 SETBK	2.0 0.0	28	SPARE	0.0 0.0
29	SPARE	0.0 0.0	30	SPARE	0.0 0.0	31	SPARE	0.0 0.0
32	SPARE	0.0 0.0	33	SPARE	0.0 0.0	34	SPARE	0.0 0.0

STANDARD #/RTN 0 = MENU?

Version 10 Operator's Guide

Having completed your handy work, you enter "@ 1 20 20 C RETURN" and look once again at the conditions controlling HEAT RECLAIM 1 which now appears as follows:

FIGURE 10-N

THU 02/15/90 TIME 1212:19	Danfoss-EMC, Inc., ZX SYSTEM CONDITIONS LIST	M1-M2-S1-S2-DB BUILDING #101																																																																						
<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">NUMBER</th> <th style="text-align: left;">BOOLEAN</th> <th style="text-align: left;">SENSOR OR SCHEDULE</th> <th style="text-align: left;">VALUE</th> <th style="text-align: left;">C P ASSOCIATION</th> </tr> </thead> <tbody> <tr> <td>4</td> <td></td> <td>(INSD TMP AIN</td> <td>[71.4]</td> <td>HTRC 1</td> </tr> <tr> <td></td> <td><=</td> <td>HTRC1 NT HSTD</td> <td>[70.0]</td> <td>)</td> </tr> <tr> <td></td> <td>or</td> <td>((INSD TMP AIN</td> <td>[71.4]</td> <td></td> </tr> <tr> <td></td> <td><=</td> <td>HTRC1 DY HSTD</td> <td>[73.0]</td> <td>)</td> </tr> <tr> <td></td> <td>and</td> <td>LOGIC COND # 6</td> <td></td> <td></td> </tr> <tr> <td>6</td> <td></td> <td>SCHEDULE GROUP #* 602</td> <td></td> <td>NESTED</td> </tr> <tr> <td></td> <td></td> <td colspan="3">* = BASED ON 0700 TO 2400 TODAY</td> </tr> <tr> <td></td> <td></td> <td colspan="3">*-0200 0000 *** ALL DAYS ***</td> </tr> <tr> <td></td> <td>or</td> <td>(SCHEDULE GROUP #* 603</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td colspan="3">* = BASED ON 0700 TO 2400 TODAY</td> </tr> <tr> <td></td> <td></td> <td colspan="3">*-0300 0000 *** ALL DAYS ***</td> </tr> <tr> <td></td> <td>and</td> <td>(OTSD TMP AIN</td> <td>[41.0]</td> <td></td> </tr> <tr> <td></td> <td><=</td> <td>HTRC WTR HSTD</td> <td>[50.0]</td> <td>))</td> </tr> </tbody> </table>	NUMBER	BOOLEAN	SENSOR OR SCHEDULE	VALUE	C P ASSOCIATION	4		(INSD TMP AIN	[71.4]	HTRC 1		<=	HTRC1 NT HSTD	[70.0])		or	((INSD TMP AIN	[71.4]			<=	HTRC1 DY HSTD	[73.0])		and	LOGIC COND # 6			6		SCHEDULE GROUP #* 602		NESTED			* = BASED ON 0700 TO 2400 TODAY					*-0200 0000 *** ALL DAYS ***				or	(SCHEDULE GROUP #* 603					* = BASED ON 0700 TO 2400 TODAY					*-0300 0000 *** ALL DAYS ***				and	(OTSD TMP AIN	[41.0]			<=	HTRC WTR HSTD	[50.0]))		
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	and	(OTSD TMP AIN	[41.0]																																																																					
	<=	HTRC WTR HSTD	[50.0]))																																																																				
CHANGE Y/RTN/CONDITION #: @9 602																																																																								

Feeling expansive, you decide to expand the number of hours that 73 degrees is the heat reclaim target by two. The theory being that the store will warm up before the manager comes in and you won't receive any more phone calls. So you key in "@9 602 RETURN" which takes you to schedule 602 and appears as follows:

FIGURE 11-N

THU 02/15/90 TIME 1212:19	Danfoss-EMC, Inc., ZX SYSTEM SCHEDULE GROUPS 602	M1-M2-S1-S2-DB BUILDING #101
CONDITION		
SCHEDULE GROUP #602		
[* = TIME RELATIVE TO BLDG HOURS, 0700 TO 2400 TODAY]		
ON/OFF	DAYS	CYCLE
ON/OFF	DAYS	CYCLE
1*-200 0000***ALL DAYS**		
SCHEDULE TO CHANGE:		
SCHED TYPE (R/S)	=	CHANGE: 1
TIME ON	=	CHANGE: -400
TIME OFF	=	CHANGE:
DAYS ON	=	CHANGE:
CYCLE GROUP	=	CHANGE:

You, of course, entered the "1" next to "SCHEDULE TO CHANGE" followed by four "RETURNS" and then entered "Y ESCAPE" and the schedule group appears as follows:

FIGURE 12-N

```

THU 02/15/90          Danfoss-EMC, Inc., ZX SYSTEM          M1-M2-S1-S2-DB
TIME 1212:19          SCHEDULE GROUPS 602                    BUILDING #101

CONDITION
SCHEDULE GROUP # 602
[ * = TIME RELATIVE TO BLDG HOURS, 0700 TO 2400 TODAY ]
1*-0400 0000 *** ALL DAYS **

SCHEDULE TO CHANGE:          CHANGE:
    
```

Now the heat reclaim set point of 73 degrees is going to be in effect 4 hours before store opening rather than 2 hours.

You do an "@ RETURN", DAT8 to make sure all ALM alarms are armed and do a "CTL D" to hang up. You feel good about the changes and have made another store happy. Of course, in fact, you are now calling for cooling when the store is above 72 degrees and calling for heating when the store is below 73 degrees which is not a very logical position to be in. You are going to be unnecessarily burning energy so this solution to this problem is not good. There should always be a 4 degree dead band between heating and cooling set points.

N.3 HOLIDAY DATES

The Group President has just declared Christmas to be a Holiday. You call the first store and bring up the "7" screen which appears as follows:

FIGURE 13-N

```

THU 02/15/90          Danfoss-EMC, Inc., ZX SYSTEM          M1-M2-S1-S2-DB
TIME 1212:19          HOLIDAY DATES                    BUILDING 101

DESCRIPTION    #   DATE  TYPE      DESCRIPTION    #   DATE  TYPE
SCHEDULED HOLIDAY# 1 12 25   8      SCHEDULED HOLIDAY# 2  0 00   0
SCHEDULED HOLIDAY# 3  0 00   0      SCHEDULED HOLIDAY# 4  0 00   0
SCHEDULED HOLIDAY# 5  0 00   0      SCHEDULED HOLIDAY# 6  0 00   0
SCHEDULED HOLIDAY# 7  0 00   0      SCHEDULED HOLIDAY# 8  0 00   0
SCHEDULED HOLIDAY# 9  0 00   0      SCHEDULED HOLIDAY# 10 0 00   0
SCHEDULED HOLIDAY#11  0 00   0      SCHEDULED HOLIDAY# 12 0 00   0
SCHEDULED HOLIDAY#13  0 00   0      SCHEDULED HOLIDAY# 14 0 00   0
SCHEDULED HOLIDAY#15  0 00   0      SCHEDULED HOLIDAY# 16 0 00   0

ENTER ITEM # TO ALTER:
    
```

As you can see, Christmas is now all set up as a type 8 holiday. You also know that on December 25, rather than the name of the day of the week appearing in the upper left hand corner of every screen, and H8 will appear.

N.4 PHONE NUMBERS

Your 30 day new installation monitoring program by Danfoss-EMC, Inc. is over and they've removed their error logger number. You decide to contract with Danfoss-EMC, Inc. for Danfoss-EMC, Inc. to receive alarms during times when the Group is closed. You dial up the store and bring up the "8" screen which appears as follows:

FIGURE 14-N

```
THU 02/15/90          Danfoss-EMC, Inc., ZX SYSTEM          M1-M2-S1-S2-D
TIME 1212:19          PHONE NUMBERS                      BUILDING #101

1 16195551212
2
3
4
5

ENTER ITEM # TO ALTER :
```

You respond to the "ENTER ITEM # TO ALTER :" by entering "1 RETURN". Your screen then appears as follows:

FIGURE 15-N

```
THU 02/15/90          Danfoss-EMC, Inc., ZX SYSTEM          M1-M2-S1-S2-D
TIME 1212:19          PHONE NUMBERS                      BUILDING #101

1 16195551212
2
3
4
5

ENTER ITEM # TO ALTER :1

PHONE # = : 16195551212  CHANGE :
```

Since you don't want to change your error logger number you enter RETURN and the screen appears as follows:

FIGURE 16-N

```

THU 02/15/90          Danfoss-EMC, Inc., ZX SYSTEM          M1-M2-S1-S2-DB
TIME 1212:19          PHONE NUMBERS                          BUILDING #101

1 16195551212
2
3
4
5
ENTER ITEM # TO ALTER :1
PHONE # = : 16195551212    CHANGE :
SCHEDULE GROUP #901

      ON/OFF    DAYS    CYCLE    ON/OFF    DAYS    CYCLE
1 0000 2400 ***ALL DAYS**

SCHEDULE TO CHANGE:          CHANGE:

```

Since you want to have your error logger number active between 8 a.m. and 4 p.m. you want to change the current schedule, so you respond "1 RETURN" to the "CHANGE:" question. You then respond to each line on the change screen as shown --- of course, when you don't want to change an item you just hit RETURN. The screen appears as follows:

FIGURE 17-N

```

THU 02/15/90          Danfoss-EMC, Inc., ZX SYSTEM          M1-M2-S1-S2-DB
TIME 1212:19          PHONE NUMBERS                          BUILDING #101

1 16195551212
2
3
4
5
ENTER ITEM # TO ALTER :1
PHONE # = : 16195551212    CHANGE :

SCHEDULE GROUP # 901

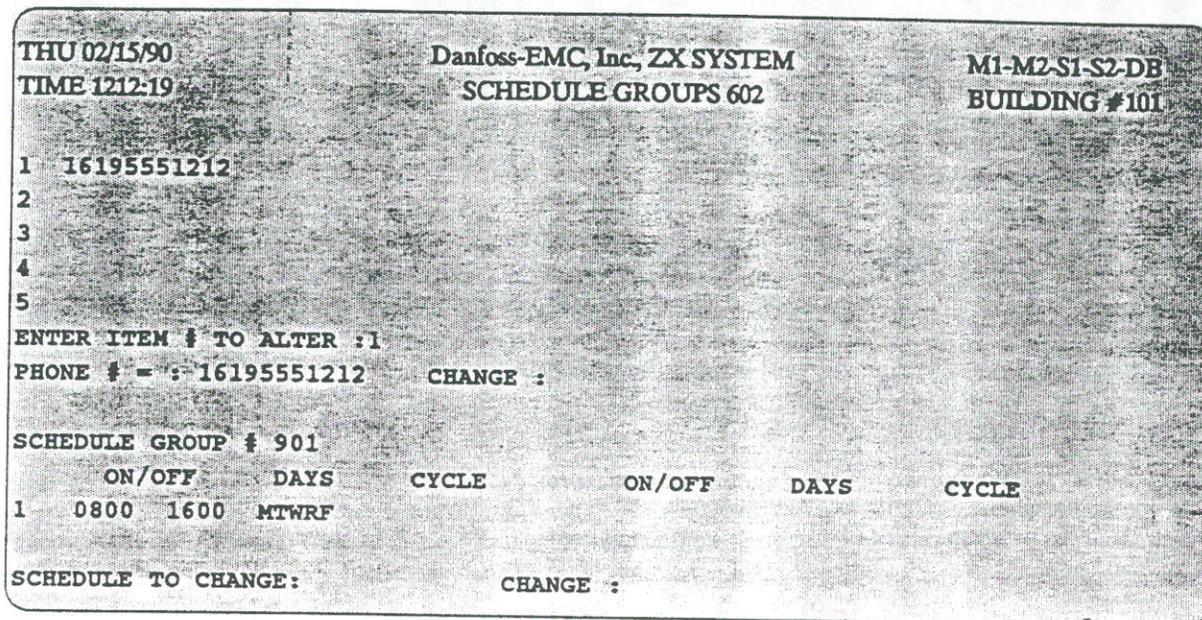
      ON/OFF    DAYS    CYCLE    ON/OFF    DAYS    CYCLE
1 0000 2400 *** ALL DAYS **

SCHEDULE TO CHANGE:          CHANGE : 1
SCHD TYPE (R/S) =          STANDARD    CHANGE :
TIME ON           =          0000      CHANGE : 0800
TIME OFF          =          2400      CHANGE : 1600
DAYS N            =          *** ALL DAYS **    CHANGE : MTWRF
CYCLE GROUP       =          0          CHANGE :
CORRECT (Y/N)    =          CHANGE : Y

```

When you hit "Y ESCAPE", the changes will be made and you'll return to the "8" screen and if you reply "1 RETURN" to "ENTER ITEM # TO ALTER : " and "RETURN" to "CHANGE : _____" when it appears, the screen will show up as follows:

FIGURE 18-N



N.5 LIGHTING SCHEDULES

The store calls you and says "My outside lights never came on under computer control last night -- I had to override them at the switch." You tell the store, "Put 'em back in control. It sounds like the photocell is broken. I'll have Danfoss-EMC, Inc. fix "it". In the meantime, I'll force your lights on at 5:30 p.m. each evening until the photocell is fixed."

You call the system and look at the Expanded Status Report for the outside lights by entering "1 1 11 RETURN" and the screen appears as follows:

FIGURE 19-N

THU 02/15/90		Danfoss-EMC, Inc., ZX SYSTEM			M1-M2-S1-S2-DB		
TIME 1212:19		EXPANDED STATUS #11			BUILDING #101		
OTSD LTS				LIGHTING			
#	STATUS	TIMING		CYC	ACCUM RUN TIME		
	OUT MON MODE	LST ON	LST OFF		TODAY	YESTERDAY	TOTAL
11	OTSD LTS	OFF	1834	0033	0	0033	1233 1746
SCHEDULE GROUP # 11							
ON/OFF	DAYS	CYCLE	ON/OFF	DAYS	CYCLE		
1 1600 2200	S		2 1600 2400	MTWFRA			
3 0000 0800	TWRFA		4 0000 0300	S			
CONDITION #16 f							
CHANGE Y/N/S/M/C/A/D/L/CP #: C							

You also want to look at the conditions so you enter "C RETURN" and the conditions appear as follows:

FIGURE 20-N

THU 02/15/90		Danfoss-EMC, Inc., ZX SYSTEM			M1-M2-S1-S2-DB		
TIME 1212:19		CONDITIONS LIST			BUILDING #101		
NUMBER	BOOLEAN	SENSOR OR SCHEDULE		VALUE	C.P. ASSOCIATION		
16		SCHEDULE GROUP #* 609			OTSD LTS SIGN LTS		
		2100	2400 ***	ALL DAYS ***			
		0000	0500 ***	ALL DAYS ***			
	OR	(FOTOCCELL AIN	[90.5]			
	<=	CONSTANT		[35.0])		
CHANGE Y/RTN/CONDITION # :							

You know that for the outside lights to come on both the schedules on the Expanded Status Report and the condition must be true. You know that Schedule Group #609 is a back-up schedule set up for just this circumstance and that if you change it so that it is true starting at 5:30 p.m. and remains true until 6:30 a.m. that the lights will work fine for the few days the photocell may not work. So, you enter "@9 609 RETURN" and Schedule 609 appears on the screen as follows:

FIGURE 21-N

```

THU 02/15/90          Danfoss-EMC, Inc., ZX SYSTEM          M1-M2-S1-S2-DB
TIME 1212:19          SCHEDULE GROUPS 609                    BUILDING #101

CONDITIONS
SCHEDULE GROUP # 609
  ON/OFF    DAYS    CYCLE      ON/OFF    DAYS    CYCLE
1 2100 2400 *** ALL DAYS **      2 0000 0500 *** ALL DAYS **

SCHEDULE TO CHANGE:          CHANGE : 1

```

You want to change the first schedule so you key in "1 RETURN". You hit RETURN on the "SCHED TYPE" line and the "TIME ON" line comes up. You enter "1730 ESCAPE" and the "CORRECT" line appears. You enter "Y" and the screen now appears as follows:

FIGURE 22-N

```

THU 02/15/90          Danfoss-EMC, Inc., ZX SYSTEM          M1-M2-S1-S2-DB
TIME 1212:19          SCHEDULE GROUPS 602                    BUILDING #101

CONDITIONS
SCHEDULE GROUP # 609
  ON/OFF    DAYS    CYCLE      ON/OFF    DAYS    CYCLE
1 2100 2400 *** ALL DAYS **      2 0000 0500 *** ALL DAYS **

SCHEDULE TO CHANGE:          CHANGE : 1
SCHED TYPE (R/S) STANDARD    CHANGE :
TIME ON                      = 2100    CHANGE : 1730
CORRECT (Y/N)                =          CHANGE : y

```

If you then hit "ESCAPE", schedule group 609 will appear as follows:

FIGURE 23-N

```

THU 02/15/90          Danfoss-EMC, Inc., ZX SYSTEM          M1-M2-S1-S2-DB
TIME 1212:19          SCHEDULE GROUPS 609                    BUILDING #101

CONDITIONS
SCHEDULE GROUP # 609
  ON/OFF    DAYS    CYCLE      ON/OFF    DAYS    CYCLE
1 1730 2400 *** ALL DAYS **      2 0000 0500 *** ALL DAYS **

SCHEDULE TO CHANGE:          CHANGE : 1

```

All you have left to do is to enter "2 RETURN" and go through a similar process to change the 0500 off time in schedule 2 to 0630. Viola, the outside lights will now come on as you have wished them to (plus or minus pre and post delays, of course) until the photocell is fixed.

N.6 BUILDING HOUR BASE

The DM calls you and tells you "they" have decided to open one store two hours later on Sundays at 0900 rather than 0700. Since all of your lighting and HVAC devices are scheduled relative to store hour base you know you need to change the Sunday schedule. You call the store and bring up the "11" screen which appears as follows:

FIGURE 24-N

THU 02/15/90		Danfoss-EMC, Inc., ZX SYSTEM				M1-M2-S1-S2-DB	
TIME 1212:19		BUILDING HOURS				BUILDING #101	
#	DAY	TIME ON	TIME OFF	#	DAY	TIME ON	TIME OFF
1	SUN	0700	2400	2	MON	0700	2400
3	TUE	0700	2400	4	WED	0700	2400
5	THU	0700	2400	6	FRI	0700	2400
7	SAT	0700	2400	8	H1	0700	2400
9	H2	0000	0000	10	H3	0000	0000
11	H4	0000	0000	12	H5	0000	0000
13	H6	0000	0000	14	H7	0000	0000
15	H8	0000	0000				

ENTER ITEM # TO ALTER:

You enter "1 RETURN" to "ENTER ITEM # TO ALTER :"; then enter "0900" to "TIME ON"; enter "RETURN" TO "TIME OFF"; and key in "Y" to "SURE". The screen now appears as follows:

FIGURE 25-N

THU 02/15/90		Danfoss-EMC, Inc., ZX SYSTEM				M1-M2-S1-S2-DB	
TIME 1212:19		BUILDING HOURS				BUILDING #101	
#	DAY	TIME ON	TIME OFF	#	DAY	TIME ON	TIME OFF
1	SUN	0700	2400	2	MON	0700	2400
3	TUE	0700	2400	4	WED	0700	2400
5	THU	0700	2400	6	FRI	0700	2400
7	SAT	0700	2400	8	H1	0700	2400
9	H2	0000	0000	10	H3	0000	0000
11	H4	0000	0000	12	H5	0000	0000
13	H6	0000	0000	14	H7	0000	0000
15	H8	0000	0000				

ENTER ITEM # TO ALTER :1
 TIME ON = 700 CHANGE: 0900
 TIME OFF = 2400 CHANGE:
 SURE (Y/N) CHANGE: Y

When you hit "ESCAPE", the changes are made and the Building Hour Base will appear as follows:

FIGURE 26-N

THU 02/15/90		Danfoss-EMC, Inc., ZX SYSTEM				M1-M2-S1-S2-DB	
TIME 1212:19		BUILDING HOURS				BUILDING #101	
#	DAY	TIME ON	TIME OFF	#	DAY	TIME ON	TIME OFF
1	SUN	0900	2400	2	MON	0700	2400
3	TUE	0700	2400	4	WED	0700	2400
5	THU	0700	2400	6	FRI	0700	2400
7	SAT	0700	2400	8	H1	0700	2400
9	H2	0000	0000	10	H3	0000	0000
11	H4	0000	0000	12	H5	0000	0000
13	H6	0000	0000	14	H7	0000	0000
15	H8	0000	0000				

ENTER ITEM # TO ALTER :

You've done it — Sunday's Time On is now 0900 while everything else remains the same.

N.7 HISTORY POINTERS

You've decided that you want to be able to look at the first 14 Analog Inputs in a store at 15 second intervals. You call the store and bring up the "12" screen which appears as follows:

FIGURE 27-N

THU 02/15/90		Danfoss-EMC, Inc., ZX SYSTEM				M1-M2-S1-S2-DB	
TIME 1212:19		HISTORY POINTERS				BUILDING #101	
1000 SAMPLES AVAILABLE PER ELEMENT							
# 1	REFR 1	# 2	REFR 2	# 3	REFR 3	# 4	REFR 4
# 5	REFR 5	# 6	HVAC	# 7		# 8	
GROUP # TO ALTER				CHANGE : @			

Noting that Groups #7 & #8 are not used you decide to put the 14 Analogs into Group #7. So in response to "GROUP # TO ALTER" you enter "7 RETURN"; in response to "GROUP NAME IS" you enter "ANALOGS RETURN"; in response to "INTERVAL (MIN)" you enter "RETURN"; in response to "INTERVAL (SEC)" you enter "15 RETURN"; in response to "SCALING FACTOR (1-10)" you enter "RETURN"; in response to "PNT/SENSOR (P/D/A/T/N) #1" you enter "A1 RETURN"; in response to "PNT/SENSOR (P/D/A/T/N) #2" you enter "A2 RETURN". You continue in this manner until you've entered "A14 RETURN" and "CORRECT? (Y/N)" comes up to which you enter "Y". The screen now appears as follows:

FIGURE 28-N

THU 02/15/90		Danfoss-EMC, Inc., ZX SYSTEM				M1-M2-S1-S2-DB	
TIME 1212:19		HISTORY POINTERS				BUILDING #101	
1000 SAMPLES AVAILABLE PER ELEMENT							
# 1	REFR 1	# 2	REFR 2	# 3	REFR 3	# 4	REFR 4
# 5	REFR 5	# 6	HVAC	# 7		# 8	
GROUP # TO ALTER				=	CHANGE : 7		
GROUP NAME IS					CHANGE : ANALOGS		
INTERVAL(MIN)				= 0	CHANGE :		
INTERVAL(SEC)				= 0	CHANGE : 15		
SCALING FACTOR(1-10)				= 0	CHANGE :		
PNT/SENSOR(P/D/A/T/N)# 1				= 0	CHANGE : A1		
PNT/SENSOR(P/D/A/T/N)# 2				= 0	CHANGE : A2		
PNT/SENSOR(P/D/A/T/N)# 3				= 0	CHANGE : A3		
PNT/SENSOR(P/D/A/T/N)# 4				= 0	CHANGE : A4		
PNT/SENSOR(P/D/A/T/N)# 5				= 0	CHANGE : A5		
PNT/SENSOR(P/D/A/T/N)# 6				= 0	CHANGE : A6		
PNT/SENSOR(P/D/A/T/N)# 7				= 0	CHANGE : A7		
PNT/SENSOR(P/D/A/T/N)# 8				= 0	CHANGE : A8		
PNT/SENSOR(P/D/A/T/N)# 9				= 0	CHANGE : A9		
PNT/SENSOR(P/D/A/T/N)#10				= 0	CHANGE : A10		
PNT/SENSOR(P/D/A/T/N)#11				= 0	CHANGE : A11		
PNT/SENSOR(P/D/A/T/N)#12				= 0	CHANGE : A12		
PNT/SENSOR(P/D/A/T/N)#13				= 0	CHANGE : A13		
PNT/SENSOR(P/D/A/T/N)#14				= 0	CHANGE : A14		
CORRECT? (Y/N):					CHANGE : Y		

If you hit : "RETURN" the History Pointers will be established and the screen will appear as follows:

FIGURE 29-N

THU 02/15/90		Danfoss-EMC, Inc., ZX SYSTEM				M1-M2-S1-S2-DB	
TIME 1212:19		HISTORY POINTERS				BUILDING #101	
1000 SAMPLES AVAILABLE PER ELEMENT							
# 1	REFR 1	# 2	REFR 2	# 3	REFR 3	# 4	REFR 4
# 5	REFR 5	# 6	HVAC	# 7	ANALOGS	# 8	
GROUP # TO ALTER				=	CHANGE : @		

You note that "ANALOGS" now appears as the name for Group #7. To be sure that everything is ok, you get to the AUTH code by entering "@ RETURN" and then enter "DATC 7 1 10 RETURN" indicating that you want 10 samples from Group #7 starting with the first element. The screen will appear as follows:

FIGURE 30-N

THU 02/15/90		Danfoss-EMC, Inc. ZX SYSTEM										M1-M2-S1-S2-DB			
TIME 1212:19		HISTORY POINTERS										BUILDING #101			
GROUP # 7, ANALOGS		: SAMPLE INTERVAL IS 0 MINS, 15 SECS.													
AI#		AI#	AI#	AI#	AI#	AI#	AI#	AI#	AI#	AI#	AI#	AI#	AI#	AI#	AI#
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
STOC		RACK	RACK	RACK	RACK	RACK	RIIC	SPAR	SPAR	HUMI	FOTO	OTSD	COMP	STOC	
2		A	B	C	D	E	25	E	E	DITY	CELL	TMP	TMP	K	K
1234	SUN	13	12	15	7	9	4	0	0	29	90	40	71	67	65
1234	SUN	13	12	7	8	9	4	0	0	33	90	40	71	67	65
0102	SUN	3	1	14	0	32	3	-126	0	15	0	3	0	-124	0
0301	SUN	1	0	38	0	-126	0	-56	0	0	0	56	-1	5	0
0301	SUN	3	0	35	0	-126	0	30	0	4	1	0	0	7	0
0102	SUN	4	4	10	0	-112	1	100	0	15	0	3	0	105	0
0301	SUN	1	0	28	0	-56	0	-56	0	100	0	56	-1	-47	0
0301	SUN	3	0	29	0	-56	0	-56	0	100	0	56	-1	-43	0
0301	SUN	3	0	6	0	-126	0	30	0	-16	0	0	0	0	0
0301	SUN	3	0	23	0	-126	0	30	0	-112	1	-56	0	44	0

AUTH

You note that the last two entries appear fine and ignore the other eight entries because they have not yet been written over (you know that if you wait 2 minutes and do a "DATC 7 1 10 RETURN" that 10 correct readings will appear). The most important thing is that the correct analogs are showing up as you intended.

N.8 DIGITAL SENSORS

You have received an alarm from a store that indicates that the main air handling unit is not on. You call the store and observe that, based on the supply air temperature, the fan is clearly running even though the monitor point is showing up as off. You decide that you'd better turn the monitor point Manual (ON) until Danfoss-EMC, Inc. fixes the monitor because you know if you don't that the conditions will prevent the cooling and auxiliary heat stages from functioning.

You call the store and bring up the "13" screen which appears as follows:

FIGURE 31-N

THU 02/15/90 TIME 12:12:19		Danfoss-EMC, Inc., ZX SYSTEM DIGITAL SENSORS				M1-M2-S1-S2-DB BUILDING #101		
NO	NAME	VALUE	NO	NAME	VALUE	NO	NAME	VALUE
1	SPARE	OFF	17	AHU	OFF	33*	COMP A 1	ON
2	SPARE	OFF	18	COOL1	OFF	34*	COMP A 2	OFF
3	SPARE	OFF	19	COOL2	OFF	35*	DEF A	OFF
4	SPARE	OFF	20	GDH 1	OFF	36*	MTBX D01	OFF
5	SPARE	OFF	21	GDH 2	OFF	37*	SDMT D02	OFF
6	SPARE	OFF	22	SPARE	OFF	38*	SDMT D03	OFF
7	SPARE	OFF	23	SPARE	OFF	39*	PKDL D04	OFF
8	SPARE	OFF	24	SPARE	OFF	40*	DYBX D05	OFF
9	SPARE	OFF	25	SPARE	OFF	41*	PKDL D06	OFF
10	SPARE	OFF	26	SPARE	OFF	42*	COMP B 1	ON
11	SPARE	OFF	27	SPARE	OFF	43*	COMP B 2	OFF
12	SPARE	OFF	28	SPARE	OFF	44*	POBX D09	ON
13	SPARE	OFF	29	SPARE	OFF	45*	DLBX D10	OFF
14	SPARE	OFF	30	SPARE	OFF	46*	HDBX D11	ON
15	SPARE	OFF	31	SPARE	OFF	47*	MILK D12	OFF
16	SPARE	OFF	32	0-LOSS	OFF	48*	HTRC 2	OFF

CHANGE = Y/SENSOR $\frac{1}{2}$ /NEXT PAGE = RTN/0 = MENU: 17 Y

You note that Digital Input #17 is for the air handling unit and shows up as "OFF". You enter "17 Y RETURN" at the bottom of the screen. The "CHANGE DIGITAL SENSOR # 17" screen will come up. To "NAME" you enter "RETURN"; to "MANUAL (COM/ON/OFF)" you enter "ON RETURN"; to "CORRECT? (Y/N):" you enter "Y" and the screen appears as follows:

FIGURE 32-N

THU 02/15/90 TIME 12:12:19		Danfoss-EMC, Inc., ZX SYSTEM CHANGE DIGITAL #17		M1-M2-S1-S2-DB BUILDING #101	
NAME :	AHU	CHANGE :			
MANUAL (COMM/ON/OFF)=	COM	CHANGE :ON			
CORRECT? (Y/N):		CHANGE: Y			

You then hit "RETURN" and your screen will appear as follows:

FIGURE 33-N

THU 02/15/90		Danfoss-EMC, Inc. ZX SYSTEM				MI-M2-S1-S2-DB		
TIME 12:12:19		DIGITAL SENSORS				BUILDING #101		
NO	NAME	VALUE	NO	NAME	VALUE	NO	NAME	VALUE
17	AHU	ON M	33*	COMP A 1	ON	49*	COMP D 1	ON
18	COOL1	OFF	34*	COMP A 2	OFF	50*	COMP D 2	OFF
19	COOL2	OFF	35*	DEF A	OFF	51*	RIFD D18	OFF
20	GDH 1	OFF	36*	MTBX D01	OFF	52*	FZBX D19	ON
21	GDH 2	OFF	37*	SDMT D02	OFF	53*	SDFJ D20	OFF
22	SPARE	OFF	38*	SDMT D03	OFF	54*	MDFY D21	OFF
23	SPARE	OFF	39*	PKDL D04	OFF	55*	HTRC 1	ON
24	SPARE	OFF	40*	DYBX D06	OFF	56*	RIIC 25	ON
25	SPARE	OFF	41*	PKDL D06	OFF	57*	RIIC D25	OFF
26	SPARE	OFF	42*	COMP B 1	ON	58*	COMP C 1	ON
27	SPARE	OFF	43*	COMP B 2	OFF	59*	COMP C 2	OFF
28	SPARE	OFF	44*	POBX D09	ON	60*	BEER D14	OFF
29	SPARE	OFF	45*	DLBX D10	OFF	61*	DYCS D15	OFF
30	SPARE	OFF	46*	HDBX D11	ON	62*	COMP E 1	ON
31	SPARE	OFF	47*	MILK D12	OFF	63*	COMP E 2	ON
32	O - LOSS	OFF	48*	HTRC 2	OFF	64*	BKBX D22	OFF

CHANGE = Y/SENSOR #/NEXT PAGE = RTN/0 = MENU : 5

Now you note that Digital Input #17 shows "ON" followed by an "M" which indicates it is manually on. You've now "fooled" the system into believing that the fan is running although the Monitor Point is, in fact, not on. And if you look at the HVAC Status Report you'll note that an * appears under Status for the AHU indicating that the monitor is manual on. THE SCREEN APPEARS AS FOLLOWS:

FIGURE 34-N

THU 02/15/90		Danfoss-EMC, Inc., ZX SYSTEM				M1-M2-S1-S2-DB	
TIME 12:12:19		HVAC STATUS				BUILDING #101	
SENSOR NAME		CURR	AVE	SENSOR NAME		CURR	AVE
54	INSD TMP	71.9F	71.2	9	HUMIDITY	30.5%	29.6
55	SPLY TMP	82.7F	84.0	12	COMP TMP	72.0F	70.3
56	RETN TMP	59.6F	59.3	14	STOCK 2	65.2F	65.3
				11	OTSD TMP	41.2F	40.7
				13	STOCK 1	67.5F	67.3
				15	STOCK 3	72.5F	73.6

CP#	NAME	STATUS	CURR	TARG/	CUT	SYSTEM	COND	RUN
			VAL	CUT IN	OUT	TYPE	#	HOURS
17	AHU	ON *	82.7F			HVAC	# 1 T	3397
18	COOL1	OFF				HVAC	# 2 F	0
19	COOL2	OFF				HVAC	# 3 F	86
20	HTRC 1	ON				HVAC	# 4 T	2737
21	HTRC 2	OFF				HVAC	# 5 F	1787
22	GDH 1	OFF				HVAC	# 7 F	405
23	SPARE	OFF				HVAC	# 8 F	404
24	ATC	ON X				HVAC		3615
25	UNITHT 1	OFF X	67.5F			HVAC	#10 F	285
26	UNITHT 2	OFF X	65.2F			HVAC	#11F	1376

ENTER CP #, RTN FOR NEXT PAGE, OR 0 FOR MENU :

N.9 ANALOG SENSOR

You've decided you want to see if the cooling stages will respond properly. You know that outside temperature is above the cooling lockout, so you decide to set the inside temperature to 85 degrees which should exercise the cooling stages. You dial up the store and bring up the "14" screen which appears as follows:

FIGURE 35-N

THU 02/15/90		Danfoss-EMC, Inc., ZX SYSTEM				M1-M2-S1-S2-DB		
TIME 12:12:19		ANALOG SENSORS				BUILDING #101		
NO	NAME	VALUE	NO	NAME	VALUE	NO	NAME	VALUE
1	RACK A	8.5P	17	SPARE	0.0	33*	MTBX T01	34.4F
2	RACK B	14.2P	18	SPARE	0.0	34*	SDMT T02	24.7F
3	RACK C	13.0P	19	SPARE	0.0	35*	SDMT T03	25.3F
4	RACK D	10.7P	20	SPARE	0.0	36*	PKDL T04	36.0F
5	RACK E	8.9P	21	SPARE	0.0	37*	DYBX T05	32.9F
6	RIIC 25	4.2P	22	SPARE	0.0	38*	PKDL T06	28.3F
7	SPARE	0.0	23	SPARE	0.0	39*	MTPR T08	48.0F
8	SPARE	0.0	24	SPARE	0.0	40*	POBX T09	30.4F
9	HUMIDITY	31.1%	25	SPARE	0.0	41*	DLBX T10	29.1F
10	FOTOCCELL	90.5*	26	SPARE	0.0	42*	HDBX T11	42.9F
11	OTSD TMP	41.2F	27	SPARE	0.0	43*	MILK T12	28.8F
12	COMP TMP	71.5F	28	SPARE	0.0	44*	BEER T14	37.5F
13	STOCK 1	67.5F	29	SPARE	0.0	45*	DYCS T15	35.3F
14	STOCK 2	65.2F	30	SPARE	0.0	46*	RIFB T18	-5.3F
15	STOCK 3	72.5F	31	SPARE	0.0	47*	FZBX T19	23.2F
16	SPARE	0.0	32	SPARE	0.0	48*	SDFJ T20	-10.6F

CHANGE = Y/SENSOR #/NEXT PAGE = RTN/0 = MENU :

You look through the report and don't find the inside temperature so you hit "RETURN" and the screen appears as follows:

FIGURE 36-N

THU 02/15/90			Danfoss-EMC, Inc., ZX SYSTEM			M1-M2-S1-S2-DB		
TIME 1212:19			ANALOG SENSORS			BUILDING #101		
NO	NAME	VALUE	NO	NAME	VALUE	NO	NAME	VALUE
49*	MDFP T21	-9.5F						
50*	BKBX T22	-3.7F						
51*	SDFP T23	-4.5F						
52*	MDFP T24	1.1F						
53*	RIIC T25	-16.3F						
54*	INSD TMP	71.6F						
55*	SPLY TMP	81.1F						
56*	RETN TMP	59.6F						

CHANGE = Y/SENSOR #/NEXT PAGE = RTN/0 = MENU :

You note that inside temperature is number 54 and enter "54 Y RETURN" which brings up the change screen for Analog Sensor #54. To "NAME" you respond "RETURN"; to "MANUAL VALUE" you respond "Y RETURN"; "85 RETURN" to "CORRECT? (Y/N):" you respond "Y". The screen now appears as follows:

FIGURE 37-N

THU 02/15/90			Danfoss-EMC, Inc., ZX SYSTEM			M1-M2-S1-S2-DB		
TIME 1212:19			ANALOG SENSORS			BUILDING #101		
NO	NAME	VALUE	NO	NAME	VALUE	NO	NAME	VALUE
54*	INSD TMP	85.0FM						
55*	SPLY TMP	80.9F						
56*	RETN TMP	59.3F						

CHANGE = Y/SENSOR #/NEXT PAGE = RTN/0 = MENU :

You note that the inside temperature now reads "85.0" followed by an "M". This indicates that the system now is "fooled" into believing that the inside temperature is actually 85 degrees when we know, in fact, that it is about 71.9. You now turn to the "5" screen and watch the system, hopefully, sequence on the cooling stages with the attendant drop in supply temperatures. When you are finished you return to the change screen and put the sensor back in COM mode.

NOTE--DO NOT DO THIS IF IT IS COLD OUTSIDE OR YOU MAY NEED NEW COOLING COMPRESSORS WHEN YOU FINISH!

N.10 SENSOR ALARMS

You have been receiving frequent sensor alarms from the temperature probe in the single deck meat case that is part of refrigerated circuit #2. You decide to call the store and bring up the "15" screen which appears as follows:

FIGURE 38-N

THU 02/15/90		Danfoss-EMC, Inc., ZX SYSTEM				M1-M2-S1-S2-DB	
TIME 1212:19		SENSOR ALARMS				BUILDING #101	
#	SENSOR	CATEGORY	PROG VALUES	CURR VALUES	ACTION	OCCURRED	
1	AI 1 RACK A	P >	24.0/0130		CRIT		
		P <	8.0/0120	6.6/0002	CRIT		
2	AI 33 MTBX T01	F >	40.0/0130		CRIT		
		F <	28.0/0100		CRIT		
3	AI 34 SDMT T02	F >	30.0/0130		CRIT		
		F <	17.0/0030		CRIT		
4	AI 35 SDMT T03	F >	30.0/0130		CRIT		
		F <	17.0/0100		ALM		
5	AI 36 PKDL T04	F >	38.0/0145		CRIT		
		F <	21.0/0100		CRIT		

CHANGE = Y/ALM #/NEXT = RTN/O = MENU :

You note that the number 3 alarm is set up on the SDMT T02 sensor and is the alarm you're interested in. You decide 30 degrees is too low a setting to be concerned about on single deck meat and determine that by raising that setting to 40 degrees you will eliminate spurious alarms, but will still be called when things really go bad. In order to change the "ON" setting you enter "3 Y RETURN" and bring up the Sensor Alarm Change Screen. To "TYPE SENS (A/D/S/C) Ai" you enter "RETURN" to "L(N/L/T/A/C/R)", to "ON L(N/L/T/A/C/R) CRIT" you enter "RETURN"; to "SENSOR NUMBER" you enter "RETURN"; to "HHMM HI LIMIT" you enter "RETURN"; to "HHMM LOW LIMIT" you enter "RETURN" to "HIGH LIMIT" you enter "40 RETURN"; to "LOW LIMIT" you enter "RETURN"; to "MIN HRS BRWN ALMS" you enter "RETURN"; to "CORRECT? (Y/N) you enter "Y". The screen will now appear as follows:

FIGURE 39-N

THU 02/15/90		Danfoss-EMC, Inc., ZX SYSTEM		M1-M2-S1-S2-DB	
TIME 1212:19		SENSOR ALARMS 3			
TYPE SENS(A/D/S/C) AI		CHANGE :			
ON L(N/L/T/A/C/R) CRIT		CHANGE :			
OFF L(N/L/T/A/C/R) CRIT		CHANGE :			
SENSOR NUMBER = 34		CHANGE :			
HHMM HI LIMIT = 130		CHANGE :			
HHMM LOW LIMIT= 30		CHANGE :			
HIGH LIMIT = 30.0		CHANGE :	40		
LOW LIMIT = 17.0		CHANGE :			
MIN HRS BTWN ALMS= 0		CHANGE :			
CORRECT? (Y/N):		CHANGE :	Y		

When you hit "RETURN", the changes will be made and the sensor alarm report will appear on the screen as follows:

FIGURE 40-N

THU 02/15/90		Danfoss-EMC, Inc., ZX SYSTEM			M1-M2-S1-S2-DB	
TIME 1212:19		SENSOR ALARMS 3			BUILDING #101	
#	SENSOR	CATEGORY	PROG VALUES	CURR VALUES	ACTION	OCCURRED
3	AI 34 SDMT T02	F >	40.0/0130		CRIT	
		F <	17.0/0030		CRIT	
4	AI 35 SDMT T03	F >	30.0/0130		CRIT	
		F <	17.0/0100		ALM	
5	AI 36 PKDL T04	F >	38.0/0145		CRIT	
		F <	21.0/0100		CRIT	
6	AI 37 DYBX T05	F >	45.0/0230		ALM	
		F <	32.0/0100		ALM	
7	AI 38 PKDL T06	F >	38.0/0230		ALM	
		F <	21.0/0100		CRIT	

CHANGE = Y/ALM #/NEXT = RTN/0 = MENU :

You note that you, in fact, have changed the high temperature alarm target to 40 degrees as you intended and confidently look forward to fewer error messages in the future.

N.11 MESSAGES

You've just been informed by the refrigeration service company that compressor #4A needs to be replaced and will be off for five days. Knowing that alarms may reach Danfoss-EMC, Inc. you decide that the best way to alert everyone about the situation is to leave a message in Message #1 on the change screen. You dial up the store and at the AUTH prompt key "MESG" "1 RETURN:" and the screen displays as follows:

FIGURE 41-N

THU 02/15/90		Danfoss-EMC, Inc., ZX SYSTEM		M1-M2-S1-S2-DB	
TIME 1212:19		DATA RETRIEVAL		BUILDING #101	
MSG # 1	02/15/90				
CURRENT:	02/15/90				
EDIT:	_____			

You then key in the following information: "COMPRESSOR A2 DOWN FOR REPAIRS "RETURN". IT IS EXPECTED BACK ON LINE 02/19/90. "RETURN"

The screen now appears as follows:

FIGURE 42-N

```
THU 02/15/90          Danfoss-EMC, Inc., ZX SYSTEM          M1-M2-S1-S2-DB
TIME 1212:19          DATA RETRIEVAL                          BUILDING #101

MSG # 1      02/15/90

CURRENT:     02/15/90
EDITED:      02/15/90 COMPRESSOR A2 DOWN FOR REPAIRS
EDITED:      IT IS EXPECTED BACK ON LINE 02/19/90.
EDIT:        _____
```

You then enter "CTL Z" and the message is stored as is and the AUTH code reappears.

To check the message you key in "DATM RETURN" and the screen appears as follows:

FIGURE 43-N

```
THU 02/15/90          Danfoss-EMC, Inc., ZX SYSTEM          M1-M2-S1-S2-DB
TIME 1212:19          DATA RETRIEVAL                          BUILDING #101

MSG # 1      02/15/90 COMPRESSOR A2 DOWN FOR REPAIRS.
              IT IS EXPECTED BACK ON LINE 02/19/90.

AUTH
```

Ten minutes after you've finished the refrigeration mechanic calls back and says "The compressor will actually be back on line on 02/18/90." That's good news but you need to update the message you just left. You dial the store and key in "MESG 1 RETURN" at AUTH.

The screen appears as follows:

FIGURE 44-N

```

THU 02/15/90          Danfoss-EMC, Inc., ZX SYSTEM          M1-M2-S1-S2-DB
TIME 1212:19          DATA RETRIEVAL                      BUILDING #101

MSG # 1   02/15/90 COMPRESSOR A2 DOWN FOR REPAIRS.
IT IS EXPECTED BACK ON LINE 02/19/90.

CURRENT:  02/15/90 COMPRESSOR A2 DOWN FOR REPAIRS.
EDIT:     02/15/90 _____ ....

```

You note that line one remains the same so you key "CTL X". The screen then appears as follows:

FIGURE 45-N

```

THU 02/15/90          Danfoss-EMC, Inc., ZX SYSTEM          M1-M2-S1-S2-DB
TIME 1212:19          DATA RETRIEVAL                      BUILDING #101

MSG # 1   02/15/90 COMPRESSOR A2 DOWN FOR REPAIRS.
IT IS EXPECTED BACK ON LINE 02/19/90.

CURRENT:  02/15/90 COMPRESSOR A2 DOWN FOR REPAIRS.

EDIT:     02/15/90 _____ .....
CURRENT:  IT IS EXPECTED BACK ON LINE 02/19/90.
EDIT:     02/15/90 _____ .....

```

You keep hitting "CTL S" until you've copied all of the letters until you get to the "9". Instead of copying the 9, you key in "8" and the screen appears as follows:

FIGURE 46-N

```

THU 02/15/90          Danfoss-EMC, Inc., ZX SYSTEM          M1-M2-S1-S2-DB
TIME 1212:19          DATA RETRIEVAL                      BUILDING #101

MSG # 1   02/15/90 COMPRESSOR A2 DOWN FOR REPAIRS.
IT IS EXPECTED BACK ON LINE 02/19/90.

CURRENT:  02/15/90 COMPRESSOR A2 DOWN FOR REPAIRS.
EDIT:     02/15/90 _____ .....
CURRENT:  IT IS EXPECTED BACK ON LINE 02/19/90.
EDIT:     IT IS EXPECTED BACK ON LINE 02/18 _____ .....

```

You then hit "CTL X" and "CTL Z". When AUTH returns, you do a "DATM" "RETURN" to make sure the message is correct. The screen appears as follows:

FIGURE 47-N

```
THU 02/15/90          Danfoss-EMC, Inc., ZX SYSTEM          M1-M2-S1-S2-DB
TIME 1212:19          DATA RETRIEVAL                      BUILDING #101

MSG # 1      02/15/90 COMPRESSOR A2 DOWN FOR REPAIRS.
              IT IS EXPECTED BACK ON LINE 02/18/90.

AUTH
```

You now have it correctly entered.

Hopefully, these sample uses of changes will help you as you strive to become more familiar with the systems in your stores. Obviously, the number of potential situations are limitless and we've only covered a few. In the final analysis, using the system is the only way that you'll become good in assessing and fixing problem situations.

INDEX

A

account code, 5, 117
 action menu, 13
 analog sensors, 17
 audit trail, 19
 building hour base, 17
 building standards, 18
 conditions list, 16
 control alarms, 15
 control point status, 15
 digital sensors, 17
 global manual change, 18
 global reset, 18
 history pointers, 17
 holiday dates, 16
 hvac status, 16
 ID #, 15
 NC25 communication, 19
 phone numbers, 16
 refrigeration status, 15
 sensor alarms, 18
 switch override, 18
 system date, 14
 system day, 14
 system time, 14
 temperature averages, 17
 utility report, 15
 Alarms
 ALM, 69
 ALT, 69
 CRIT, 69
 LOG, 69
 REPT, 69
 analog input, 3
 analog sensor, 39, 65, 101
 audit trail, 5, 117
 AUTH, 5, 117
 authorization, 5

B

Boolean operator, 56
 building hours, 91
 operating hours, 91
 building standards, 111

C

calculated analog, 101
 calling priorities, 90
 case temperature, 34
 communication, 3
 condition constants, 111
 conditions list, 55
 change screen, 81
 constant value, 81
 fields, 56
 control alarms, 45
 control point, 3, 23, 31
 expanded status, 31
 fields, 24
 status, 23
 switch status, 33
 system types, 27
 cut-in, 34
 cut-out, 34

D

DAT'A, 61
 DAT'B, 92
 DAT'C X Y ZU D HO, 95
 DAT'D, 64
 DAT'E, 66
 DAT'F, 70
 DAT'G, 112
 DAT'X, 69
 DAT1, 29, 37
 DAT2, 42
 DAT3, 46
 DAT4, 49
 DAT5, 54
 DAT6, 58
 DAT7, 88
 DAT8, 90
 DAT9, 85
 days on, 85
 defrost change screen, 77
 minimum hours, 78
 dew point, 101
 digital input, 3
 digital output, 3
 digital sensors, 63, 97

E

EMS/Z, 3
 enable condition, 68, 108
 entry limits, 73
 escape function, 73
 key, 8, 85
 expanded status, 15, 75
 *, 31
 fields, 32
 L, 31

H

hi limit, 107
 history collection, 93
 history pointers, 93
 holiday dates, 87
 holiday types, 87
 HVAC change screen, 78
 HVAC status, 51
 fields, 51
 sensors, 51
 HVAC systems, 32
 schedule group #, 35
 types, 32

I

intergration accumulator, 35
 inverted logic, 33
 I, 33

K

KWH, 48

L

lighting change screen, 78
lighting systems, 32
 schedule group #, 35
 types, 32
log off, 5, 9
log on, 117
low limit, 107

M

maintenance run hours, 113
meter multiplier, 48
military time, 9
multiple racks, 34

N

NC25 communications, 115
nesting, 57

P

password, 5
phone numbers, 89
pressure offset, 35
program value, 68

Q

Q option, 8

R

rate of change, 34
refrigeration change screen, 75
refrigeration status, 39
 fields, 39
Refrigeration system
 MR(X), 41
 UR(X), 41
refrigeration systems, 31
 types, 31
relative building hour, 35

relative schedule, 84
return key, 7
rotation factor, 35
run hours, 28

S

scaling factor, 93
schedule group #
 standard schedule, 35
schedule groups
 change screen, 83
 sensitivity, 77
sensitivity counter, 35
sensor alarms, 67, 105
 fields, 67
sensor averages, 59
sensor number, 107
software control status, 33
 Blank, 33
 ON6, 33
standard schedule, 84
switch override, 43
switch/software manual, 25
system type
 HVAC, 53
 motor control, 53
 NC10, 53
 NC25, 53

T

target temperature, 42
target values, 34

U

utility meters, 47
utility report, 47

X

X feature, 9

