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**Instruction Manual
Model 2460
Environment Controller**

APPLICABILITY & EFFECTIVITY

This manual provides instructions for the following Sierra Monitor products:

<u>Model</u>	<u>Description</u>
2460	Environment Controller

The instructions are effective for the above models as of February 1, 1999

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1. INTRODUCTION

1.1 PRODUCT DESCRIPTION

The Model 2460 Environment Controller provides electronic, microprocessor based sensing and control of heating, ventilation and air conditioning (HVAC) and other environmental conditions in remote telecommunications structures. Specialized software is used to collect data from sensor inputs and make continuous, real time control and alarm logic decisions. The results of the logic are used to operate control outputs, send alarms to telephone company systems and display status and alarm conditions on the front panel of the controller.

The Model 2460 can serve as a stand-alone controller (with or without a modem for communications outside the structure) or as a node in a network of controllers. A stand-alone controller can later be incorporated into a networked system.

Although the Model 2460 is designed primarily for remote, unmanned structures such as controlled environment vaults, controlled environment cabinets and huts, it also has the expansion capability to control large building HVAC systems including all types of chiller equipment.

The Model 2460 is completely self-contained and has a built-in user interface consisting of a 4 line x 40 character LCD display and keypad. A separate Quick Reference Guide explains the use of the keypad and display for viewing status, alarm conditions and configuration parameters. With the proper authorization code, programmed settings may also be changed.

1.2 COMPUTER INTERFACE

The Model 2460 is designed for convenient external interface via either direct or modem personal computer connection. The controller automatically recognizes the method of communication at the time of any connection. Upon connection, the operator presses the ENTER key and the controller responds with the prompt “Auth”, requesting an authorization code. When the code is entered, the controller returns an ACTION MENU and the operator is then able to view all status parameters, logs and set points. If authorized, he is also able to make changes to programmed settings.

1.2.1 *InterLink* Software

With *InterLink* software, the operator can access all the data screens in a control system, make changes to control settings, respond to alarms, retrieve stored history and other performance data and send and retrieve controller database files. *InterLink* also has full-function color graphics and graphing capabilities.

InterLink includes drawing libraries and a screen editor and can be used to create custom drawings, typically pictorial diagrams of the structure and its mechanical equipment. In the graphics mode, real time control and environmental data are displayed on graphic screens designed by the user. As conditions change in the controlled environment, the values on the graphic display are updated.

1.2.2 Communications Within a Network

Communications between controllers in a network take place on an RS485 bus. A PC in terminal mode can be connected directly to the RS232 port on a Model 2460 controller for communication with that particular controller and with all other controllers in the network. The controller to which the PC is connected must be address 0 in the network

2. GUIDELINES FOR COMPUTER INTERFACE

2.1 ABBREVIATIONS USED IN THIS MANUAL

In this manual, conventional abbreviations are used for certain terminal keys, such as <ENTER> for the RETURN or ENTER key, <ESC> for the ESCAPE key, and so forth. Where the names of two or more keys are connected with a hyphen, as in <CTRL-F>, the first key (in this case the <CTRL> key) is depressed and held down while the second (in this case the F key) is depressed.

2.2 SCREEN TYPES AND AUTHORIZATION CODE

There are two types of screens in the Model 2460, DATA screens and CHANGE screens. DATA Screens allow the operator to observe how the Model 2460 is performing and what information it is using to determine its control actions. CHANGE Screens allow the operator to alter selected portions of the Model 2460 database in order to permit tuning of the system and to allow for changing needs in the building.

Access to view DATA screens and enter CHANGE screens requires an authorization code. Upon making the connection between the PC and controller, pressing <ENTER> causes the controller to return the prompt "Auth", requesting the authorization code. Entering VIEW in response to the prompt will enable the operator to view DATA screens.

The controller is configured with a factory default authorization code which enables the operator to enter CHANGE screens. This code may continue to be used or changed as desired by the user. For security reasons, **THE AUTHORIZATION CODE TO ENTER CHANGE SCREENS IS NOT PRESENTED IN THIS MANUAL.** The code is transmitted under separate cover to supervisory personnel responsible for operating and maintaining the facility or structure.

A third authorization code enables the operator to set the day, date and time in the controller. The code is GZSM and the procedure for setting the time is given in Section 2.8.1.

The number of spaces shown in a CHANGE screen prompt indicates the maximum number of characters that can be entered; all of these spaces will not necessarily be needed for a particular entry.

Any entry made in communicating with the controller from the PC keyboard is finished by pressing either <ENTER> or <ESC>. Until one of these keys is pressed, the controller will wait for additional input; but after 15 minutes, if there is no keystroke activity, the Model 2460 will "time out" (see Section 2.9).

At the bottom 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 the ACTION MENU.

If an entry error is made before pressing <ENTER>, the operator may backspace and enter the correct information. The space bar will also erase incorrect information. If an entry error was made and <ENTER> has been entered, it is recommended to answer N to the "CORRECT? (Y/N)" or "SURE? (Y/N)" questions and use the <ESC> key to repeat the activity.

By convention, only Upper Case letters are used in the Model 2460 for operator input. Be sure the <CAPS LOCK> is on.

2.3 ENTER KEY

Pressing the <ENTER> key alone has several functions. One is to retreat to the ACTION MENU or a previous screen and a second is to advance within a screen or one whole screen. In a DATA screen, pressing <ENTER> without entering any data at the prompt will retreat the screen one step to a former screen, or to the ACTION MENU. Also it will advance the screen to the next page if so stated in a prompt such as RETURN FOR NEXT PAGE. Also, the <ENTER> key will advance from question to question in a CHANGE screen until a prompt occurs asking if the correct data has been entered. Finally, if in the ACTION MENU, pressing <ENTER> displays the “Auth” prompt.

2.4 ESCAPE KEY

The Escape key has a function similar to the <ENTER> key. In a DATA screen, if no data has been entered at the prompt and <ESC> is pressed, the system will retreat one screen or return to the ACTION MENU. If data is entered and <ESC> is pressed, it functions as the <ENTER> key and enters the data. In a CHANGE screen, however, pressing <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.

2.5 SPACE BAR

The operator must space between elements of data being entered as a single string.

Examples:

1<space>15<ENTER> or
@1<space>15<space>15<ENTER>

It is not necessary to space before pressing <ENTER> or <ESC> at the end of a response.

2.6 “@” CHARACTER

At any screen prompt, the operator has the option of beginning his response with the "@" character, most often found above the "2" on terminal and computer keyboards. Using an "@" can save many keystrokes in navigating around the screens, especially when the operator begins to learn the menu numbers and their associated functions.

Whenever the @ symbol is entered, the controller executes as if from the ACTION MENU prompt. By chaining commands (separated by <space>), the operator can move immediately from any prompt to any other screen in the system.

Example:

@n<ENTER>

where **n** is the number of the ACTION MENU item (1-16) desired.

2.7 CHAINING COMMANDS

The operator may enter up to four levels of destination commands in a chain, either from the ACTION MENU or following "@" before <ENTER>.

Example:

@1<space>1<space>1<space>Y<ENTER>

This will take the operator directly to the CHANGE screen for CONTROL POINT #1. Reading the command symbol by symbol,

- @ "from the ACTION MENU,"
- 1 "select menu item 1 (CONTROL POINT STATUS),"
- 1 "start with CONTROL POINT NUMBER 1"
- 1 "respond to prompt at the bottom of the CONTROL POINT STATUS screen requesting the expanded status of CONTROL POINT 1,"
- Y "respond to the prompt of CONTROL POINT 1's expanded status screen: 'Yes, I want to make a change.'"

2.8 24-HOUR CLOCK TIME

The time shown in the heading of each screen is given in the 24-hour system, where each day starts at 0000 (midnight). The first two digits of the time tell the hour, from 00 to 23. The right pair of digits tell the minute, from 00 to 59.

Examples:

0135	1:35 AM	2019	8:19 PM
1123	11:23 AM	2222	10:22 PM
1355	1:55 PM	2347	11:47 PM

It may help to remember that one can always translate quickly back to the 12-hour system (AM/PM) by subtracting 12 from the first two digits of any number over 1200; that will give the corresponding PM hour.

2.8.1 Setting the Time

The time is set from the "Auth" prompt. From the ACTION MENU, press <ENTER> to display the "Auth" prompt and follow the keystroke sequence:

GZSM<ENTER>	Displays Z>
CS	Displays YEAR:
Enter the year<ENTER>	Displays MNTH:
Enter the month<ENTER>	Displays DATE:
Enter the date <ENTER>	Displays DOW:
Enter the day of the week Sunday=1<ENTER>	Displays HOUR:
Enter the hour (24 hour clock)<ENTER>	Displays MIN:
Enter the minutes<ENTER>	Displays SEC:
00<ENTER>	Displays date, time and day of week
<ENTER>	Displays "Auth" Prompt

2.9 TIME OUT (LOG OFF)

If the operator does not send any commands to the Model 2460 for a period of 5 minutes, it will automatically "log off," which means that he must re-enter an authorization code if he wishes to continue his session. If the session was not local, but over a telephone line, the Model 2460 will break the telephone connection, and the unit must be dialed up again to restore communications.

2.10 Overriding a Group of Control Points

From the ACTION MENU, (or from any prompt, using the "@" feature, as in @17....), the operator has the ability to override or restore to computer control any group of sequential control points. After using a "17" command, the ACTION MENU is always returned,

regardless of where the command was executed.

The "17" command is very powerful, and one should always check the effects of the change after using it. The examples in this section will demonstrate this.

The format of a "17" command is:

```
@17<space> s <space> m <space> n <ENTER>
```

where 's' is the status to which the operator wishes to set the points:

0 = computer control

1 = override ON

2 = override OFF

'm' is the number of the first control point in the series whose status is to be changed.

'n' is the number of the second control point in the series whose status is to be changed.

Once again, study the examples; note especially that the "m" and "n" are optional, and the effect of not using them.

Examples (the <space> is assumed where actual spaces are shown):

```
@17 1 11 17<ENTER> sets control points 11 through 17 to override status ON.  
@17 1 11<ENTER> sets all points from 11 up to 48 to override status ON.  
@17 1<ENTER> sets all points to override status ON.  
@17 2 6 9<ENTER> sets control points 6 through 9 to override status OFF.  
@17 0 10 15<ENTER> sets control points 10 through 15 to computer control.  
@17 0 sets all points to computer control.  
@17 1 12 12<ENTER> sets only control point 12 to override status ON.
```

3. SERIAL INTERFACES

There are two ways to communicate with a Model 2460 using a terminal or computer:

1. Over a telephone line from a remote location, if the Model 2460 is equipped with the optional expander board and optional modem.
2. At the controller site, directly, by connecting to the RS-232 port on the Model 2460.

3.1 MODEM

When using a computer with hard disk storage, use the Sierra Monitor *InterLink* program to get the full benefit of graphics. If graphics are not important, use any communications software with a terminal emulation mode.

1. Connect a Telephone Line to the PC's Modem per the Modem Users manual.
2. Line settings:
 - 9600 bps (or baud) communication speed
 - 8 data bits
 - 1 stop bit
 - No parity
3. Input the Correct Telephone Number and Dial the Number.
Enter the telephone number in the *InterLink* or other program's telephone directory for future calls.
4. Making the Connection:
Enter the appropriate command to call the unit.
5. Using capital letters, enter the authorization code and press <ENTER>. Note that the code is not echoed on the screen

3.2 DIRECT

1. Connect a serial cable between the 25-pin connector in the controller cabinet and the computer COM1.
2. Line settings:
 - 9600 bps (baud) communication speed
 - 8 data bits
 - 1 stop bit
 - No parity
3. Making the Connection:
Press <ENTER> on the computer. The Model 2460 will respond with an **Auth** prompt. Using capital letters, enter the four character authorization code and press <ENTER>.

4. MENU, DATA, AND CHANGE SCREENS

4.1 THE ACTION MENUS

```

MON 03/01/97      Sierra Monitor - Model 2460 System      25-00-
M4-08-22
TIME 0800:10      ACTION MENU                          ACE
TELECOM
                  (C) 1990 Danfoss, 1999 Sierra Monitor Corporation

SELECT 1 THRU 16 :
```

**Figure 1: The abbreviated ACTION MENU.
Enter 0<ENTER> to see the items listed by number and description**

The abbreviated, or "expert mode" ACTION MENU shown in Figure 1 is the first screen the user sees after entering a correct authorization code. The PROMPT,

SELECT 1 THRU 16:

allows the user to select any data screen. To view the full numbered menu, press:

0<ENTER>

```

MON 03/01/97      Sierra Monitor Corporation - Model 2460 System
25-00-M4-08-02
TIME 0814:53      ACTION MENU                          ACE
TELECOM
                  (C) 1990 Danfoss, 1999 Sierra Monitor Corporation

          1. CONTROL POINT STATUS          2. NOT IMPLEMENTED
          3. CONTROL ALARMS REPORT        4. NOT IMPLEMENTED
          5. KWH STORAGE DISPLAY          6. CONDITION CODE LISTING
          7. TODAYS AVERAGES              8. YESTERDAYS AVERAGES
          9. SCHED GROUP/CONTROL PT      10. PHONE NUMBERS REPORT
         11. HOLIDAY DATE RANGES         12. HISTORY POINTER
         13. DIGITAL SENSOR REPORT       14. ANALOG SENSOR REPORT
         15. SENSOR ALARM REPORT         16. STANDARDS/SETPOINTS

SELECT 1 THRU 16 :
```

Figure 2: The full ACTION MENU.

With the full ACTION MENU displayed, there is a screen title and number to explain what information each menu selection will present. This menu can be displayed from any prompt by entering:

@0<ENTER>

4.1.1 THE SCREEN HEADING

Note that both of the screens shown so far have the same heading; most of the same heading information will appear on every other screen displayed by the Model 2460.

The first line contains the day of the week and date, and immediately below the date is the time given in the 24-hour system (which is explained in Section 2.8 of this manual). Note whether this information is correct. Any schedules entered as control parameters refer to this system date and time, and it should be correct within five minutes. Setting the time is discussed in Section 2.8.1.

Also on the first line of the display, at the right, is a string of data separated by hyphens into five two-character fields:

25-00-M4-08-02

The first field, 25, indicates the Model 2460; the second, 00, is the address of the Model 2460 (00 indicates that the Model 2460 is the first (or only) controller in a network. Together, the third and fourth, M4-08 signify the software version. The fifth, 02, is the revision number of the database. This one has been revised once.

4.1.1.1 Screen Title

The screen title (in this case, the words ACTION MENU) appears on the second line in the center.

4.1.1.2 Unit Name

The identity of the Model 2460 is found at the right on the second line of every screen. In Figure 2 the Model 2460 is installed at Ace Telecom.

4.1.1.3 Copyright Notice

The copyright notice appears only in the ACTION MENU screens, on the third line.

4.2 SELECTING FROM THE ACTION MENU

To display a data screen from the ACTION MENU, enter its number followed by <ENTER>

4.3 DATA SCREENS AND CHANGE SCREENS

```

MON 03/01/97      Sierra Monitor Corporation - Model 2460 System
25-00-M4-08-35
TIME 0859:37
TELECOM
CONTROL POINT STATUS
ACE

CP      NAME          STATUS  CURR  TARG/  CUT  SYSTEM  COND
RUN
#              VAL  CUTIN  OUT  TYPE  #
HOURS
1  FAN              ON      76.3F
0
5  COMP 1           ON      76.2P
0
6  COMP 2           OFF X (OFF)112.4P
0
7  HEAT             OFF X
0
8  DEHUMID          OFF X   53.4%
0
10 DAMPER           OFF X   68.7F
0
11 WATR ALM         OFF X
0
12 TEMP ALM        OFF X
0
13 HUMD ALM        OFF X
0
14 VENT ALM        OFF X
0
15 POWR ALM        OFF X
0
16 EXPL ALM        OFF X   587p
0
17 TOXICGAS        OFF X   1.4p
0
18 GREEN LT        ON  X
0
19 FLRESCNT        ON  X
0
22 AUDIBLE         OFF X
0

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

Figure 3 The CONTROL POINT STATUS screen.
Control points following 22 will be on subsequent pages, as the prompt indicates

4.3.1 CONTROL POINT STATUS SCREEN

The CONTROL POINT STATUS screen shows each control point by number and name, its current ON/OFF status, whether or not it has an associated digital input (monitor point), its override status, the value of its principal associated analog sensor, key cooling parameters, the control point type, and the number and state of its key logical condition. The CONTROL POINT STATUS screen is divided, for each control point, into the following fields and sub-fields:

- CP# The number of the Control Point.
- NAME The 8 character, alpha-numeric designation for the Control Point.
- STATUS Status includes three sub-fields:
 ON/OFF field -- status of the control point. If there is an associated digital input (monitor) point, this field will indicate the

sensed status of the controlled device. If this control point is not monitored, the ON/OFF field will indicate the status the Model 2460 is calling for based on its programming, and an X will appear in the next sub-field.

X field -- an X will appear here for control points which are not monitored.

(ON/OFF) field, also called the "override" field. The contents of this field indicate that a user authorized to make changes in the system has put the control point in a manual override status, either through the change screen or with an "@17...." command (see section 2.10 of this manual for an explanation of the "@17" command). The field contents are always displayed in parentheses.

In the example, Figure 3, Control Point 4, COMP 2, has been put manually off. Since COMP 2 is not monitored (there is an X in the X-sub-field) the computer might be calling for the point to run, in which case the ON/OFF field could read ON while the override field read (OFF). The controlled device would still be in override, and would still be off.

CURR VAL	The reading from an associated Analog Input, if any.
TARG/CUTIN	The target suction pressure to be maintained by the Sierra Monitor Rate-of-Change Algorithm. Typically reserved for use in complex HVAC systems with multiple compressor stages.
CUT OUT	The cut-out suction pressure to be used if the Sierra Monitor Rate-of-Change Algorithm is used. Typically reserved for use in complex HVAC systems with multiple compressor stages.
SYSTEM TYPE	This is the System Type or Control Point Type. In the example (Figure 3), Control Point 1's type is HVAC, the HVAC algorithm is being used. <div style="margin-left: 40px;">LITE indicates a lighting-type point. HVAC indicates an HVAC-type point.</div> Assignment of the control point type is done when the database is written for the Model 2460, and the type is selected based on the control strategy needed. Both lighting and HVAC-type points are used in controlling systems, as they are in the example.
COND	The Condition field includes two sub-fields. The first references the Model 2460 logical condition (The conditions are listed in screen 6), if any, that must be true for the Model 2460 to turn this control point ON; the second indicates whether this condition is presently true or false (T/F).
RUN HRS	The total time, in hours, that this Control Point has been ON (or, if not monitored, has been called for) since this value was last cleared.

4.3.2 CONTROL POINT EXPANDED STATUS SCREEN

Entering a control point number at the CONTROL POINT STATUS screen's prompt causes the Model 2460 to display the EXPANDED STATUS of that control point. The EXPANDED STATUS CONTROL POINT screen contains further information specific to a control point and is also the point of entry to the CHANGE screen for that control point.

```

MON 03/01/97      Sierra Monitor Corporation - Model 2460 System
25-00-M4-08-35
TIME 0919:27      EXPANDED STATUS, C.#      5          ACE
TELECOM

COMP 1           CURR= 76.2           HVAC TYPE           I

      STATUS
      OUT MON CODE  MODE      TIMING           ACCUM RUN TIME
      LST ON      LST OFF CYC  TODAY  YESTERDAY
TOTAL
5  ON  ON  3           0919:25  0859:27  0  0020:02  0000:00
0

BASE COND # 5           SHUT DOWN # 35

ALARMS :

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

Figure 4: An EXPANDED STATUS CONTROL POINT screen shows more detailed information for a single control point than the CONTROL POINT STATUS screen

4.3.3 CONTROL POINT EXPANDED STATUS FIELDS

The number and types of fields in a control point's EXPANDED STATUS screen will be different for different types of control points. For example, Figure 4 is the expanded status of an HVAC point and the fields are described as follows:

- COMP 1 This is the name field, containing the 8-character name of the control point.
- CURR= 76.2 In this case, the current inside temperature. This field can be used to display a single analog input value, such as inside temperature, humidity, etc.
- I This character, at the far right on the same line with the control point name, indicates that the output of this control point is "inverted." When in the ON state, the Model 2460 control point relay will be closed between common and normally closed. If a control point is "non-inverted", when in the ON state, the Model 2460 control point relay will be closed between common and normally open.

Status and Run Time Fields

The next section of the screen gives the status and run timing for every control point in the "block;" in this case, compressor 1. The data is arranged in columns, and there are two lines of column headings.

- STATUS OUT What the Model 2460 is calling for this point to do; either turn on or turn off.

STATUS MON	If there is an associated digital input, this is the actual state of the controlled device as sensed by the digital input.
STATUS CODE	A numerical representation of the state of the OUT and MON fields (used by the Model 2460 control algorithms).
STATUS MODE	If this point were in override, (ON) or (OFF) would appear in this field.
TIMING LST ON	The last time the Model 2460 turned the control point ON.
TIMING LST OFF	The last time the Model 2460 turned the control point OFF.
TIMING CYC	The number of times the device has cycled since midnight, based on the digital input (monitor point), if one is wired, for the device. Otherwise the number of cycles is based on the digital output.
ACCUM RUN TIME	Three fields which contain the accumulated run time for today, yesterday, and a total since the last time the field was cleared.

Condition Fields

BASE COND	The number of the condition directly associated with the control point; in this case, the condition which causes normal operation of the compressor.
SHUT DOWN	The number of a an Emergency Shut Down condition, if any. The condition may reference a smoke alarm, a phase loss monitor, a high head pressure or low suction pressure sensor, etc., in any combination. If this condition becomes FALSE, the device being controlled is immediately shut off, bypassing any associated time delays.

Alarms Field

ALARMS :	Generally contains a record of the most recent overrides of the control point, by action of the Model 2460 or an operator.
----------	--

The Expanded Status Prompt

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

Entry selections produce the following responses:

- Y: Display CHANGE Screen for this Control Point.
- N: Revert back to the Control Point Status screen.
- S: Display the Schedule Group, if any, associated with the control point.
- M: Set the Accumulated Run Time TOTAL field back to zero.
- C: Display the Base Condition, if any, listed on the condition line.
- A: Display the associated Analog Input, if any.
- D: Display the associated Digital Input, if any.
- CP #: The number of another Control Point -- display the EXPANDED STATUS screen for the selected control point.

4.3.4 TYPES OF CONTROL POINTS

In addition to the HVAC type of control point, there are other control point types that determine the control strategy that will be used. Other types include lighting control, lockout control, and analog (or variable) output control. The next figures show the expanded status of a lockout control point and a variable output control point:

```

MON 03/01/97          Sierra Monitor Corporation - Model 2460 System
    25-00-M4-08-35
TIME 1030:19          EXPANDED STATUS, C.# 29          ACE
TELECOM

COMPL LP                      LOCKOUT

    STATUS                      TIMING                      ACCUM RUN TIME
    OUT MON CODE  MODE          LST ON   LST OFF  CYC  TODAY  YESTERDAY
TOTAL
29 OFF          6          0859:26  0859:26  0  0000:00  0000:00
0

BASE COND # 51          NUM OF CND # 3          BASE CODE # 51

ALARMS :

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

Figure 5: The EXPANDED STATUS of a Lockout type control point.

- "Type" Field** Point types other than HVAC include a field opposite the name of the point which gives its type (in this case, LOCKOUT).
- BASE COND #** The first condition number that will trigger a lockout should the condition become true (in this case, low suction pressure).
- NUM OF CND #** The number of contiguous conditions (base condition and sequential) that can trigger a lockout.
- BASE CODE #** The alarm code that will be generated once a lockout has occurred. This is a way of giving a user-definable meaning to the event that triggered the lockout condition.

```

MON 03/01/97      Sierra Monitor Corporation - Model 2460 System
25-00-M4-08-35
TIME 1047:01      EXPANDED STATUS, C.# 10          ACE
TELECOM

DAMPER              CURR= 68.7                      ANALOG OUTP

      STATUS
      OUT MON CODE  MODE      TIMING              ACCUM RUN TIME
      LST ON      LST OFF CYC  TODAY      YESTERDAY
TOTAL
10  73.0%
   0
      0859:26  1045:11  1  0000:00  0000:00

BASE COND # 14

ALARMS :

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

Figure 6: The EXPANDED STATUS of an Analog type control point.

- Type" Field** Point types other than HVAC include a field opposite the name of the point which gives its type (in this case, ANALOG OUTP).
- BASE COND #** The condition number that will vary the percentage output.
- STATUS OUT** The current output of the device in percent.

4.3.5 THE CONTROL POINT CHANGE SCREEN

Entering "Y" to the prompt in an EXPANDED STATUS screen causes the heading lines to display. Then, each time the <ENTER> key is pressed, the succeeding prompt line appears. Figure 7 illustrates a CONTROL POINT CHANGE screen:

```

MON 03/01/97      Sierra Monitor International - Model 2460 System
25-00-M4-08-35
TIME 1112:42      EXPANDED STATUS, C.P.# 5          ACE
TELECOM

NAME:      COMP 1      CHANGE :
PRE DELAY (MIN) = 0    CHANGE :
POST DELAY (MIN) = 0    CHANGE :
MAN (COM/ON/OFF) = COM CHANGE :
CORRECT? (Y/N):
```

Figure 7: The CHANGE SCREEN for an HVAC control point.

Each prompt contains the current value of the parameter, followed by the word CHANGE, then a number of spaces for a new value. The number of spaces in each prompt is the maximum number of characters which can be used in the field.

4.3.6 CONTROL POINT CHANGE SCREEN FIELDS

- NAME: COMP 1 The name of the control point.
- PRE DELAY (MIN) The amount of time in minutes (0-120) after a condition becomes true before it can be turned ON by the algorithm.
- POST DELAY (MIN) The amount of time in minutes (0-120) after a condition becomes false before it can be turned OFF by the algorithm.

MAN (COM/ON/OFF) This value provides the override status of the control point -- either COMputer control, override ON, or override OFF.

CORRECT? (Y/N) To implement a change, press Y<ENTER>. Pressing N<ENTER> negates any changes.
 Entering <CTRL>-J after responding "Y" to the final change screen prompt displays the first line of the change screen for the next control point.
 Entering <ESC> at the Y/N prompt reverts activity to the beginning of the change screen for the same control point.

4.3.7 CONTROL ALARMS REPORT SCREEN

The CONTROL ALARMS REPORT displays two types of alarms: (1) system alarms and (2) control point alarms.

```

MON 03/01/97      Sierra Monitor Corporation - Model 2460 System
25-00-M4-08-35
TIME 1127:09      CONTROL ALARMS REPORT                      ACE
TELECOM

SYSTEM ALARMS
MON 0904 COND# 48 #07          MON 0900 FUSE ALM #26
MON 0900 BAT FAIL #22        MON 0859 MODEMTST #04
SUN 1234 # 44 DOWN
CP # 6 COMP 2
MON 0859 MAN OFF(COM)
ENTER CP #, RTN FOR NEXT PAGE, OR 0 FOR MENU :
```

Figure 8: The CONTROL ALARM REPORT screen

4.3.7.1 System Alarms

SYSTEM ALARMS display the day of the week and time that an alarm occurred, the name of the Analog Input, Digital Input or Condition that was in an alarm state, and the Sensor Alarm Number. A Lockout type Control Point can also generate a DOWN Alarm, which indicates the number of the Control Point or Sensor Alarm which caused the lockout.

4.3.7.2 Control Point Alarms

Control Point ALARMS display the day of the week and time that a Control Point was overridden in software or returned to computer control.

4.3.8 KWH STORAGE DISPLAY SCREEN

The Model 2460 has four meter inputs, and each of these has a dedicated KWH storage display screen. With appropriate sensors (current transformers) and transducers (watt-hour transducers), power consumption at up to four points can be measured and recorded.

Five pages can be displayed in the KWH STORAGE DISPLAY screen: one for each meter input and the fifth giving the total of the other four pages. If less than four meter inputs are used, their respective pages will be blank.

MON 03/01/97		Sierra Monitor Corporation - Model 2460 System					
25-00-M4-08-35							
TIME 1428:21		KWH STORAGE DISPLAY		1		ACE	
TELECOM							
		KWH		KWH		METER	
1							
HOUR	TODAY	YESTERDAY	HOUR	TODAY	YESTERDAY		THIS
0000	72	72	1200	51	54		MONTH
	LAST						
	MONTH						
0100	77	77	1300	54	56	KWH	2557
	52721						
0200	75	76	1400	34	53	PEAK DAY	1
	7						
0300	76	78	1500	0	52	PEAK TIME	1717
	1728						
0400	74	79	1600	0	54	PEAK 15 MIN	23
	26						
0500	77	77	1700	0	84	LAST 15 MIN	14
0600	75	75	1800	0	78		THIS
	LAST						
0700	49	50	1900	0	80	DAILY	WEEK
	WEEK						
0800	55	56	2000	0	78	SUN	1617
	1667						
0900	57	59	2100	0	79	MON	1627
	1698						
1000	53	54	2200	0	78	TUE	930
	1662						
1100	51	55	2300	0	73	WED	1585
	1702						
			TOTAL	930	1627	THU	1615
	1688						
	PEAK 15 MIN					FRI	1659
	1692						
0546	22					SAT	1644
	1708						
	1717	23					MULT:
	1.400						
RETURN FOR NEXT PAGE, OR 0 FOR MENU:							

Figure 9: The KWH STORAGE DISPLAY screen.

Hourly totals for today and yesterday are accumulated into weekly and monthly totals and a record is kept of a Peak Window with the date and time it occurred.

4.3.9 CONDITION CODE LISTING SCREEN

```

MON 03/01/97      Sierra Monitor Corporation - Model 2460 System
25-00-M4-08-35
TIME 1144:50      CONDITION CODE LISTING                      ACE
TELECOM

NUMBER  BOOLEAN  SENSOR OR  SCHEDULE  VALUE  C. ASSOCIATION
19      ^        FIRE ALM  DIN      [ OFF ]  NESTED
20 F          PWR ALM  DIN      [ OFF ]  POWR ALM
21      <        INSD TMP  AIN      [ 76.3 ]  NESTED
          TEMP ALM  BSTD [ 60.0 ]
22      <        HUMIDITY  AIN      [ 53.4 ]  NESTED
          HUMD ALM  BSTD [ 25.0 ]
23 T      ^        EXPL ALM  CPT      [ OFF ]  GREEN LT
          and ^    TOXICGAS  CPT      [ OFF ]
          and ^    VENT ALM  CPT      [ OFF ]
          and ^    GASMOMFL  CPT      [ OFF ]
          and ^    FIRE ALM  DIN      [ OFF ]

CHANGE Y/RTN/CONDITION # :
```

Figure 10: The CONDITION CODE LISTING screen.

The Model 2460 software is extremely flexible in the control and monitoring routines it provides, because every application is unique in many respects. The conditions list for a Model 2460 allows programming for the needs of specific devices and situations. The CONDITION CODE LISTING screen contains the logic statements unique to a particular controlled site. Each logical statement has either a truth value (TRUE or FALSE) or a numeric value; those values can be used as variables in the control application.

4.3.9.1 Condition Code Listing Screen Fields

NUMBER The number of the condition. This number will appear in CONTROL POINTS EXPANDED STATUS screens (see section 4.3.2). When this condition is part of another condition ("nested"), the number will be used in the other condition of which it forms a part.

Status sub-field

After the condition number, if the condition is not "nested," a T or F will appear, indicating the current truth value of the condition.

BOOLEAN The logical operator applying to the statement on the same line in the next field. In the example used in Figure 10, the condition 19 uses the symbol "^" as a Boolean operator. That symbol means "NOT," so the condition will be true if the FIRE ALM digital input is OFF.

There are several other Boolean operators; in addition, this field can contain the more familiar arithmetic operators +, -, / (for "divided by"), and *n (for "multiplied by", where n is a number of decimal places). Here are the possible Boolean operators and their meanings:

- AND For the expression to be TRUE, both arguments (the expressions separated by the AND) must be true.
- ^ For the expression to be TRUE, what follows must be OFF or FALSE.

- OR For the expression to be TRUE, one of the arguments separated by the OR must be TRUE.
- > Is greater than
- < Is less than
- = Is equal to
- >= Is greater than or equal to
- <= Is less than or equal to
- ^= Is not equal to
- + Plus
- Minus
- *n Multiplied by, where n is a numeral indicating the number of places to the right of the decimal point in the product.
- / Divided by
- \ Mod (the result of this operation is the remainder when the number preceding the operator is divided by the number following the operator).
- () Parentheses. Treat the enclosed expression as one number. In reading conditions, evaluate expressions in parentheses first. For expressions containing parentheses within parentheses, evaluate in order, solving the innermost expression first.

SENSOR OR
SCHEDULE

The "argument," or value being operated on in the condition. In the example used in Figure 10, condition 19 uses a digital input, FIRE ALM, as the argument. A digital input or a control point is TRUE if it is ON.

The field may contain a sensor name or schedule number, but it may also contain the name of a control point, a setpoint or the number of another condition. There is a subfield following which specifies a control point (CPT), a digital input (DIN), an analog input (AIN), or a setpoint (ASTD or BSTD).

In complex conditions, the need to have many arguments and operations requires several lines in the screen. Analyzing a complex condition is simplified by writing it out on a single line.

VALUE

The current value. For control points and digital inputs, the values will be either ON or OFF. For analog sensors or analog outputs the value will be the output or sensed numerical value.

C. ASSOCIATION

The control point for which this condition is effective; or, the word NESTED. Nested conditions are those used as arguments in other conditions. Nesting can be several layers deep; i.e., a condition can call a condition which can call another condition, etc.

4.3.9.2 The Condition Code Change Screen

The only item that can be changed directly in a Condition is a CONSTANT. To make a change, from the prompt in the CONDITION CODE LISTING screen, type the number of the condition in which the constant is to be changed, then a <SPACE>, then Y<ENTER>:

Enter: 14 Y<ENTER>
 Model 2460 responds: CHANGE TO :___

```

14 T          MATH COND # 15                                GASDETEC
      (      CARB MON  AIN  [ 27.8]
      >      CO ALARM   BSTD [ 50.0]                       )
or (      METHANE   AIN  [ 1203]
      >      METH ALRM  ASTD [ 5000]                       )
or ((     HOURS TIMER # 1  [ 44.0]
      >=     CONSTANT   [  8.0]                           )
and (     SECND TIMER # 1  [ 60.0]
      >      CONSTANT   [ 15.0]                           ))

15          (      CARB MON  AIN  [ 27.8]                    NESTED
      <      CO ALARM   ASTD [ 35.0]
      CLEAR TIMER # 1

CHANGE Y/RTN/CONDITION # : 14 Y

14 T          MATH COND # 15
      (      CARB MON  AIN  [ 27.8]
      >      CO ALARM   BSTD [ 50.0]                       )
or (      METHANE   AIN  [ 1203]
      >      METH ALRM  ASTD [ 5000]                       )
or ((     HOURS TIMER # 1  [ 44.0]
      >=     CONSTANT   [  8.0]                           )  CHANGE TO
:___
    
```

Figure 11: The CONDITION CODE CHANGE screen.

Enter the new constant, which will overwrite the underlined characters. Other changes to condition parameters can be made in the SETPOINTS screen.

4.3.10 TODAYS AND YESTERDAYS AVERAGES SCREENS

```

MON 03/01/97      Sierra Monitor Corporation - Model 2460 System
25-00-M4-08-35
TIME 1625:49
TELECOM
                                TODAYS AVERAGES                1          ACE

ANALOG CHANNEL      CURRENT      MAXIMUM      MINIMUM
 1 INSD TMP         75.7F      1100 76.9F   0656 74.1F

  HOUR           MINUTES AFTER HOUR           HOUR           MINUTES AFTER HOUR

 45              00      15      30      45              00      15      30
0000 75.8      75.6      75.9      75.3      0100 75.9      75.3      75.7
75.5
0200 75.9      75.4      75.6      75.4      0300 75.0      75.2      75.6
76.8
0400 75.5      75.7      75.1      75.3      0500 75.4      76.7      76.0
76.0
0600 74.2      74.0      73.8      74.2      0700 75.5      75.0      75.1
74.9
0800 76.5      75.1      75.2      76.2      0900 75.6      76.3      75.5
75.7
1000 76.0      75.3      75.2      75.1      1100 75.7      76.1      76.0
76.5
1200 75.6      75.3      76.3      74.9      1300 75.0      75.4      76.4
75.4
1400 75.1      75.0      75.0      74.8      1500 74.9      75.2      75.8
75.7
1600 75.3      0.0      0.0      0.0      1700 0.0      0.0      0.0
0.0
1800 0.0      0.0      0.0      0.0      1900 0.0      0.0      0.0
0.0
2000 0.0      0.0      0.0      0.0      2100 0.0      0.0      0.0
0.0
2200 0.0      0.0      0.0      0.0      2300 0.0      0.0      0.0
0.0
RETURN FOR NEXT PAGE, OR 0 FOR MENU:
    
```

Figure 12: The TODAY'S AVERAGES screen.
The YESTERDAY'S AVERAGES screen contains the same fields

The AVERAGES screens contain, for each analog sensor, its number and name, its current value, its maximum and minimum for the period displayed and the time at which the maximum or minimum value occurred, and the average sensor value for every fifteen minutes.

The "next page" referred to by the prompt will contain today's values for the next analog sensor. To see yesterday's averages for the same sensor, enter Y<ENTER> from the TODAY'S AVERAGES screen.

In TODAY'S AVERAGES, sensor value averages are posted to the screen every quarter hour, but there is a quarter hour posting delay. In the example (Figure 12), the most recent average posted is for the period ended at 1600, even though the current time is past 1615. The average for the fifteen minutes ending at 1615 will be posted at 1630.

Averages for periods which have not yet occurred are shown as zeros.

The TODAY'S AVERAGES and YESTERDAY'S AVERAGES screens are identical in layout. Each day just after midnight, all of the values are erased from the YESTERDAY'S AVERAGES screen and are replaced by the contents of TODAY'S AVERAGES.

4.3.11 PHONE NUMBERS REPORT SCREEN

```
MON 03/01/97      Sierra Monitor Corporation - Model 2460 System
25-00-M4-08-35
TIME 1627:11          PHONE NUMBERS REPORT          ACE
TELECOM

1 19415612642
2
3

ENTER ITEM # TO ALTER :
```

Figure 13: The PHONE NUMBERS REPORT screen.

The PHONE NUMBERS REPORT screen contains the telephone numbers the Model 2460 (if address 0) will dial when there is a system or sensor alarm. *A Model 2460 networked to another Model 2460 must have a dummy phone number (e.g. "123") in order for its alarms to be dialed out by the master.*

When an alarm becomes active, it will dial each number whose schedule is TRUE, starting with telephone number #1, every fifteen minutes until it connects and transmits the alarm. Five attempts will be made to dial out to telephone numbers #2 and #3; The Model 2460 will continue to call telephone number #1 every fifteen minutes until it connects and transmits the alarm.

Check the schedules!

Dial-out will occur only to numbers with a valid schedule.

4.3.11.1 Phone Numbers Report change Screen

When entering a telephone number to change, the schedule for dialout to that telephone number may also be changed. The prompts will appear as a continuation of the PHONE NUMBERS REPORT screen. For example, enter 1<ENTER> at the prompt:

```

MON 03/01/97      Sierra Monitor Corporation - Model 2460 System
25-00-M4-08-35
TIME 1627:11      PHONE NUMBERS REPORT                      ACE
TELECOM

1 19415612642
2
3

ENTER ITEM # TO ALTER :1

PHONE # = : 19415612642  CHANGE : _____

SCHEDULE GROUP # 123

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

SCHEDULE TO CHANGE                                CHANGE : 1_
TIME ON      =      0000      CHANGE : ____
TIME OFF     =      2400      CHANGE : ____
DAYS ON      = *** ALL DAYS ***  CHANGE : _____
CORRECT? (Y/N): _
    
```

Figure 14: The PHONE NUMBER REPORT screen with the change prompts displayed.

Change the telephone number as needed, using a "prefix 1" and an area code if needed from the location of the Model 2460. Upon entering the telephone number, CHANGE prompts will appear to change the schedule for dialout.

IMPORTANT:

If alarms defined in the Model 2460 are to be posted up to a Network Manager Model 2460, there must be a number (by convention Sierra Monitor uses 123) in telephone number slot #1, and a valid schedule for that telephone number.

When changes are entered, they may be checked by redisplaying the PHONE NUMBER REPORT screen.

4.3.12 HISTORY POINTER SCREEN

```

MON 03/01/97      Sierra Monitor Corporation - Model 2460 System
25-00-M4-08-35
TIME 1628:14
TELECOM
                HISTORY POINTER                1                ACE

SAMPLE INTERVAL IS  0 MINS, 15 SECS. ANALOG  SUCTION 1  LOCKED

  4.2   4.5   4.5   4.5   4.2   4.2   4.0   4.2   4.2   4.5
  4.7   5.0   4.7   5.0   5.2   5.0   5.0   5.2   5.2   5.2
  4.7   5.0   5.0   5.0   5.2   5.0   5.2   5.7   6.0   6.2
  6.5   6.2   6.0   6.0   5.5   5.2   5.0   5.0   5.0   5.0
  5.0   5.2   5.5   5.2   5.2   5.5   5.2   5.0   5.0   5.2
  5.0   5.2   5.2   5.0   5.0   5.2   5.2   4.7   5.0   5.0
  5.0   4.7   5.2   5.7   5.5   5.7   5.7   5.7   6.2   6.0
  5.7   6.0   6.0   5.7   5.2   5.5   5.5   5.2   5.2   5.0
  5.0   4.5   4.7   4.7   4.2   4.2   4.2   4.5   4.7   4.5
  4.5   5.0   4.7   5.0   5.5   5.7   5.7   6.0   5.7   6.0
  5.7   6.0   5.7   6.0   6.0   6.0   6.0   6.0   6.0   6.0
  6.0   5.7   5.7   5.5   5.7   6.2   6.2   6.0   6.2   6.2
  6.5   6.2   6.2   6.0   5.7   5.5   5.2   5.2   5.2   5.0
  5.0   4.7   4.7   4.7   4.7   4.7   4.7   4.7   4.7   5.0
  5.2   5.5   5.5   5.7   5.7   6.0   6.0   6.5   6.2   6.0
  6.0   5.2   4.7   4.5   4.2   4.2   4.0   4.2   4.2   4.0
  3.7   4.0   4.5   4.2   4.7   4.7   5.0   5.2   5.2   5.5
  5.7   5.7   6.2   6.2*  6.0   6.2   6.0   5.7   5.7   0.0

CHANGE = Y/NEW #/NEXT PAGE = RTN/0 = MENU:
    
```

Figure 15: The HISTORY POINTER screen

The Model 2460 can store 180 samples from each of 20 points, which may be analog or digital inputs or control point outputs. By default, history samples are stored in a "rolling window" where the oldest sample is lost when the newest is written. As an option, an alarm may be specified in the HISTORY POINTER CHANGE screen, and when that alarm occurs, the history for that page will "lock," either immediately or after a specified further number of intervals. Locking after an alarm occurs insures retention of history for 180 intervals before the lock, and is a powerful troubleshooting tool.

When viewing a HISTORY POINTER screen after locking has occurred, note that one of the samples is followed by an *, and that is the interval at which locking occurred. If a number of COUNTS AFTER LOCK has been specified, there will be that many additional samples after the one with the *.

There are up to 20 pages of the HISTORY POINTER screen, one for each point defined in the CHANGE screen. Figure 15 shows history for this Model 2460's analog input 1, which is the suction pressure for the A/C compressor. The sampling interval has been set to 15 seconds. Any interval, in minutes and seconds up to 480 minutes, can be specified in the CHANGE screen.

A locked HISTORY POINTER page can be "unlocked" only by accessing its CHANGE screen and responding "Y" to the last prompt (whether or not a change is made).

4.3.12.1 History Pointer Change Screen

Enter “Y” to the CHANGE prompt in the HISTORY pointer screen. The prompts appear one at a time. Most are explained in the preceding paragraphs. For the third prompt, the point number must be entered preceded by:

- P for history of a control point output
- D for history of a digital input
- A for history of an analog input

The numbers of the analog and digital inputs are listed in the DIGITAL SENSOR REPORT (@13) and ANALOG SENSOR REPORT (@14), which are discussed in the following two sections.

```

MON 03/01/97      Sierra Monitor Corporation - Model 2460 System
25-00-M4-08-35
TIME 0625:28      HISTORY POINTER          1          ACE
TELECOM

INTERVAL(MIN)    =          0  CHANGE : ____
INTERVAL(SEC)    =          15  CHANGE : ____
POINT/SENSOR(P/D/A)=  A  2  CHANGE : ____
ALARM # FOR LOCK =          15  CHANGE : ____
COUNTS AFTER LOCK =          5  CHANGE : ____
CORRECT? (Y/N):  _
    
```

Figure 16: The HISTORY POINTER CHANGE screen.

Control points are listed by number in the CONTROL POINT STATUS screen (@1).

The response to the ALARM # FOR LOCK prompt should be a sensor alarm number taken from the SENSOR ALARM REPORT (@15), found in Section 4.3.17 of this manual.

4.3.13 DIGITAL SENSOR REPORT SCREEN

The DIGITAL SENSOR REPORT screen displays the number, name, and value of all of the Model 2460's digital inputs.

There are two digital inputs, #49 and #50, which can be displayed only by entering @13 n, where n is some number greater than 2, or by entering 49<ENTER> at the prompt. The normal "next page" action, entering an <ENTER> at the prompt at the bottom of the page, will not display them. Inputs 49 and 50 give the status of the RS-485 communications bus and the Model 2460's hardware clock, and are used for programming and diagnostic purposes.

```

MON 03/01/97      Sierra Monitor Corporation - Model 2460 System
25-00-M4-08-35
TIME 1305:45          DIGITAL SENSOR REPORT      1          ACE
TELECOM

NO  NAME      VALUE      NO  NAME      VALUE      NO  NAME
VALUE
1  FAN        ON        17  FUSE ALM   OFF        33* SPARE
OFF
2  SPARE      OFF        18  LITE RST   OFF        34* SPARE
OFF
3  SPARE      OFF        19  SPARE      OFF        35* SPARE
OFF
4  SPARE      OFF        20  NC25DOOR  OFF        36* SPARE
OFF
5  COMP 1     ON        21  PWR FAIL   OFF        37* SPARE
OFF
6  COMP 2     OFF       22  BAT FAIL   OFF        38* SPARE
OFF
7  SPARE      OFF        23  12V ALM1   OFF        39* SPARE
OFF
8  SPARE      OFF        24  12V ALM2   OFF        40* SPARE
OFF
9  WATR ALM   OFF       25* SPARE   OFF        41* SPARE
OFF
10 SUMP PMP   OFF       26* SPARE   OFF        42* SPARE
OFF
11 FAN DPS    ON        27* SPARE   OFF        43* SPARE
OFF
12 SPARE      OFF       28* SPARE   OFF        44* SPARE
OFF
13 PWR ALM    OFF       29* SPARE   OFF        45* SPARE
OFF
14 FIRE ALM  OFF       30* SPARE   OFF        46* SPARE
OFF
15 GAS MALF  OFF       31* SPARE   OFF        47* SPARE
OFF
16 HATCHALM  OFF       32* SPARE   OFF        48* MODEMTST
OFF

CHANGE = Y/NEW #/NEXT PAGE = RTN/0 = MENU:
    
```

Figure 17: The DIGITAL SENSOR REPORT screen.

- Override Indicator** Any sensor which has been set by CHANGE screen to a manual value will display an M after its ON or OFF value.
- Special character *** The Model 2460, by hardware configuration, can have available 8, 16, 32, or 48 real digital inputs. All points which are not supported by hardware are shown with an asterisk (*) following their number in the DIGITAL SENSOR REPORT.

4.3.13.1 Digital Sensor Change Screen

From the DIGITAL SENSOR CHANGE screen, the name of a digital input may be changed if the need arises. The point may also be overridden so that it will always read ON or OFF rather than reflect the true value of the monitored sensor.

```
MON 03/01/97      Sierra Monitor Corporation - Model 2460 System
25-00-M4-08-35
TIME 1629:44      CHANGE DIGITAL SENSOR# 1          ACE
TELECOM

NAME:      FAN          CHANGE : _____
MANUAL(COM/ON/OFF)= COM    CHANGE : ____
CORRECT? (Y/N):  _
```

Figure 18: The DIGITAL SENSOR CHANGE screen.

Enter “Y” to the CHANGE prompt in the DIGITAL SENSOR REPORT screen. Prompts will appear to change digital sensor #1.

To change other digital sensors, enter the desired sensor number in the CHANGE prompt in the DIGITAL SENSOR REPORT screen. Enter “Y” to the CHANGE prompt to change that sensor.

Alternately, press @13 n Y <ENTER>, where n is the digital sensor number, to change that sensor.

4.3.14 ANALOG SENSOR REPORT SCREEN

The ANALOG SENSOR REPORT screen displays the number, name, value, units of measure, and override status of each analog sensor.

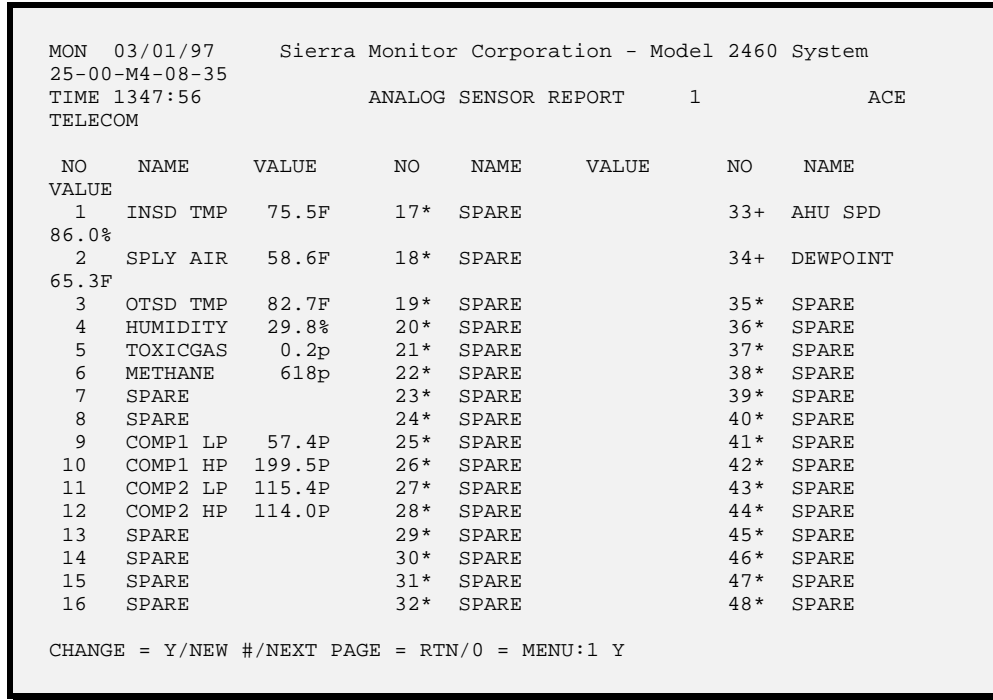


Figure 19: The ANALOG SENSOR REPORT screen.

Special character: An * after the sensor number indicates that analog information is being received from another member of the control network rather than from a sensor wired to this Model 2460.

Special character: A + after the sensor number indicates that the value is being calculated by a condition rather than being read from physical sensor hardware.

INDICATORS FOR UNITS OF MEASURE

The units of measure are indicated immediately following the analog value of the sensor, and a single character is used. These are some of the more common units of measure and their abbreviations:

- P (upper case) pressure in PSI
- F temperature in degrees Fahrenheit
- C temperature in degrees Celsius
- p (lower case) parts per million
- % percent
- A amperage or current
- V voltage

Override Indicator: As with digital sensors, an M after the value for a sensor indicates that the sensor is in override and has been manually set to that value.

4.3.14.1 Analog Sensor Change Screen

By entering @14 n Y, where n is the number of an analog sensor to be changed, the

CHANGE screen for that analog sensor is displayed. When viewing the ANALOG SENSOR REPORT screen, enter n Y to display the CHANGE screen.

```
MON 03/01/97      Sierra Monitor Corporation - Model 2460 System
25-00-M4-08-35
TIME 1630:50      CHANGE ANALOG SENSOR # 1      ACE
TELECOM

NAME:      INSD TMP      CHANGE : _____
ADJUSTMENT OFFSET= 0      CHANGE : ____
MANUAL (Com/Man) = COM    CHANGE : ____
CORRECT? (Y/N):  _
```

Figure 20: The ANALOG SENSOR CHANGE screen.

From this CHANGE screen, the operator can change the name of the sensor, enter an offset (either plus or minus) which will be added to the value sensed, or override the value.

CAUTION (OFFSET)

If an analog sensor is offset, there will be no special character displayed with the value in any other screen. The only way to determine that an offset has been applied to a sensor value is to inspect the ANALOG SENSOR CHANGE screen.

Entering MAN to override a sensor will result in a prompt requesting a VALUE. In answer to the prompt, enter the value and the sensor will read that value until it is restored to COMputer control. An analog sensor set to MANual mode will display an M following its value.

4.3.15 SENSOR ALARM REPORT SCREEN

```

MON 03/01/97      Sierra Monitor Corporation - Model 2460 System
25-00-M4-08-35
TIME 1330:19          SENSOR ALARM REPORT      10          ACE
TELECOM

#   SENSOR      CATEGORY  PROG VALUES  CURR VALUES  ACTION
OCCURRED

10 AI  1 INSD TMP F  >      80.0/0010     81.4/0008     CRIT  MON
1322
           F  <      60.0/0020           CRIT

11 DI  9 WATR ALM ON >           0002           CRIT  THU
1315

12 DI 10 SUMP PMP ON >           0003           CRIT

13 DI 10 SUMP PMP CYC >           3/0010           0/0002     CRIT

14 DI 13 PWR ALM ON >           0005           CRIT

15 DI 14 FIRE ALM ON >           0005           CRIT

16 DI 15 GAS MALF ON >           0001           CRIT

17 DI 16 HATCHALM ON >           0030           LOG

18 CN 17 COND      ON >           0005           CRIT

CHANGE = Y/NEW #/NEXT PAGE = RTN/0 = MENU:1 Y
    
```

Figure 21: The SENSOR ALARM REPORT screen.

Thirty-two Sensor Alarms can be defined in the Model 2460, for Analog Sensors, Digital Sensors, or Conditions.

Alarm number 10 in Figure 21 is based on an analog sensor, number 1, INSD TMP, which is the inside temperature. The alarm has two "levels:" if the temperature is greater than 80.0 °F for 10 minutes, a CRIT or "critical" alarm will result; and a CRIT alarm will also result if the temperature is less than 60.0 °F for 20 minutes. In this example, the temperature is 81.4 °F. Because the temperature is outside the safe range as defined by one of the alarm levels, its value appears in the CURR VALUES field of the SENSOR ALARM REPORT. The out of range value is displayed:

81.4/0008

meaning that the temperature is now 81.4 °F and the sensor reading has been above 80.0 °F for 8 minutes. If the temperature remains greater than 80.0 °F for another 2 minutes, an alarm will be generated, will be posted in the CONTROL ALARMS REPORT (Section 4.3.7 of this manual) and will dial out if a telephone number in the PHONE NUMBERS REPORT (Section 4.3.13 of this manual) has a TRUE schedule.

Alarm number 11 in Figure 21 is based on a digital sensor, number 9, WATR ALM, and will occur if the water level sensor reads on for 2 minutes. The alarm occurred on Thursday at 1315.

Alarm number 13 is based on a digital sensor. number 10, Sump Pmp , and will occur if digital input 10 cycles (becomes true) three times in 10 minutes.

Alarm number 18 is a condition alarm based on condition 17. To review CONDITION 17,

enter @6 17<ENTER>. The condition is printed in this manual in Figure 10, found in Section 4.3.11 -- the condition becomes TRUE any time the power alarm sensor is ON. Alarm number 18 will be generated if condition 17 is ON for longer than 5 minutes.

- The ACTION field** The alarms described above are all set to the CRIT level. There are several other actions which can be programmed:
- LOG This action will log the day and time of occurrence in the OCCURRED field; it will not initiate a dialout.
 - ALM This ACTION will log occurrence of the sensor alarm in the OCCURRED field and will initiate a dialout if the alarm flag is clear. When a sensor alarm set to ALM is dialed out, it sets a software flag; no other sensor alarm set to ALM will dial out until the alarm flag is cleared. The alarm flag is cleared by running a data retrieval (DAT) while communicating with the Model 2460. This requirement assumes that when a dialed-out alarm is acknowledged, the system will be inspected for other alarms that have occurred; multiple dialouts to what is usually a long distance number are avoided.
 - CRIT This ACTION will post the alarm to the CONTROL ALARMS REPORT and will dial out regardless of the condition of the alarm flag. CRIT is the most-used type of alarm for serious alarm conditions. No second alarm will be generated unless the value being alarmed returns within limits and then again exceeds the alarm limits for value and time.
 - NONE No action is taken.
- The alarm flag ...**

4.3.15.1 Sensor Alarm Change Screen

```

MON 03/01/97      Sierra Monitor Corporation - Model 2460 System
25-00-M4-08-35
TIME 1631:19      SENSOR ALARM REPORT      21      ACE
TELECOM

TYPE SENSOR(A/D/C) CN      CHANGE : ___
ON LVL (N/L/A/C)= NONE    CHANGE : ___
OFF LVL (N/L/A/C)= NONE    CHANGE : ___
CYC LVL (N/L/A/C)= CRIT   CHANGE : ___
SENSOR NUMBER = 38        CHANGE : ___
CYCLE TIME (HHMM)= 20     CHANGE : ___
CYCLE COUNT = 3          CHANGE : ___
CORRECT? (Y/N): _
    
```

Figure 22: The SENSOR ALARM CHANGE screen for a condition alarm or a digital sensor alarm.

Enter “Y” to the CHANGE prompt in the SENSOR ALARM REPORT screen. Prompts will appear to change sensor alarm 1. To change other sensor alarms, enter the desired alarm number in the CHANGE prompt in the SENSOR ALARM REPORT screen. Enter “Y” to the CHANGE prompt to change that alarm. Alternately, press @15 n Y<ENTER>, where n is the sensor alarm number, to change that alarm.

Figure 22 shows the CHANGE screen with all prompts for a condition alarm. The same prompts will be presented for a digital sensor alarm. Upon entering CN for condition or DI

for digital input, the Model 2460 will automatically present the prompts needed for that type of alarm.

Notice that each level of the alarm, ON, OFF, and CYC has an independent action setting. It is often useful to set one level of an alarm as CRIT and another as NONE.

The CHANGE screen for an analog sensor alarm is shown in Figure 23.

```

MON 03/01/97      Sierra Monitor Corporation - Model 2460 System
25-00-M4-08-35
TIME 0625:28          SENSOR ALARM REPORT      11          ACE
TELECOM

TYPE SENSOR(A/D/C) AI      CHANGE : ___
ON LVL (N/L/A/C)= CRIT    CHANGE : ___
OFF LVL (N/L/A/C)= CRIT   CHANGE : ___
SENSOR NUMBER = 7         CHANGE : ___
HHMM > HI LIMIT = 100    CHANGE : ___
HHMM < LOW LIMIT = 130   CHANGE : ___
HIGH LIMIT = 10.0        CHANGE : ___
LOW LIMIT = -15.0        CHANGE : ___
CORRECT? (Y/N): _
    
```

Figure 23: The SENSOR ALARM CHANGE screen for an analog sensor alarm.

Figure 23 shows the CHANGE screen with all prompts for an analog sensor alarm.

4.3.16 STANDARDS/SETPOINTS SCREEN

```

MON 03/01/97      Sierra Monitor Corporation - Model 2460 System
25-00-M4-08-35
TIME 1418:48          STANDARDS/SETPOINTS          ACE
TELECOM

      STANDARD      A STD  B STD          STANDARD      A STD  B STD
1 SPACETEMP      77.0F  0.0F          2 HUMIDITY      55.0%  60.0%
4 TEMP ALM       0.0F  60.0F          5 HUMD ALM      75.0%  25.0%
6 AUD DELAY      30.0M  0.0M          7 LOW PRESS     45.0P  10.0P
8 HIGH PRES      360.0P 400.0P       9 METH ALM      5000p
10 METH FAIL      5p    7000p          11 CO ALM       35.0p  50.0p
12 OXYGEN         18%   24%           33 AUTH         6.4   6.4

ENTER ITEM # TO ALTER :1
    
```

Figure 24: The STANDARDS/SETPOINTS screen.

The STANDARDS/SETPOINTS screen is used to store variables that are used in conditions and in certain types of control points.

Standards and setpoints are stored as pairs of values, A STD and B STD. Some are used as cut-in and cut-out setpoints while others store the target value.

In Figure 24, SPACETEMP is controlled to a setpoint value of 77°F. Humidity, on the other hand, is controlled within a band of 55-60%.

Standard/Setpoint #33, AUTH, is the numerical authorization code which must be entered to make changes from the Model 2460 keypad.

4.3.16.1 Standard/Setpoints Change Screen

```

MON 03/01/97      Sierra Monitor Corporation - Model 2460 System
25-00-M4-08-35
TIME 1418:48
TELECOM
                                STANDARDS/SETPOINTS                                ACE

      STANDARD      A STD  B STD      STANDARD      A STD  B STD
1 SPACETEMP        77.0F  0.0F      2 HUMIDITY      55.0%  60.0%
4 TEMP ALM         0.0F  60.0F      5 HUMD ALM      75.0%  25.0%
6 AUD DELAY        30.0M  0.0M      7 LOW PRESS     45.0P  10.0P
8 HIGH PRES        360.0P  400.0P     9 METH ALM      5000p
10 METH FAIL       5p   7000p     11 CO ALM       35.0p  50.0p
12 OXYGEN          18%   24%     33 AUTH         6.4   6.4

ENTER ITEM # TO ALTER : 2
2 HUMIDITY          CHANGE : _____
2 HUMIDITY          55.0%  CHANGE : _____
2 HUMIDITY          60.0%  CHANGE : _____

CORRECT? (Y/N): _
    
```

Figure 25: The STANDARDS/SETPOINTS screen showing the CHANGE prompts.

The CHANGE prompts appear one at a time after entering the number of a standard to change. The operator can change the name of the standard and either or both of the setpoints (first A, then B for a given standard). The changes take effect only after answering Y<ENTER> to the CORRECT? prompt. Upper and lower limits are assigned to each setpoint. These limits are not visible to the operator. Limits are enforced to preclude changing a setpoint beyond pre-selected boundaries.

5. APPENDICES**5.1 APPENDIX A: Special Key Summary**

KEY	DESCRIPTION
<ENTER>	Normally labeled on a keyboard as "RETURN" <RTN> or "ENTER," this key functions to execute commands to the Model 2460. See Section 2.3 for a more detailed explanation.
<ESC>	ESCAPE has the same function as the <ENTER> key except within a change screen where it takes the operator directly to the "CORRECT? Y/N" prompt. If already at the "CORRECT? Y/N" prompt, <ESC> reverts back to the first change screen prompt. Entering Y<ESC> at the "CORRECT? Y/N" prompt will cause the changes to take effect, then return to the first change screen prompt. See Section 2.4 for additional information.
BACKSPACE	When used during response to a prompt, will erase the preceding character each time it is pressed.
<CTRL>-D	Causes controller to break a telephone connection or interrupt a direct connection requiring re-entry of authorization code.
<CTRL>-O	Starts automatic refresh of data screens (Scrolling).
<CTRL>-F	Stops automatic refresh of data screens (Scrolling).
<CTRL>-J	When at the "CORRECT? (Y/N)" prompt at the end of a CHANGE screen for Control Points, Digital Sensors, or Analog Sensors, after entering either Y/N, use <CTRL>-J instead of <ENTER> to proceed directly to the CHANGE screen for the next point.
@	Used from any prompt, a command beginning with @ is interpreted by the controller as a command issued from the ACTION MENU prompt. If @ is entered without any further commands, the controller will display an AUTH prompt.

5.2 APPENDIX B: Data Retrieval (DAT)

In addition to the information in the DATA Screens, there is a report format called Data Retrieval, (DAT) that allows the operator to download certain ACTION MENU items directly to a printer or disk file for storage.

DAT's are done from the AUTH Prompt. Enter @<ENTER> to display an AUTH prompt.

The command to generate a data retrieval is DATn<ENTER>, where n is a number corresponding most often to an ACTION MENU item number. For selected DAT's, alpha arguments are used after the initial DAT.

- | | |
|------|--|
| DAT1 | will retrieve Control Point information for every control point. |
| DAT3 | will retrieve the complete Control Alarms Report. |
| DAT5 | will retrieve all five KWH Storage Report screens. |
| DAT6 | will retrieve the entire Conditions Code Listings. |
| DAT7 | will retrieve the first four Today's and Yesterday's Averages screens.
Entering DAT7 6<ENTER> will retrieve four screens beginning with analog #6. |
| DAT8 | same as DAT7 |
| DATC | will retrieve the first four History Pointers screens. Entering
DATC<space> 7<ENTER> will retrieve four History Pointer screens beginning
with History Pointer #7. |
| DATD | will retrieve the entire DIGITAL SENSOR REPORT. |
| DATE | will retrieve the entire ANALOG SENSOR REPORT. |
| DATF | will retrieve the entire SENSOR ALARM REPORT. |
| DATG | will retrieve the entire STANDARDS/SETPOINTS screen. |