EMC
Station Manager®
Data Logger

Users Manual

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Foreword

We are pleased to present this manual to assist you with the set-up, operation and maintenance of your Station Manager® data logger. While every effort has been made to provide accurate and concise information, Environmental Monitoring Company, Inc., makes no warranty, expressed or implied, nor assumes responsibility or liability regarding the contents or use of this manual.

Station Manager® is a registered trademark of Environmental Monitoring Company, Inc., (EMC). The Station Manager Data logger software is protected by United States copyright laws and international treaty provisions. This software is the wholly owned intellectual and physical property of EMC, and Station Manager Data logger software may only be operated by licensed users with the expressed written authorization and consent of EMC.

If you have questions about this manual or need assistance with the Station Manager Data logger, please do not hesitate to contact the EMC Customer Support Department at the address listed on the front cover.

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1.0 Introduction

This is the Users Manual for the EMC Station Manager® data logger. It has been written to make initialization, operation and maintenance of the Station Manager Data logger easy for new or experienced users. This manual contains examples of the displays that actually appear on the screen of the Station Manager Data logger.

Station Manager Data logger is an inherently user-friendly data logger. It is quite easy to learn and operate. Most control and display actions are performed with a single mouse click on push buttons that appear on every screen. Learning to use the Station Manager Data logger is intuitive. Users will only require a few minutes of practice to become confident and comfortable in operating the many powerful features and capabilities of this data logger.

This manual is divided into sections to help the user understand the logical order of the Station Manager Data logger. Included is operational information about the initialization, setup, calibration controls, printing data and displays, logbook, and the many utility features that make up the Station Manager Data logger. A Troubleshooting Guide is provided to assist users with problems that may occur in the operation of the data logger. It also includes a Glossary, which defines the terms and nomenclature used in this manual.

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2.0 General Information

2.1 Station Manager Overview

EMC Station Manager® data loggers can be used for ambient air quality, CEMS, meteorological, and water quality data logging applications. This unique PC based data logger offers users many advanced data acquisition and data management features and capabilities.

An EMC Station Manager Data logger consists of two basic components. The first is a PC, which has EMC Station Manager Data logger software, running Microsoft Windows XP, installed on it. The second is a Signal Interface Unit (SIU).

The SIU is the hardware interface for analog and digital input/output signals from analyzers or sensors to the Station Manager Data logger. An SIU is a base-unit that accepts plug-in input/output (I/O) modules. The signal cable connection between a Station Manager PC and an SIU unit can be a standard RS-232C serial cable or a 2-wire, multi-drop, RS-485C cable, or an Ethernet LAN connection.

2.2 Hardware Configurations

Figure 2-1 shows a typical Station Manager Data logger configured with one SIU unit. One SIU unit will accept either 4 or 8 plug-in analog or digital I/O modules. This configuration uses an RS-232C serial cable, or an Ethernet LAN connection, between the Station Manager Data logger PC and the SIU unit. This is the standard configuration used in most ambient air quality data logging applications or CEMS installations where the Station Manager PC and an SIU unit are mounted adjacent to each other and only four I/O modules are required.
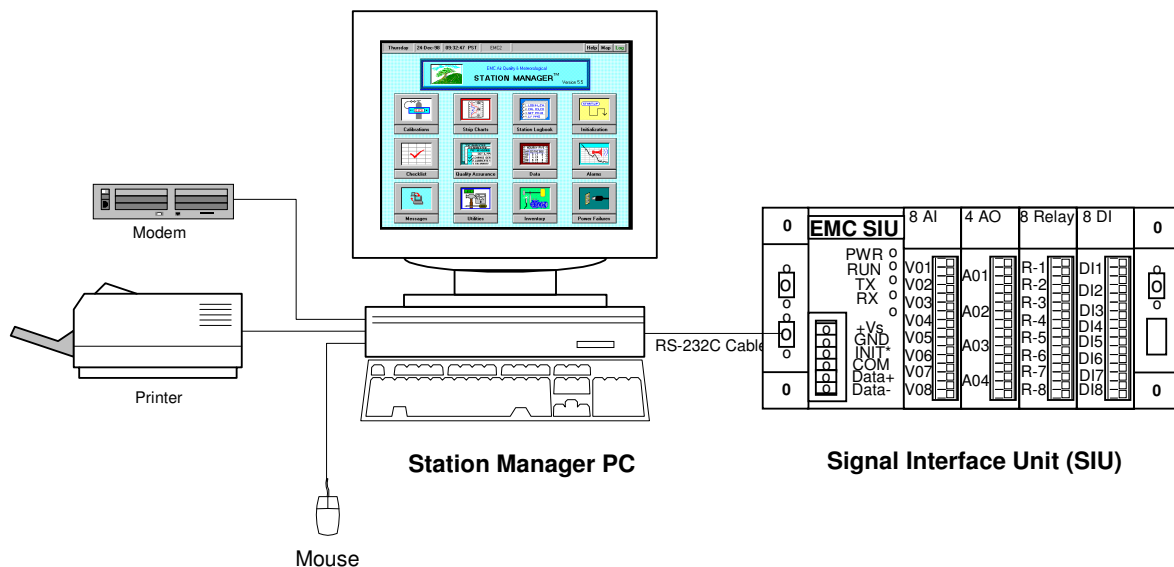
Figure 2-1
Station Manager Data Logger with 1 SIU Unit

Figure 2-2 illustrates a Station Manager Data logger PC configured with four SIU units. This configuration will permit up to 16 plug-in I/O modules to be installed in one Station Manager Data logger. SIU units configured in this manner must be operated on an RS-485C data bus and require the installation of an externally mounted RS-232C to RS-485C. SIU units may be installed adjacent to the Station Manager PC or they may be installed at locations separated by up to 1000 feet.

This configuration can be used in plant environments where a Station Manager Data logger is configured as a distributed data acquisition system. The same type of configuration can also be used in an ambient monitoring station or a CEMS installation where the Station Manager PC and multiple SIU units are mounted adjacent to each other.

EMC Station Manager PC   **4 Signal Interface Units (SIU)**
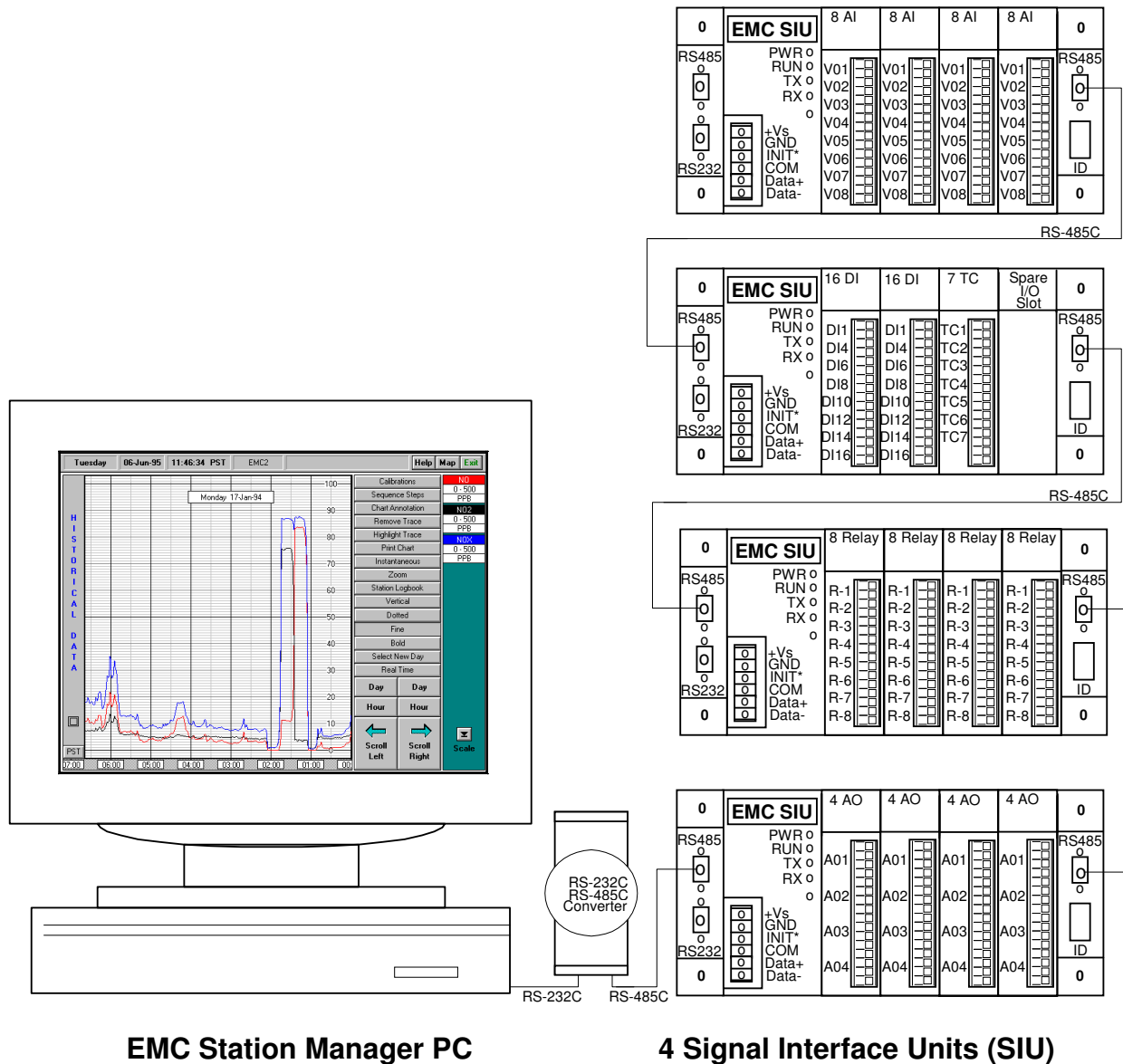
Figure 2-2
Station Manager Data Logger with 4 SIU Units

2.3 **Station Manager Data Logger Software**

EMC Station Manager® data logger software has been written in C++ using the Microsoft Visual Studio Development Environment. Selected data logger applications and quality assurance programs have been written in Microsoft Visual Basic to maintain compatibility with similar compatible applications on the EMC System Manager central data management system.

The Station Manager Data logger offers users a wide range of meaningful features and capabilities for collecting ambient air quality, CEMS, meteorological, and water quality data. One of the unique features of Station Manager Data loggers is an innovative graphical user interface and menu system. The menu system allows users to easily navigate through the following programs and options:

> Data display programs
> Trending or strip chart program
> Logbook program
> Quality assurance
> Initialization programs
> Alarms programs
> Data export programs

2.4 **Conventional Data Logger Operation**

EMC Station Manager Data loggers can be used to replace conventional stand-alone data loggers and strip chart recorders in air quality monitoring stations or in Continuous Emission Monitoring System (CEMS) shelters. In ambient or CEMS operation, the Station Manager PC is usually located directly adjacent to the Station Manager SIU or Rack Mount Interface Panel. SIU units can either be mounted on DIN-rails in 19" equipment racks, panel-mounted, or operated on a bench top surface. The connection between the SIU unit and the Station Manager Data logger PC can be either RS-485C or RS-232C, or an Ethernet LAN connection.

2.5 **Distributed Data Logging Operation**

An EMC Station Manager Data logger configured with multiple SIU units can also be operated as a distributed data acquisition system. In this type of operation, the Station Manager PC can be located in a central plant location, such as a control room, and one to four SIU units can be installed at remote locations throughout a plant. A 24 VDC power supply is used to power the SIU units at each site. In the distributed mode of operation, the data connection between the Station Manager PC and the remote SIU units are made with a single, 2-wire, RS-485C data bus. The maximum distance possible with the RS-485C protocol is 1,000 feet. Distances up to 2,000 feet are possible when an RS-485C repeater is used.

2.6 **Input/Output Modules**

SIU units accept a variety of standard plug-in input and output (I/O) modules. One SIU unit can accept from one to four plug-in I/O modules. Up to four SIU units can be connected together on an RS-485C data bus to expand the number of I/O modules that can be operated on one Station Manager Data logger to a total of sixteen I/O plug-in module slots. The following is a summary of the types of available I/O modules and functions:

ADAM 5017 Analog Input Module: Each analog input module (up to four per SIU) uses an A/D converter to convert sensor voltage and or current inputs to digital data. When prompted by the Station Manager software, the data is converted to engineering units and sent to the PC through a standard RS-232 interface. The analog input modules offer superior protection from ground loops and power surges found with older" hardware technology" data loggers. Each Analog Input module can handle up to 8- channel differential input that provides programmable input ranges on all channels. Analog inputs accept voltage inputs (±1 V, ±5 V, ±10 V) and current inputs (0-20 ma and 4-20 ma). Since each module accepts 8 channels, a total 32 analog input channels can be monitored with each SIU unit. In addition, Station Manager can have eight calculated channels, providing a total capacity of 40 data channels.

ADAM 5052 Digital Input Module: The 5052 is a universal digital input/output module that can be independently programmed for each channel. Digital outputs are open collector outputs which may be used to drive user-supplied relays to switch on heaters, pumps, valves or other devices. The digital inputs can be either dry or wet contacts. The 5052 monitors eight digital inputs with full independent isolation of 5000 V rms to prevent ground loops and to prevent damage from power surges. Each SIU module can handle up to four of these modules.

ADAM 5068 Relay Output Module: Each relay output module offers eight channels of Form A relays for control of external devices. The contact ratings are .5 A for 120 VAC and 1 A for 30 VDC. Relay Output Modules can be installed in any available I/O module slot on any SIU unit that is connected to a Station Manager Data logger.

ADAM 5024 Analog Output Module: The analog output module provides four channels that are measured or calculated from the Station Manager. The format of the data is engineering units in a digital form that is converted to an analog voltage or current by the 5024. Ranges are 0-20 mA, 4-20 mA or 0-10 VDC. Four ADAM 5024 Analog Output Modules will provide a total of 16 analog output channels on each Station Manager Data logger. Analog Output Modules can be installed in any available I/O module slot on any SIU unit that is connected to a Station Manager Data logger.

2.7 Station Manager Data Logger Main Menu

Figure 2-3 shows the Station Manager Data logger Main Menu screen. It illustrates the innovative graphical user interface available with the Station Manager Data logger. All of the display and selection screens within the Station Manager Data logger incorporate a similar style that results in a clear and intuitive operation for the user. Conflicting or confusing options are eliminated, allowing users to concentrate on managing the monitoring station and the data being collected by the data logger.

Station Manager Data logger users quickly learn how to navigate through all of the screens and tables in the data logger.   A single click is all that is necessary to cause any action or selection to occur. The Exit button on all screens is always located at the top, right-hand corner of the screen. The interface is consistent and easy-to-learn.
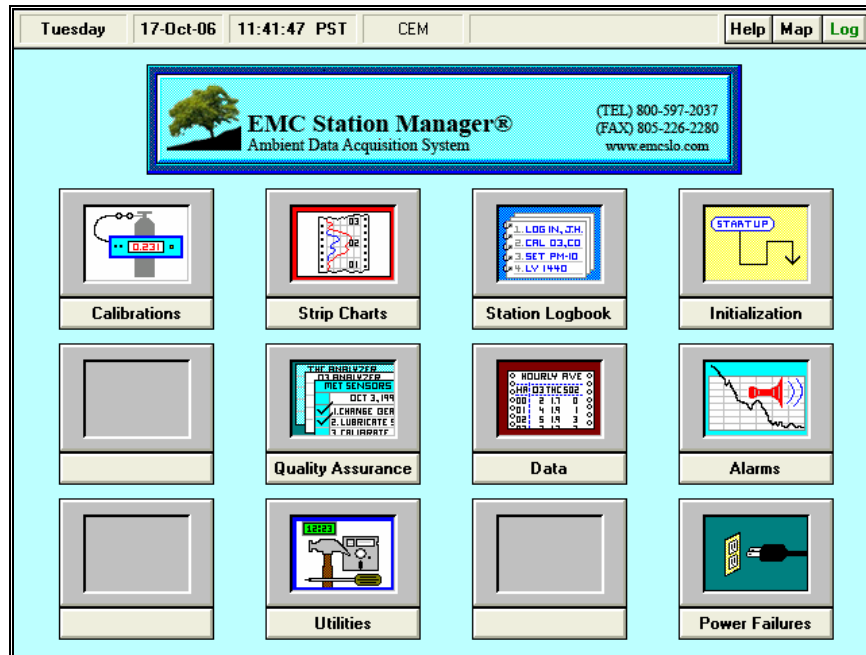
Figure 2-3
Station Manager Main Menu

2.8 **Recommended Station Manager PC Hardware**

The following are recommended hardware specifications for EMC Station Manager Data loggers. EMC normally supplies new Station Manager Data loggers equipped with either a Gateway or Dell PC. Customers may optionally specify any other data logger brands or directly purchase the PC hardware themselves. EMC recommends that Station Manager PCs meet the following minimum specifications:

- 1.8 GHZ Intel Celeron or Pentium processor
- 512 MB RAM memory
- 15" Color VGA Monitor
- 80 GB Hard Disk Drive
- 4 ea RS-232C Serial Ports
- 1 parallel printer port
- Desktop or Micro-Tower Case
- HP Desk Jet Color Printer or Equivalent
- 56 KB U.S. Robotics External Modem
- Microsoft Windows Small Business Edition (MS Word, Excel)
- Microsoft Windows XP Pro

Whenever customers perform the installation of Station Manager Data logger software on a PC that they provide, EMC recommends that the customer contact EMC prior to any procedures being done. EMC recommends that the hard disk drive of the Station Manager PC be reformatted according to the procedures described in Section 3.4 of this manual. This procedure will eliminate potential conflicts with non-recommended software programs and utilities that may be pre-installed on customer provided PC hardware. EMC Station Manager Data logger software will conflict with concurrent installation of Microsoft Access database programs on the same PC. EMC therefore does not recommend that these programs be

installed on a Station Manager Data logger PC. EMC is not responsible for any actions performed without EMC knowledge.

The history of the PC industry has demonstrated that the power and capabilities of the newest PC hardware will steadily increase over time. PC hardware purchased by consumers today and used for Station Manager Data loggers are very powerful and will operate Station Manager software extremely well. PC hardware available in the future will certainly be more powerful and probably lower in price. Although it may not be necessary to upgrade the users Station Manager data logger PC hardware today, users will always have the option to upgrade the PC hardware used to operate their licensed copy of EMC Station Manager data logger software at any time in the future if they desire to do so.

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3.0 Getting Started

The following section contains detailed instructions for starting up an EMC Station Manager Data logger. Users should read and understand the startup procedures described in this section before continuing with the installation. EMC recommends that users complete these steps in the following order:

3.1 Receive & Inspect Components
3.2 Connect Components Together
3.3 Switch On AC Power
3.4 Install Software
3.5 Initialize Data Logger
3.6 Perform Acceptance Testing
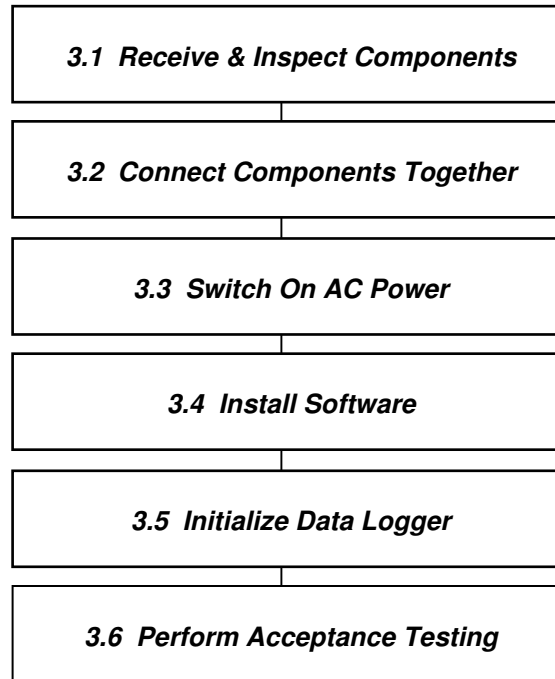
3.1 Receive & Inspect Components

3.1.1 Procedures

1. The Station Manager data logger will be received from the factory packed in several shipping boxes. One of the boxes will contain a Packing List detailing all of the components shipped in this order and a list of specific components in each box.

2. Unpack all boxes carefully and remove each component. Inspect the components for obvious damage that may have occurred during shipment. Report any suspected damage to the local freight carrier and EMC immediately.

3. Locate the "Packing List" that documents all materials shipped. It will be attached to the outside of one of the shipping boxes.

4. Immediately perform an inventory of all materials received and compare these against the enclosed EMC Packing List and the customer's original purchase order.

5. Retain shipping boxes for at least 90 days in case a warranty return shipment is needed.

6. Contact EMC Customer Support at (805) 226-2275 if a discrepancy is noted between the Packing List and the contents of the boxes or the purchase order.

3.2 Connect Components Together

3.2.1 Connecting PC Components and Peripherals Together

1.   Place all of the hardware components of the Station Manager data logger on a clean, uncluttered workbench or working surface.

2.   Look at Figure 3-1 to understand how the major components of a Station Manager data logger are connected together. The components include the computer PC, monitor, keyboard, mouse, modem, printer, EMC Signal Interface Unit (SIU), EMC Modular Power Supply, and connecting cables.

3.   Locate all of the PC hardware and connect them together. The PC hardware includes the PC, keyboard, mouse, and monitor. Plug the PC components into their respective sockets on the rear of the PC. Plug in the AC power cords, but don't turn on the power yet.

4.   Locate and connect the SIU to the PC. If only one SIU will be used, connect the male end of the supplied 6-foot long DB-9 (9-pin) RS-232C serial cable into the COM 1 female serial port on the rear of the PC. Connect the other male end of this cable into the female RS-232C serial port on the left side of the Signal Interface Unit (SIU). If multiple SIU units will be used, go to Section 3.2.3 and follow the instructions for connecting multiple SIU together on an RS-485C data bus.

5.   Locate the modem cable and connect it to the rear of the PC. Plug the male DB-9 connector end of the modem cable into the female COM 2 serial port on the rear of the computer PC. Plug the other end of the modem cable into the modem.

6.   Connect the printer cable into the DB-25 parallel port or USB printer port, on the rear of the Station Manager PC if a printer will be installed. Connect the other end of the printer cable to the printer. Plug the printer into the plug strip, but don't turn on the AC power yet.
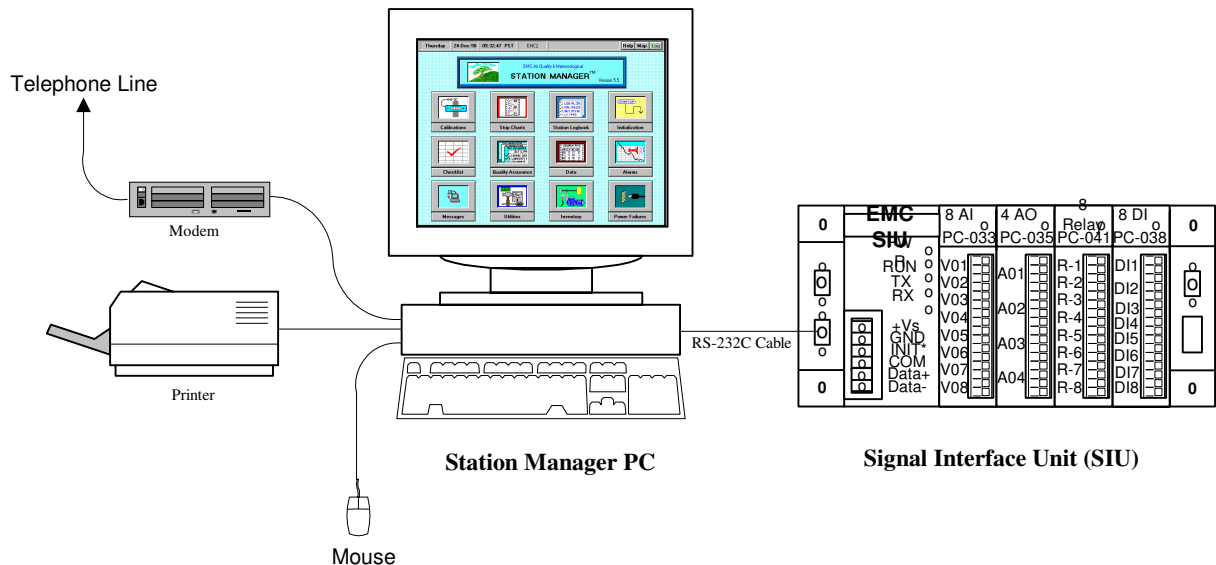
Figure 3-1
Station Manager Data Logger with One SIU Unit

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3.2.2 Connect Modular Power Supply to SIU Unit

1. Connect the SIU Power Supply to the SIU unit according to the wiring diagram shown in Figure 3-2. The Modular Power Supply includes an integral cable that is used for connecting the 24 VDC power to the power input screw terminals on an SIU.

2. Verify that the AC line voltage where you are located is the same voltage as that printed on the SIU Modular Power Supply you were supplied. The standard AC line voltage in the USA is 120 VAC. Other countries may be either 120 VAC or 240 VAC. If the AC line voltage marked on the SIU Power Supply Module is different than the AC line voltage where you are located, do not attempt to operate or plug it into the AC line power outlet. Please contact EMC Customer Support for assistance.

3. Locate and connect the positive wire of the power supply cable (black with white dash marks) to the +V screw terminal on the SIU unit. Connect the negative wire of the cable (black) to the GND screw terminal on the SIU. Plug the Modular Power Supply into the plug-strip. Don't turn on the AC power yet.

4. SIU units are usually mounted on 19" wide DIN-rails. They can also be mounted on rack panels or on desktop surfaces.
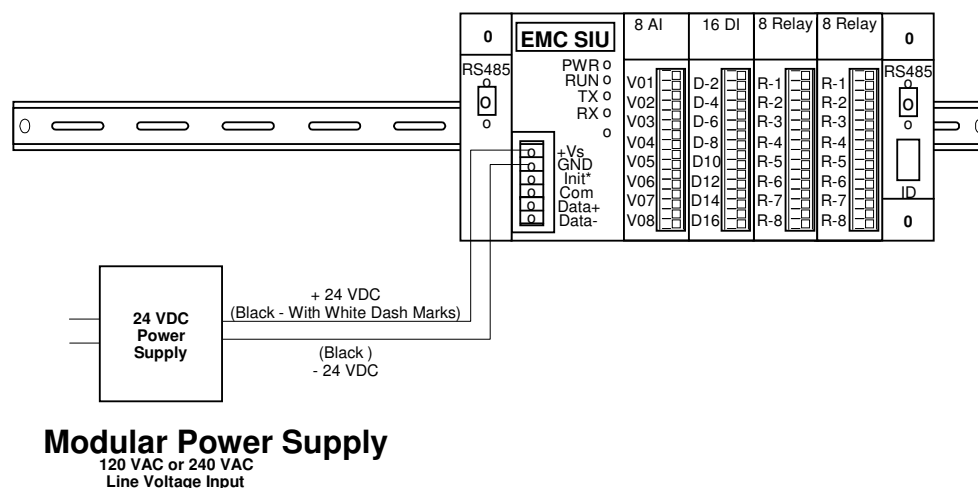
Figure 3-2
Modular Power Supply

3.2.3 Connect Multiple SIU Units to one Station Manager PC

1. Use the following procedure to connect 2, 3, or 4 SIU units to one Station Manager PC.

2. Determine if more than 4 I/O plug-in modules will be installed in the Station Manager data logger. If more than four I/O modules will be used, it will be necessary to install additional SIU units. Up to four SIU units can be connected to one Station Manager PC to provide a maximum total of 20 Input/Output (I/O) module slots.

3. Connect multiple SIU units to the Station Manage data logger with a 2-wire, multi-drop RS-485C data bus. 1, 2, 3, or 4 SIU units can be remotely located from the Station Manager PC on the 2-wire, multi-drop RS-485C data bus.

4.   Use an RS-485C repeater device if the total distance from the PC to the last SIU is a maximum of 1000 feet. See Figure 3-3 for an illustration of an RS-485C repeater device.

5.   Physically locate the multiple SIU units next to each other in an ambient monitoring station or CEMS shelter, or locate the SIU units remotely in the manner described in this section.

6.   Use the RS-232C serial cable supplied by EMC when only one SIU unit is connected to a Station Manager data logger. Refer to Figure 3-1 for an example of a Station Manager data logger connected to one SIU unit.

7.   Mount the SIU units on 19" wide DIN-rails, rack panels, or desktop surfaces.

8.   Observe that each SIU unit has two DB9 connectors that are labeled RS-485C. One of the RS-485C ports is a male connector and the other is a female connector. Either one of the RS-485C ports, or both of them, can be connected to other SIU units.

9.   Note that there is also a third RS-485C port connection on the top of each SIU. This is a set of two screw terminals that can be used for connecting a 2-wire RS-485C signal cable. As with the DB-9 connectors, the screw terminal RS-485C connections can be used by themselves, or in combination with either of the two DB-9 connectors.

10.   Connect the RS-485C data bus using a 2-wire, multi-drop cable. One of the two wires is the plus (+) signal wire and the other is the negative (-) signal wire. Observe in Figure 3-3 that all SIU units have the plus signal wires connected together and the negative signal wires connected together.

11.   Note that on DB-9 connectors the plus signal wire is Pin 2 and the negative wire is Pin 3. A ground wire, or signal cable shielded connection is not used or required for operation of the RS-485C data bus.

12.   Normally PCs are only equipped with RS-232C serial ports. The RS-232C serial data signal on the COM1 port must be converted to an RS-485C data signal with an RS-232C to RS-485C converter device (see Figure 3-3).

13.   See Figure 3-3 on the following page for an illustration of two methods for connecting multiple SIU units to a Station Manager data logger PC.
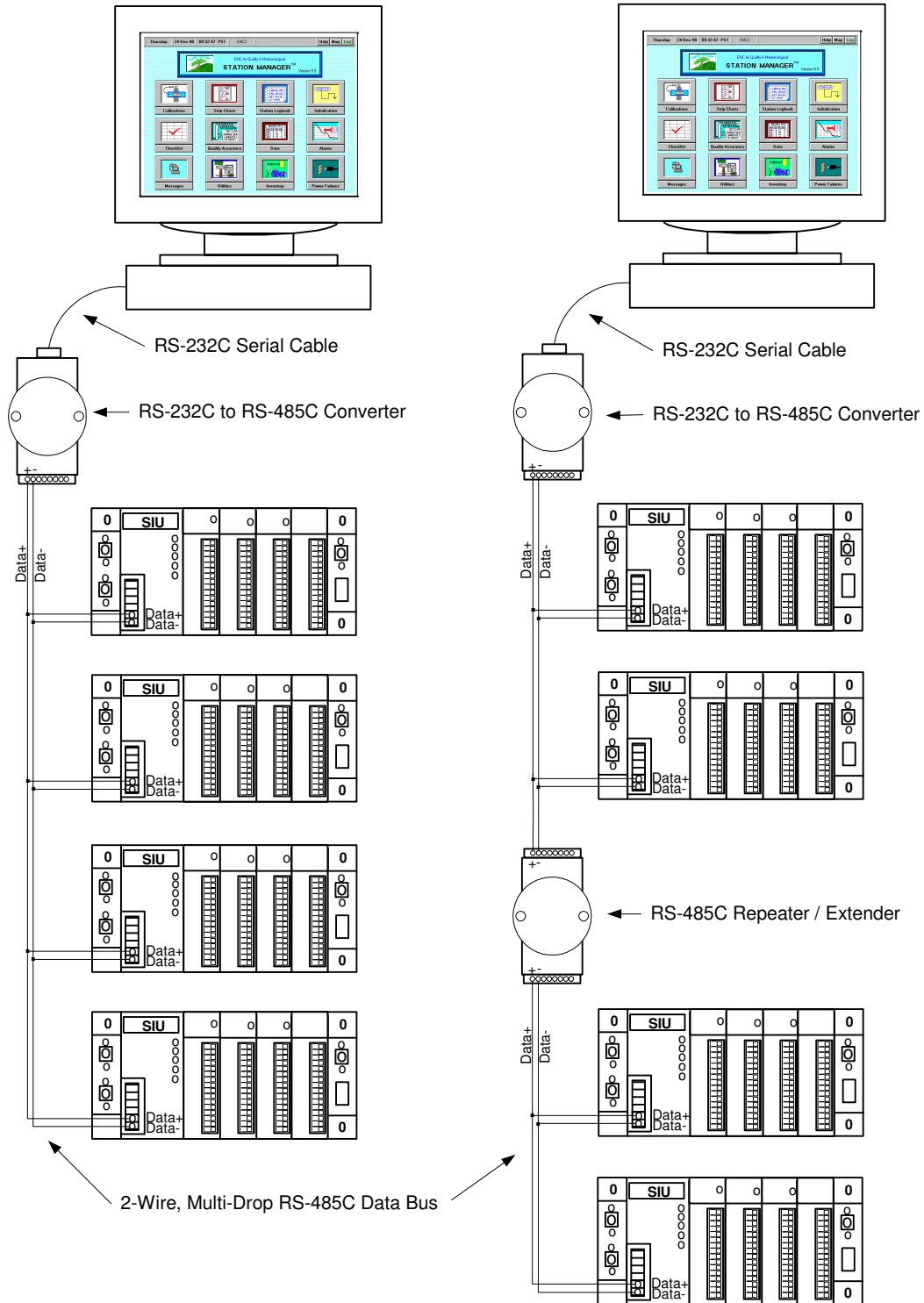
Figure 3-3
Multiple SIU Units

3.2.4 Connect Signal Wires to I/O Modules

The following section illustrates how to wire signal connections to analog and digital I/O modules that plug into SIU units. The types of available plug-in I/O modules include analog input modules, analog output modules, digital input modules, digital output modules, in special cases can be configured to handle Thermocouple input modules. A drawing is provided for each type, which shows the signal terminals and wiring to external input or output devices.

3.2.4.1 Connect Signal Wires to Analog Input Modules

1.   Use the following information to configure the signal wiring to Analog Input Modules. After all signal wiring has been completed, perform the initialization of the analog inputs with the Initialize Parameters Table in the Station Manager data logger.

2.   The ADAM 5017 module has 8 differential analog input channels. It is a low sampling rate module with a 16-bit A/D converter.

3.   Each analog input channel requires the connection of 2 signal wires: a (+) signal and a ground (-) signal. The analog input modules accept 0-1, 0-5, 0-10 VDC, or 0-20 and 4-20 ma input signals.

4.   Typical signal wiring connections for voltage and current loop inputs are illustrated below in Figure 3-4.
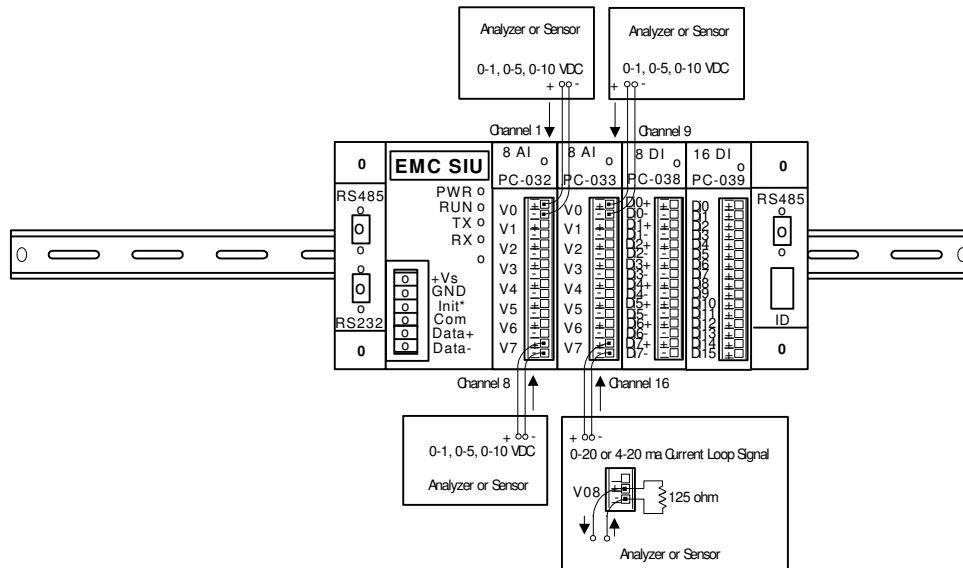
Figure 3-4
Analog Input Modules

3.2.4.2 Connect Signal Wires to Digital Input Modules

1.   Use the following information to configure the signal wiring to Digital Input Modules. After all signal wiring has been completed, perform the initialization of the digital inputs with the Digital Input Table in the Station Manager data logger.

2.   The ADAM 5052 module has 8 optically isolated digital input channels. The optically isolated digital inputs on this module will detect a digital status condition when a voltage in the range of 3 to 32 VDC is applied to a digital input channel. The signal terminations on the module have two signal wire terminals for each digital input channel. One terminal is the (+) signal and the second terminal is the ground or negative (-) signal.

3.   Figure 3-5 illustrates typical digital input signal wiring connections.
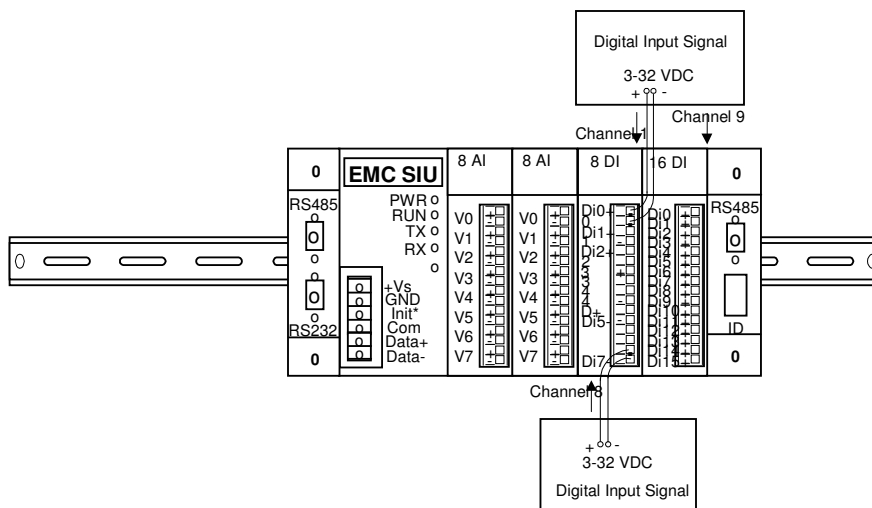
Figure 3-5
Digital Input Modules

3.2.4.3 Connect Signal Wires to Digital Output Modules

1.   Use the following information to connect signal wiring to Digital Output Modules. After all signal wiring has been completed, perform the initialization of the analog inputs with the Digital Output Table in the Station Manager data logger.

2.   The ADAM 5068 digital output modules have 8 relay outputs and are used to control calibrators and switch solenoid valves.

3.   Signal terminations on the 5068 modules have two signal wire terminals for each digital relay output channel. The letters "NO" designate "Normally Open" and the letters "Com "designate "Signal Common."

4.

Figure **3-6** illustrates typical digital output wiring connections for the digital output modules.
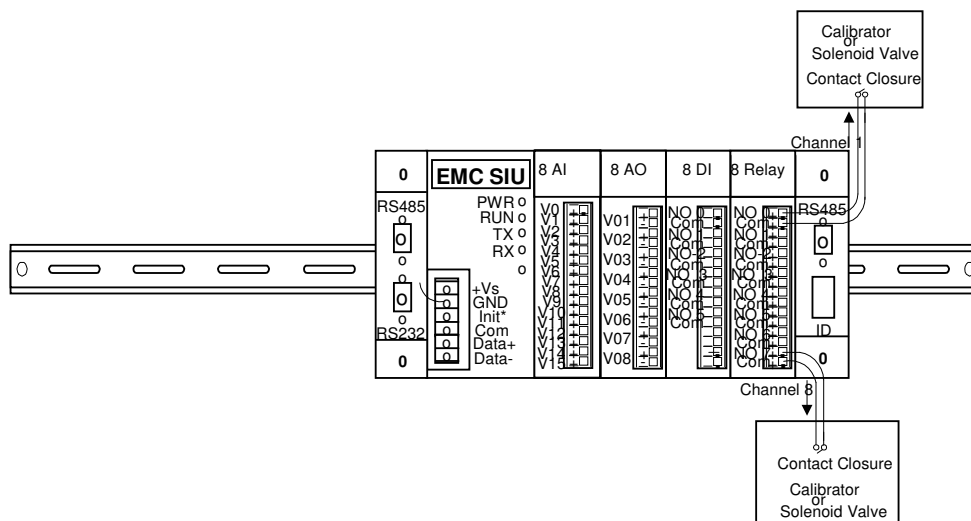
Figure 3-6
Digital Output Modules

3.2.4.4 Connect Signal Wires to Analog Output Modules

1. Use the following information to connect signal wiring to Analog Output Modules. After all signal wiring has been completed, perform the initialization of the analog inputs with the Analog Output Table in the Station Manager data logger.

2. Analog output channels can be any calculated or directly measured data parameter recorded by the Station Manager data logger.

3. The analog output module has two sets of signal terminals with 4 channels on each set for a total of 8 analog output channels.

4. The first set of terminals for each of the 4-channel analog output channels. The first set of

terminals is current output terminals (0-20 or 4-20 ma). These terminals are labeled "I0 +, I1+, I2+ I3+" and "I0 −, I1-, I2-, I3-" respectively. Since these current loop signals are not isolated signals, EMC recommends using a separate signal isolator module to isolate the current loop output signals from external circuits.

5. The second set of terminals is voltage output terminals (0-10 VDC). These terminals are labeled "V0+, V1+, V2+, V3+" and "V0 −, V1-, V2-, V3-" respectively. Since these voltage signals are not isolated signals, EMC recommends using a separate signal isolator module to isolate the voltage output signals from external circuits.

6. Figure 3-7 illustrates typical signal wiring connections for the analog output module.
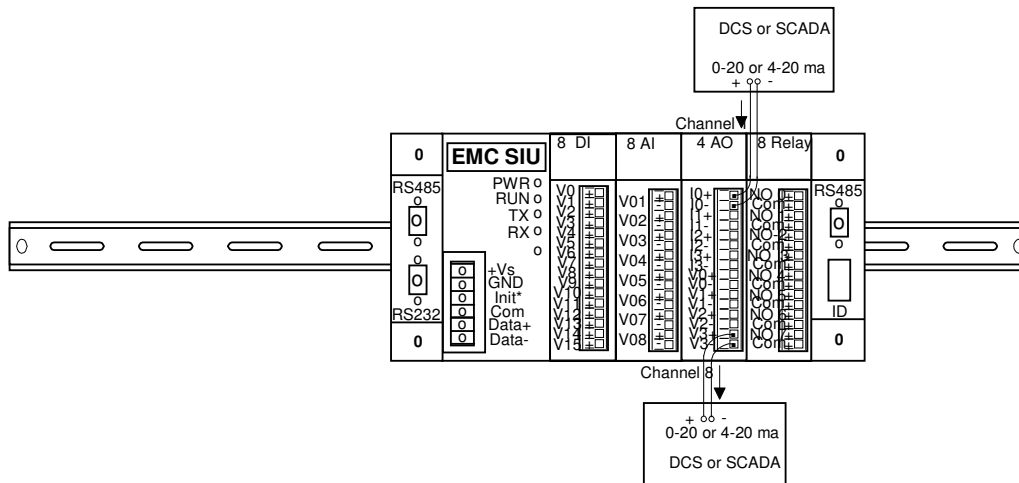
Figure 3-7
Analog Output Module

3.2.4.5 Connect Thermocouple Signal Wires to Thermocouple Input Modules

1. Use the following information to connect signal wiring to Thermocouple Modules. After all signal wiring has been completed, perform the initialization of the analog inputs with the Parameter Initialization Table in the Station Manager data logger.

2. The ADAM 5018 Thermocouple module has 7 differential thermocouple input channels that can accept Type J, K, T, E, R, S, and B Thermocouples.

3. Each Thermocouple input channel on the Thermocouple module has 2 input terminals: the (+) signal and a ground (-) signal terminal.

4. Figure 3-8 illustrates typical wiring connections for a Thermocouple module.

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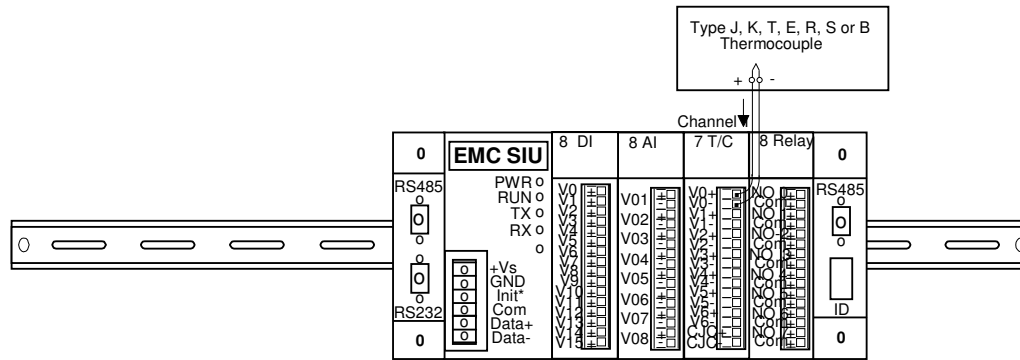
Figure 3-8
Thermocouple Input Module

3.2.4.6 **Connect Signal Wires to Tipping Bucket Rain Gauge**

1. Use the following information to connect signal wiring to a tipping bucket rain gauge. Either before, or after all signal wiring has been completed, perform the initialization of the analog inputs with the Parameter Initialization Table in the Station Manager data logger.

2. The tipping bucket rain gauge connects to any channel on an Analog Input Module. The channel number used for rainfall monitoring is selected in the Station Manager Parameter Initialization Table.

4. A tipping bucket rain gauge has two signal contact-closure terminals. Connect the signal wires to the 1.0 microfarad capacity, 2.0 mega ohm resistor, and the 5 VDC power supply according to the wiring diagram shown below in Figure 3-9.

Tipping Bucket Rain Gauge
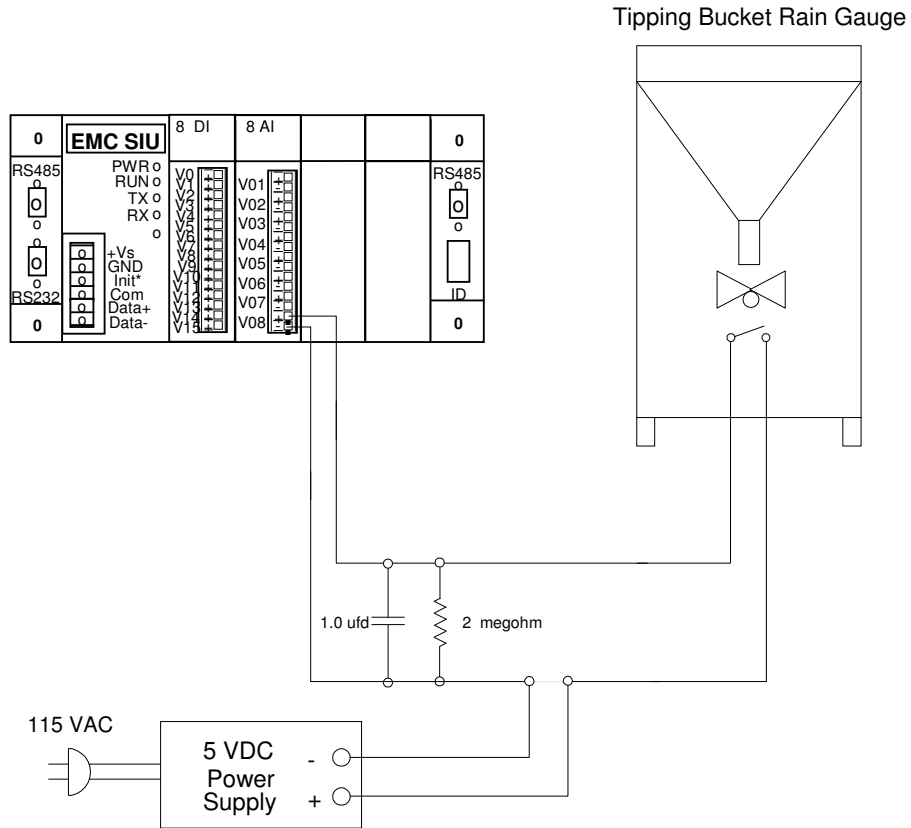
Figure 3-9
Tipping Bucket Rain Gauge

3.3 PC Startup

3.3.1 Switch On AC Power

1. After the previous steps have been completed and it has been verified that the cables have been plugged in correctly, the AC power can be actuated on the PC, video monitor, the printer, and the modem.

2. EMC Station Manager data loggers will automatically boot up after a power failure and automatically begin collecting data. The Station Manager data logger is designed to run continuously, and without operator intervention after power is restored following a power failure.

3. When users log in to the Station Manager data logger after a power failure or restart, it will display the "Recent Power Failure" dialog box shown in Figure 3-10. This dialog box notifies the user that a power failure has occurred and prompts the user to acknowledge the power failure. The Power Failure Program records the time and duration of the power failure and the person's initials that acknowledged the power failure in the Station Manager Power Failure Log in Figure 3-11.
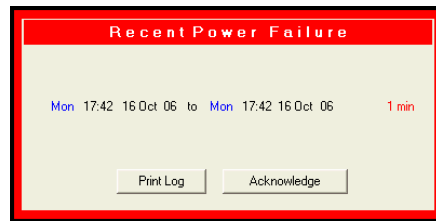
**Figure 3-10
Recent Power Failure Dialog Box**

**Figure 3-11
Power Failure Log**

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3.3.2 Startup Station Manager Software

1. After the AC Power has been switched on, Microsoft Windows will boot up and the EMC Station Manager Data logger software will automatically startup.

2. The first screen on the video terminal will be the Station Manager Data logger Main Menu.

3. Immediately after this screen is displayed, a dialog box will appear on top of it that prompts the user to enter a password.

3.3.3 Default Password

1. Each time the Station Manager software starts up, a valid password must be entered to gain access to the screens and functions of the Station Manager Data logger.

2. The first time the Station Manager Data logger is started up, use the default password EMCEMC.

The default password is: **EMCEMC**.

3. After the user or System Administrator has become familiar with the security system and the methods of entering new passwords and permissions, the security permissions and new passwords should be modified to fit the user's requirements.

4.   When the user is ready to enter new passwords and permissions, do the following:

   a. Click on the security sub-menu on the Utilities Menu screen to bring up the Security sub-menu.

   b. Use the screens in this sub-menu to modify or enter new passwords, or assign permissions to users for any screen display or editing function in the Station Manager data logger.

   c. The default password EMCEMC will continue to be used until such time as the System Administrator or an authorized user changes it to a different password.

   d. Users should refer to the procedures outlined in Section 4.10.1 of this Manual for detailed information about the security password system in the Station Manager data logger and the procedures to modify or change passwords.

   e. It is recommended to contact EMC before attempting to change any passwords. EMC is not responsible for any issues that may arise if this is done without EMC's knowledge.

3.4 Install Software

The first step in this section is to determine whether or not the installation of Microsoft Windows and EMC Station Manager Data logger software will be required.

1. Do Not Install Software - If EMC supplies the PC.

Whenever EMC provides the Station Manager PC, it will not be necessary for the user to install Microsoft Windows or Station Manager Data logger software. The EMC factory will have already installed this software. If EMC has supplied the Station Manager PC, the user should skip this section and go to Section 3.5 and begin to initialize the Station Manager Data logger.

2. User Install Software - If the user supplies the PC.

DO NOT INSTALL the EMC Software on any PC before consulting with EMC. Whenever the user supplies the Station Manager PC, it will be necessary for the user to re-format the hard drive, re-install Microsoft Windows XP, and install EMC Station Manager Data logger software. If the user supplies the PC, complete the steps in Sections 3.4.1 & 3.4.2.

3.4.1 Re-Install Windows XP

A re-format of the PC hard disk is always required when the user supplies the Station Manager PC and performs the installation of EMC Station Manager Data logger software.   A re-format is not required when EMC provides the Station Manager PC.

NOTE: A RE-FORMAT IS NOT RECOMMENDED WITHOUT CONSULTING EMC FIRST! Be advised that if this PC has important data currently on it, you will LOSE ALL your previous data.

1. Insert the Windows XP CD-ROM into your CD-ROM drive and then restart the computer. NOTE: To start your computer from the Windows XP CD-ROM your computer must be configured to start from the CD-ROM drive. In some cases, you may have to modify your computer's BIOS settings to do this.
2. At the Welcome to Setup page, press ENTER to continue.
3. Press F8 to accept the Windows XP Licensing Agreement.
4. If an existing Windows XP installation is detected, you are prompted to repair it. Press ESC (DO NOT REPAIR).
5. All existing partitions and unpartitioned spaces are listed for each physical hard disk. Using the arrow keys select each partition and delete them all by pressing "D". You should end up with only end up with one unpartitioned space.
    NOTE: If you press D to delete an existing partition, you must then press L (or press ENTER, and then press L if it is the System partition) to confirm that you want to delete the partition. Repeat this process for each of the existing partitions that you want to use for the new partition.
6. To install Windows XP, select the unpartitioned space and then press ENTER.
7. Select the format option "Format the partition by using the NTFS file system", and then press ENTER.
8. After Setup formats the partition, follow the on-screen instructions to continue Setup until Windows XP fully installs.

3.4.2 Change Microsoft Windows Settings

Several Microsoft Windows settings must be changed for proper Station Manager Data logger operation. These changes can be made from the Windows Control Panel. To open the Control Panel, press "Start" in the Task Bar, select "Settings", and click on "Control Panel."

3.4.2.1 Display

Check the following Microsoft Windows settings and change if needed:

1. The Station Manager Data logger is designed to run at 640x480 resolution. To adjust the PC to this resolution, find the "Display" icon in the Control Panel and double click. Select the "Settings" tab and look for a box titled "Screen area."   If the area is not 640x480 (i.e. 800x600) then adjust it 640x480 and press Apply. Windows will resize your screen automatically and you must press Yes to accept the setting change.

2. The Station Manager Data logger is not compatible with the use of screen savers. Do not attempt to use screen savers with the Station Manager Data logger.

3. To disable screen savers, find the "Display" icon in the Control Panel and double click. Select the "Screen Saver" tab and ensure that "None" appears under Screen Saver.

3.4.2.2 Power Management

Microsoft Windows Power Management is designed to save energy and will automatically turn off your hard drive after a certain amount of inactivity. Station Manager Data loggers will not work properly with this feature enabled.

The Power Management feature MUST be disabled!

Locate the "Power Options" icon in the Control Panel and double click on this icon.

Find the option named "Turn off hard disks" and select "Never" from the pull down menu. Press "Apply" and then "OK" to save changes.

Users can use the video monitor power management system on their video monitor. This is optional and will not affect the operation of Station Manager Data logger.

3.4.2.3 Date/Time

Microsoft Windows automatically adjusts the time for daylight savings. Station Manager Data loggers will not function properly with this feature enabled therefore MUST remain in Pacific Standard Time, PST.

1. THE "Daylight Savings" FEATURE MUST BE DISABLED!!!

2. Find and double click the "Date/Time" icon in the bottom right hand corner of the Task Bar.

3. Select the "Time Zone" tab and ensure "Automatically adjust clock for daylight saving changes" is not checked.

4. Press "Apply" then "OK" to save and exit.

3.4.3 Install Station Manager Data Logger Software

This section provides instructions for the installation of EMC Station Manager Data logger software on the Station Manager PC using the EMC supplied CD-ROM media.   This procedure involves the installation of two separate programs. The first is the installation of an SIU Utility Program. This program is used for configuring and calibrating the Signal Interface Unit. The second program is the EMC Station Manager Data logger software. Both of these software programs are provided on the EMC Station Manager Data logger CD-ROM media.

3.4.3.1 SIU Utility Software Installation

Follow these step-by-step instructions to install the SIU Utility file into a hard drive directory of the Station Manager Data logger PC, and to initialize and load the SIU Utility software.

1.   Close down any applications running in the taskbar. This can be done by right clicking on the application icon in the taskbar followed by a left click on "Close."

2.   Insert the Station Manager Data logger Setup CD and open the CD-ROM Drive.

3.   Locate the ADAM Utility Folder with respect to the SIU supplied with the Station Manager Data Logger. This should be either the Serial SIU or the TCP/IP SIU and in some cases the 4017 SIU.

4.   Launch the install file and follow the prompts using all the defaults selected.

5.   The utility files will be installed followed by the message "Advantech Adam Utility Setup was completed successfully." Select "OK" to exit setup and installation is complete.

3.4.3.2 Station Manager Software Installation

Please review all the following steps to perform the installation of EMC Station Manager Data logger software before continuing:

1. First, make sure that the PC is set up to auto reboot upon a power failure which is set in the BIOS.
2. Change the CD-ROM drive letter from D:\ to any letter, typically E:\. To do this, go in to the Start Menu -> Control Panel -> Administrative Tools -> Computer Management -> Right click on the CD-ROM Drive and select change drive letter.
3. Once the drive letter is changed, insert the Station Manager Data logger Setup CD into the CD-ROM drive.
4. Run the Setup.exe in the Default Station Manager Installation Folder. Figure 3-12
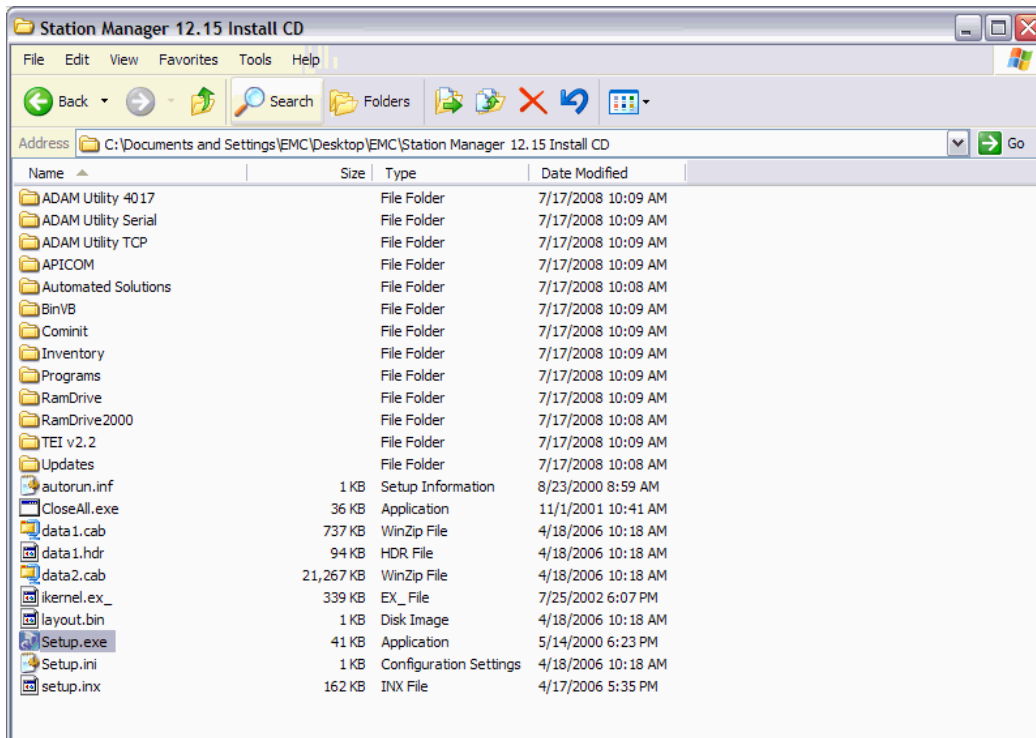
Figure 3-12
Setup.exe File

5. Upon the startup of the Station Manager Setup process Windows Install Wizard will prompt the user to acknowledge that Station Manager is about to be installed. Click "Next". Figure 3-13
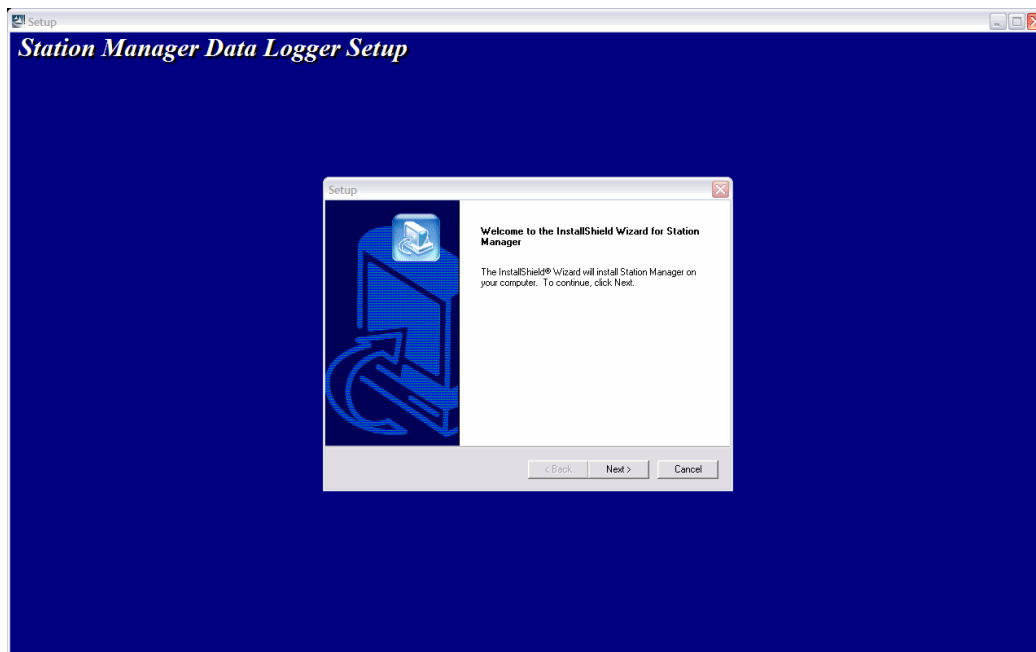
Figure 3-13
Welcome Screen

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6. The following screen displays the software license for EMC Station Manager Software. Click "Accept" to continue. Figure 3-14

Figure 3-14
License Agreement

7. The user will then be prompted to select the type of Installation desired. Always select "Install- Station Manager Ambient Datalogger" unless specifically instructed to do otherwise by EMC. Figure 3-15
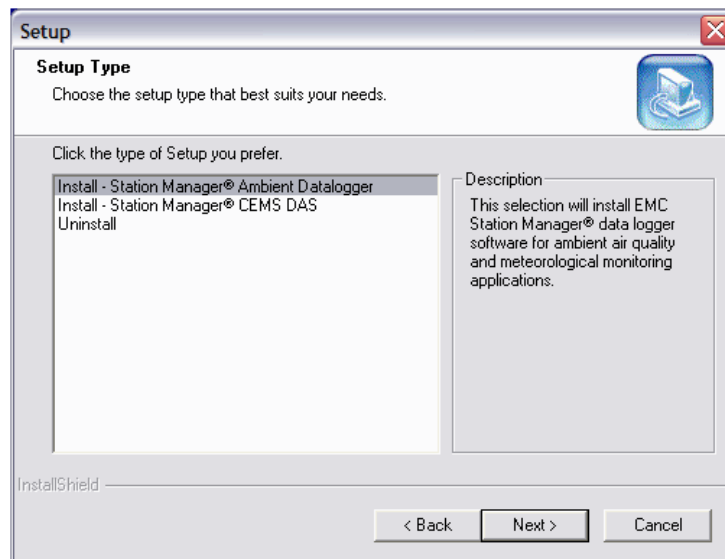
Figure 3-15
Datalogger Type

8. Select the English version of the installation. Figure 3-16
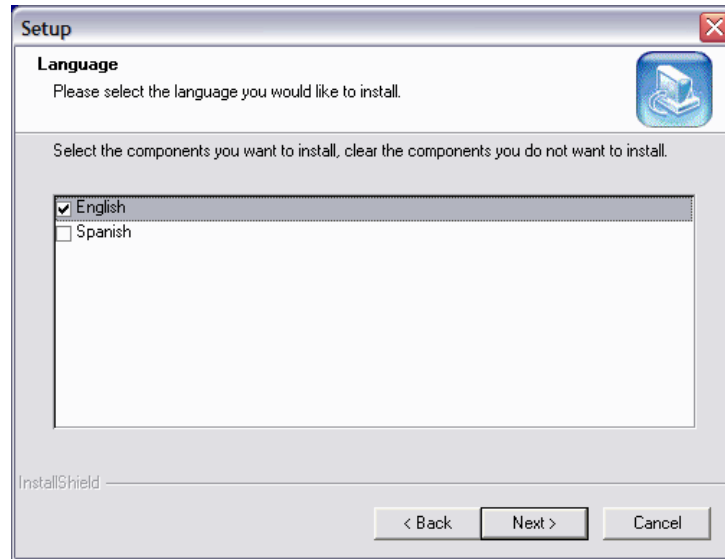
Figure 3-16
Language Type

9. EMC Station Manager Software will now be installed. Figure 3-17
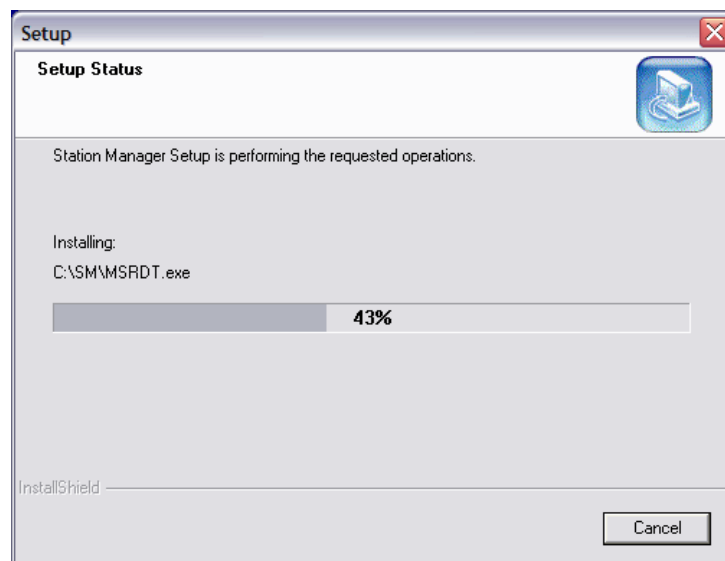
Figure 3-17
Station Manager Installation

10. Upon completion of the Station Manager Setup, the user will be prompted to select the communication device being used to collect data. Always select "Advantech SIU" unless specifically instructed to do otherwise by EMC. Figure 3-18

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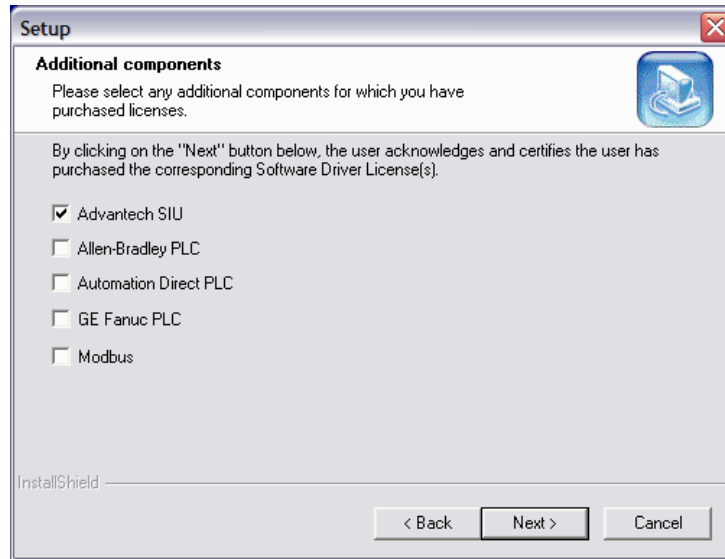
Figure 3-18
Install SIU

11. Once the SIU has been installed, a new screen will prompt the user to install the "RAM Disk". Figure 3-19
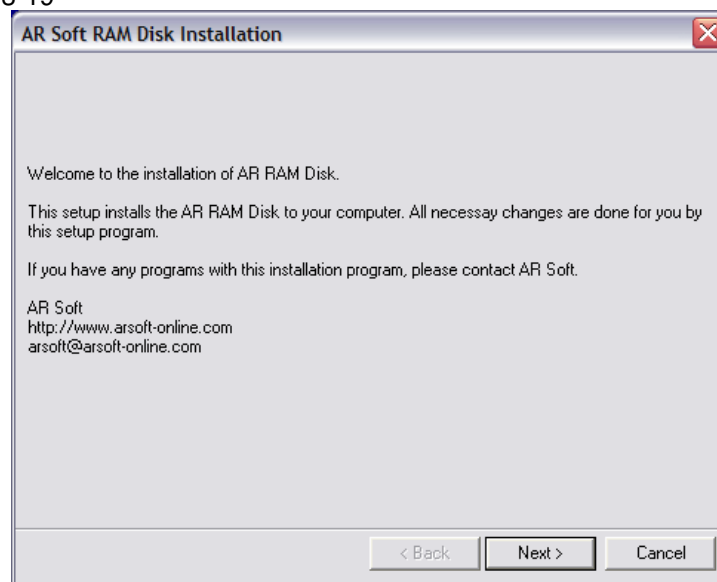
Figure 3-19
Install Ram Disk

12. The user will then be prompted to accept the license agreement for the "RAM Disk" software. Figure 3-20
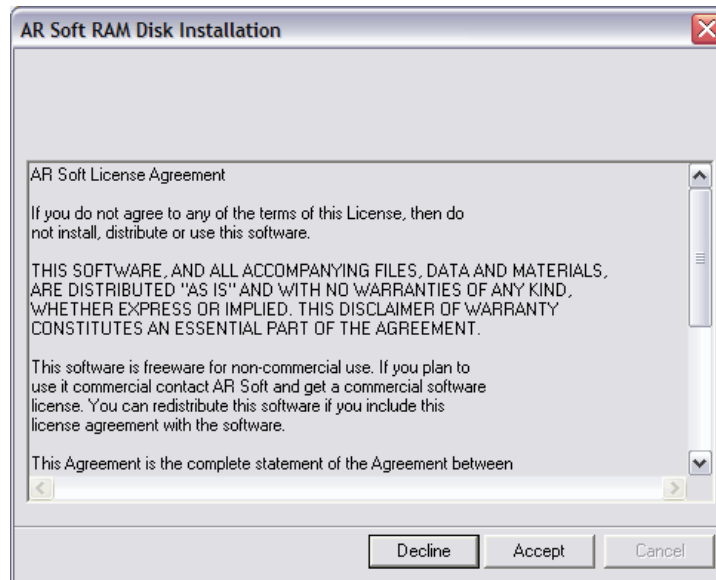
Figure 3-20
RAM Disk License Agreement

13. After the License Agreement, the user will be prompted to install the "RAM Disk" software. Figure 3-21
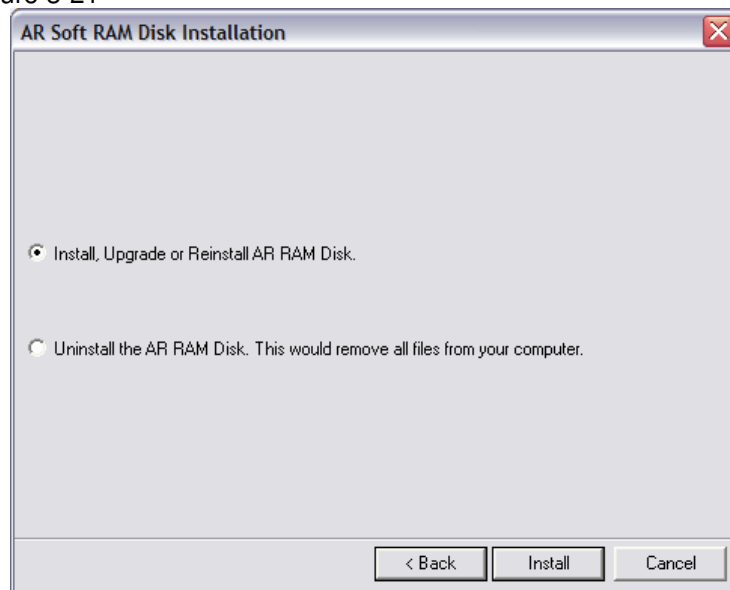
Figure 3-21
Install RAM Disk

14. A "Hardware Installation" window will pop up stating that "The hardware has not passed Windows Logo testing". When this prompt appears, click "Continue Anyway". Figure 3-22

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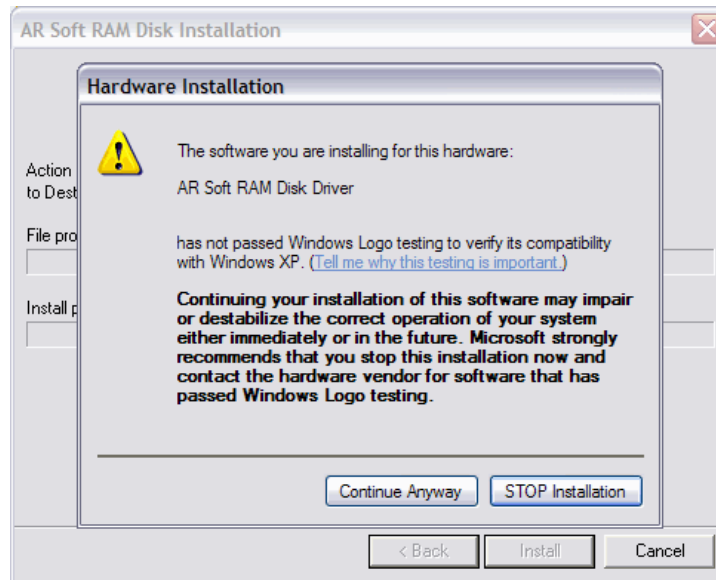
Figure 3-22
Hardware Installation Error

15. Once the "RAM Disk" Software has been installed, it will prompt the user to configure the "RAM Disk". Click "Finish" to configure the RAM Disk. Figure 3-23
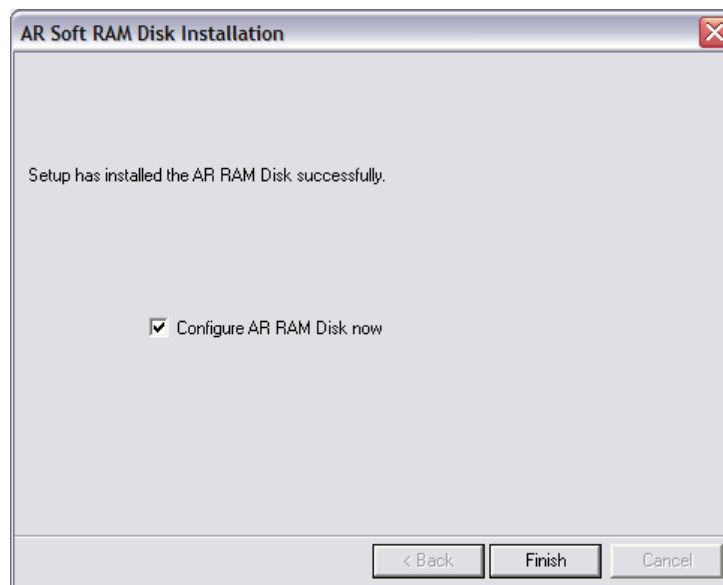
Figure 3-23
Configure RAM Disk

16. When the "RAM Drive Settings" screen appears, make sure the "Enable RAM Disk" is checked, select "D:\" for the "Driver Letter", leave the Startup Type as "Automatic" and select "Emulate a local hard disk" as the Operating Mode. Figure 3-24

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Figure 3-24
RAM Disk Configuration

17. Once the setup is complete, restart the computer. Figure 3-25
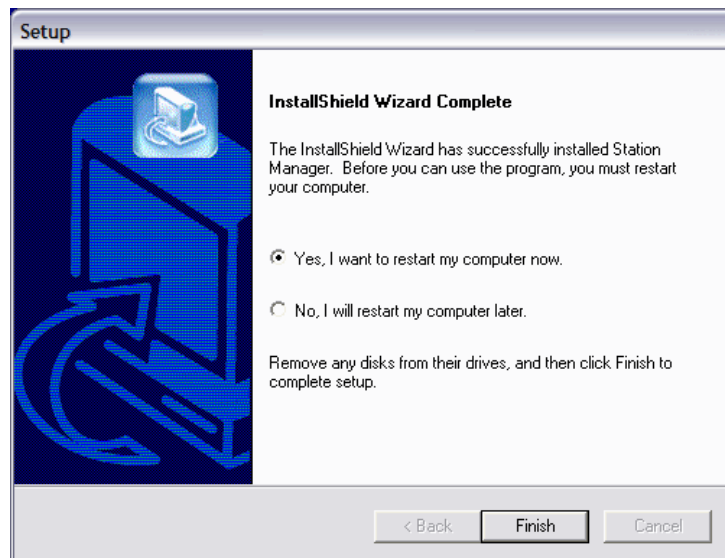
Figure 3-25
Setup Complete

18. After restarting the PC, close all applications running in the task bar.
19. Open the Station Manager Install CD and locate the "Updates" Folder.

20. Copy all the files in the "Setup" Folder and "SM" Folder in to the respective folders on the C:\ drive. i.e. From the Setup Folder in the Updates Folder, copy all the files to the C:\Setup Folder.
21. From the "Updates" Folder, locate the "Windows" Folder. In the "Windows" Folder, copy the respective "Statman ambient.ini" or the "Statman cem.ini" file to the "C:\Windows" folder, depending on which system the user requires. Change the current "statman.ini" file name to a different one, i.e. "Statman1.ini". Then change the "Statman ambient.ini" file to "statman.ini".
22. Locate the "System32" Folder in the "Updates\Windows" Folder and copy the "syslog.dll" file in to the C:\Windows\System32 Folder.
23. Once all the files have been copied from the "Updates" Folder, restart the computer and let everything take effect.

3.4.3.3 Upgrades

Software upgrades are contained on CD-ROM and include a complete new set of the EMC Station Manager Data logger software. A software version number is assigned to each upgrade CD-ROM version release. EMC will assist you via the telephone, if necessary during the software upgrade. All upgrades must be done either via a call out service or via the telephone with an EMC technician. NOTE: EMC is NOT liable for any upgrades performed without EMC assistance.

A software upgrade CD-ROM can contain corrections to software problems and other enhancements to Station Manager Data logger software. New features and capabilities can also be included on a software upgrade CD-ROM.

3.5 Initialize Station Manager Data Logger

This section provides step-by-step procedures for initializing a Station Manager Data logger.

3.5.1 Introduction

1. Initializations are the setup files and tables, which represent the unique personality of each Station Manager Data logger. Initializations are comprised of approximately eighty disk files and tables stored in the Setup directory located on the hard disk of the Station Manager data logger.

2. When a Station Manager Data logger is initialized, the primary station name entered for the polling name becomes the directory name for that set of initializations. For example, if the station name were "Woodward," the initializations for that Station Manager Data logger would be called Woodward.

3. When a Station Manager Data logger is received by a customer, it will contain two sets of generic initializations. One of these is called "Ambient" and the other is called "CEMS." After the Station Manager Data logger has been started, the user can choose to use and edit either of these pre-installed Ambient or CEMS initializations, or create a totally new set of initializations that is specific for the user's monitoring station.

4. Initializing a Station Manager data logger requires the completion of the following steps:

• Select Initialization Menu, Initialize Station, & Initialize Polling. Enter Primary Station Name.

- Select Initialize Parameters. Edit for the monitoring station requirements.
- Select and edit the Initialize Station and the Initialize Averaging screens.
- Select and edit the Initialize Com Ports screen and attach the modem(s).
- Re-start the computer to begin collecting data.

5. It would be helpful for the user to read Sections 3.5.2 and beyond before proceeding with actual steps of initializing a Station Manager Data logger.

3.5.2 Initialize a Station Manager Data Logger

Press the Initialization button on the Main Menu to begin the steps of initializing a Station Manager Data logger. This will bring up the Initialization Menu, which provides access to all of the selection screens and tables needed to initialize and startup a Station Manager Data logger. Figure 3-26
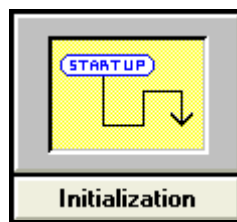
Figure 3-26
Initialization Button

3.5.2.1 Initialization Menu

The Initialization Menu has six selections that are used for initializing a Station Manager Data logger. It would be helpful for the user to click on each button on this screen, one at a time, and view the different screens that are available. This can help the user become familiar with the screens and related terms before proceeding with the actual steps of initializing a Station Manager Data logger. Figure 3-27

Figure 3-27
Initialization Menu

3.5.2.2 Parameter Initialization Table

The first step in setting up and creating new initializations for a Station Manager Data logger is to make entries into the Parameter Initialization table. Select Initialize Station from the Initialization Menu, and then select Initialize Parameters. Figure 3-28

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Figure 3-28
Parameter Initialization Table

1.   The following section describes the Initialize Parameters table and the procedures for entering new data or editing existing data.

   a.   This table is used to initialize all data channels recorded by the Station Manager data logger, including both analog input channels and calculated channels.

   b.   To edit this table, select the Edit Table button at the bottom of the table. Clicking on this button will cause the bottom half of the table to change into the Edit Mode work region.

2.   The following describes the Edit Mode work region and procedures for editing data or making new entries into this table.

   a.   The editing methods used to edit the Initialize Parameters table are identical to those used in all other tables in the Station Manager data logger, a Regional Manager data management system, or System Manager central data management system. After the user has learned these procedures, the user will understand how to edit all other tables.

   b.   When the Edit Mode work region first appears, it will have blank entries in all of the 13 fields shown. This is the normal starting point for users when entering new data into a blank, unconfigured Initialize Parameters table. Even when entries have already been made into the Initialize Parameters table, the user will still use the Edit Mode work region to add additional lines of channel configuration data to the table.

   c.   The Edit Mode work region is used to edit existing lines of initialization data in the table as well as make new entries.

   d.   To edit a line of data in the table, click anywhere on any line in the body of this table. This will cause that line of data to be highlighted and entered into the Edit Mode work region. When the line of data selected is highlighted, it indicates that the information on that line also appears in the Edit Mode work region and can now be edited by the user.

   e.   A second method of editing data in this table can be performed by the user. This is done by clicking the Edit Line button at the top of the Edit Mode work region. When the Edit Line button is pressed, a dialog box appears that prompts the user to select a line to be edited in the Initialize Parameters table. The use of the Edit Line button is functionally identical to the procedure described in "d" above, where the user clicks on a line in the body of the Initialize Parameters table.

   f.   The user can select and edit any of the fields in the line of data retrieved from the Initialize Parameters table by clicking on the button above that field in the Edit Mode work region.

   h.   If the user clicks on the Parameter button in the Edit Mode work region while entering new data, or editing existing data, a scrollable pull-down list of parameters will appear underneath that field. Clicking on the scroll buttons at the edge of this pull-down list will permit the user to view the entire list of parameters configured on the Station Manager data logger.

   i.   On the bottom of the Parameter pull-down list are two buttons. The first is Add and the second is Del. The Add is used to add a new parameter name that doesn't

currently exist in the parameter list. The Del is used to delete a parameter name that currently exists in the parameter list. The user may use any of the pre-configured names, or delete any of the parameter names shown and add new ones. Parameter names can be any combination of up to five alphanumeric characters.

j. Some fields in various Station Manager data logger tables have Add or Del buttons at the bottom of their pull-down lists. When these add or delete buttons are pressed, a dialog box appears that require users to make keyboard entries. Other dialog boxes permit the user to make choices from scrollable lists of data.

k. After a selection has been made in the parameter list, the next field in the table, the Averaging Method pull-down list will appear. This is a list of averaging methods available on a Station Manager data logger.

l. As the user completes entries into each field, a pull-down list in the next field to the right of it will appear. New data is entered into the table one field at a time, from left to right. Once all data has been entered or edited, press the Save Line button to save the changes.

m. The New Entry button on the Edit Mode work region is used to insert a line of data at any location in the table. This permits the user to organize the entries any way they wish.

n. When the Delete Line button is pressed, a dialog box will appear that prompts the user to select a line in the body of the Initialize Parameters table. If the user selects a line in the table to delete, a second dialog box will appear that asks the user to confirm (Yes or No) that the line selected is to be deleted. If the user indicates "Yes," that line will be deleted from the Initialize Parameters table.

o. The buttons on the top row of the Edit Mode work region are used for new entries or close the Edit Mode work region without performing any editing activity.

3. The user can create new parameter names of up to 5 characters in the Initialize Parameter table, edit existing parameter names, or delete any parameters names in the list of parameter names.

4. The following are the channel configuration capabilities of Station Manager data loggers.

a. Station Manager data loggers can be initialized for a maximum total of 40 data channels.

b. The minimum configuration of Station Manager data loggers is 8 differential analog input channels. This can be increased in increments of 8 analog input channels to a maximum of 32 differential analog input channels by using additional analog plug-in modules.

c. Station Manager data loggers can be configured to record an additional 8 calculated data channels if 32 analog input channels are installed. The maximum number of initialized data channels, including both analog input channels and calculated channels is 40.

5. The user can select a variety of averaging methods for any data channel. The methods include: standard arithmetic averaging of 1-second samples, wind speed and direction vector averaging, scalar wind speed and direction, vertical wind speed, sigma, sigma theta, sigma w, sigma v, rainfall, coefficient of haze (COH), difference between two channels, sum of two channels, ratio of two channels, lbs/hr, ppm-dry-corrected,

volumetric stack flow, and % efficiency.

6.   The user may create "Dummy" or "Phantom" channels. Users may have special requirements to create Dummy channels as place markers in the serial streams of data that are sent to polling systems other than EMC's System Manager. These systems may include ESC central polling systems and others. Dummy channels can be identical to any other analog input, or calculated channel, except that the user may not wish to retain data from these channels. To create a Dummy channel, the user should select an appropriate name and initialize it in the same manner as they would any other channel, whether analog input, or calculated. In order to conserve the number of analog input channels used, Dummy data channels should be created as calculated channels. Examples of fictitious Dummy channels could include calculated channels, such as difference between two channels, sigma calculation, or others. The user has the option to select the averaging intervals of data from Dummy channels. The procedure for selecting the averaging intervals for each parameter is found in Section 3.5.2.3.

7.   The next field in the Initialize Parameters table lists the input channel type. Only two types of input channels can be listed here. The first type is calculated channels, and the second type is analog input channels. Any averaged data channel that directly receives its input data from an analog input has the corresponding analog input channel number listed in this field. This can be a number between 01 and 32, and corresponds to the analog input channel number on the analog input PC board. If the averaged channel is a calculated type that is a calculation derived from other analog input channels or sources, the letters "calc" will appear in this field.

8.   The user can easily specify where the decimal point will appear in the data that is stored on Station Manager data logger. This is performed by clicking the Data Format button in the Edit Mode work region. A pull-down list displays the possible choices of where the decimal point will appear in all data stored for that data channel.

9.   Users can select the pre-configured unit labels by clicking on the Units button in the Edit Mode work region. A pull-down list shows the units that have been pre-configured. Users can edit, delete, or add new unit names with the Add and Del buttons at the bottom of the pull-down list.

10.   The full-scale value of each recorded data channel may be selected by clicking the full-scale button. The full-scale value is equivalent to the "m" component in the slope and intercept equation: $y=mx\pm b$. The value entered should be the same as the full-scale range of that data channel in engineering units. When this button is selected, a pull-down list will show a range of pre-configured full-scale values. The user may edit, delete, or add new values in the list.

11.   The zero value of each recorded data channel may be selected by clicking the Zero button. The zero value is equivalent to the "b" component of the scaling equation: $y=mx\pm b$. The value entered should be the same as the zero range of that data channel in engineering units. As an example, if a temperature sensor data channel had a range of -20 C^o to +70 C^o, the full scale engineering units value would be "+70," and the zero engineering units value would be "-20." When the Zero button is selected, a pull-down list will show a range of pre-configured full-scale values. The user may edit, delete, or add new values with the Add and Del buttons.

12.   The Max. Value is the a user selectable value, or level in engineering units at, or above which Station Manager data logger will flag data with an Invalid flag. When this button is clicked, a pull-down list of values will appear. The pull-down list shows the values that have been pre-configured with Station Manager data logger. The user can edit, delete, or add new values with the Add and Del buttons at the bottom of the scrollable pull-down list.

13. The Min. Value is the a user selectable value, or level in engineering units at, or below which Station Manager data logger will flag data with an Invalid flag. When this button is clicked, a pull-down list of values will appear. The pull-down list shows the values that have been pre-configured with Station Manager data logger. The user can easily edit these values, delete, or add new values with the Add and Del buttons at the bottom of the scrollable pull-down list.

14. The F.S. Volts field is used for software selection of the full scale input voltage for each analog input channel. The available choices are 1v, 5v, and 10v. These may be independently selected for each analog input channel.

15. There are two Min Samples fields that are used to independently set the criteria for minimum number of valid samples for 1-minute averages and 1-hour averages. Clicking on the either button will display a scrollable list of numbers to select the applicable minimum samples criteria.
If the number of valid data samples by Station Manager for each data channel is less than the 1 Minute or 1 Hour criteria specified by the user, the averaged data will be flagged as invalid.

16. The Rate of Change field is used to flag data that change in magnitude from one 1-Second data sample to the next 1-Second data sample at a value greater than the threshold value set in the Initialize Parameters table. The threshold values are in engineering units. The user can edit, delete or add new values in the table with the Add and Del buttons.

17. The user may print out a hard copy of the Initialize Parameters table to a printer connected to the Station Manager data logger by clicking on the Print button at the bottom of the table.

3.5.2.3 Averaging Methods

The following section describes the methods Station Manager data loggers employ to average or calculate data channels. This method applies to analog input channels and numerically calculated channels that use data from other analog input data channels or digital inputs channels.

- Station Manager Data loggers collect approximately 10 samples per second from every analog input channels and calculated channels.
- These samples are averaged into 1-second data samples for each channel. A large quantity of samples, or over-sampling, is used to achieve accurate recording of all data channels and provide smoothing of 1-second data samples.
- 1-second data samples are held in memory for calculations, but are not stored in non-volatile memory on the hard disk of the Station Manager Data logger.
- 1-second data samples for all channels are available for display in the Station Manager Data logger Instantaneous Data Display screen.
- 1-second data samples for each channel are averaged into 1-minute averages, short-term averages, and 1-hour averages.
- Short-term averages are user selectable and may be set to either 5-minute or 6-minute averages.
- Only the 1-minute, short-term, and 1-hour averages are stored on the Station Manager Data logger hard disk in non-volatile storage. 1-second average data samples are not stored on Station Manager's hard disk.

The following are acronyms and synonyms associated with the averaging methods provided in the meteorological calculations:

WSR	Wind Speed Resultant
WSA	Wind Speed Average
WS_i	Instantaneous Wind Speed
WDR	Wind Direction Resultant
WDA	Wind Direction Average
WD_i	Instantaneous Wind Direction
sigma theta	Wind Direction Standard Deviation
WSN	Wind Speed Normal to Resultant Wind Vector
WSN_i	Instantaneous Wind Speed Normal to Resultant Wind Vector
sigma v	Standard Deviation of Wind Speed Normal to Resultant Wind Direction
VWS	Vertical Wind Speed
VWS_i	Instantaneous Vertical Wind Speed
VWSA	Average Vertical Wind Speed
sigma w	Vertical Wind Speed Standard Deviation
sigma phi	Standard Deviation of the Vertical Wind Direction
N	Number of Instantaneous Samples
S	Analog Input Signal
V	North-South Component of the Wind Vector
U	East-West Component of the Wind Vector

1. Arithmetic Averaging

    A.   The standard averaging method used for most data channels is the Arithmetic averaging method.

    B.   This method is commonly used for many air quality, meteorological, and CEMS parameters; such as O3, SO2, CO, temperature and flow.

    C.   During the initialization of the Station Manager data logger, the user can specify the arithmetic averaging technique for any desired analog signal (S) input channel. The procedure for performing this type of initialization is described in Section 3.5.2.2.

    D.   Station Manager data logger uses the 1-second data samples from each of the channels that are initialized for arithmetic averaging to compute 1-minute averages. Every minute, sixty 1-second samples are averaged to make the 1-minute averages and the 1-minute averages are then used to compute arithmetic short-term averages and 1-hour averages.

    E.   The following is the equation Station Manager data logger uses for computing standard arithmetic averages for any data channel (S):

$$A = \frac{\sum_{i=1}^{N} S_i}{N}$$

<u>Where N is the number of 1-second samples</u>

2. COH (1 Hr) - Coefficient of Haze 1 Hour Calculation

A. Coefficient of Haze (COH) is a measurement of particulates performed by an AISI tape sampler or other samplers, which use the same data sampling technique.

B. COH is measured in the engineering unit of COH and represents a single measurement value taken at the end of each measurement period.

C. COH 1-hour measurement periods are (0000 to 0059) . . . (2300-2359). COH values are stored in the regular hourly average data files on the hour of each measurement period.

D. COH is initialized with the procedures for using the Initialize Parameters table described in Section 3.5.2.2.

E. The following is the algorithm Station Manager uses to compute COH:

1). At the beginning of each measurement period, Station Manager enables digital output line number 8 or 16 for approximately 5 seconds.

2). If a relay interface PC Board has been installed on the Station Manager data logger, the relay contacts on digital output line number 8 or 16 will close. If a relay interface PC Board was not installed, and if only TTL digital output lines are available, the event described in (1) above will cause the TTL output on digital output line number 8 or 16 to transition from a logical "0" state (high, approximately 5 VDC) to a logical "1" state (low, approximately 0 VDC).

3). Users should normally connect the relay output line described above to the tape advance signal terminals on an AISI tape sampler. The closing of this relay will cause the AISI tape sampler to advance to the next measurement period. Other custom interfaces can be employed to cause the TTL level signal to switch a relay device to accomplish the advance of the AISI tape sampler.

4). One minute after the beginning of a measurement period, Station Manager data logger will store a 1-minute average value from the COH data channel. This 1-minute average will represent the beginning or tare value for each COH measurement period.

5). 58 minutes later, Station Manager data logger will record a second 1-minute average data value from the COH channel. This value will be the final measurement value for the COH channel for each measurement period.

6). At the end of every measurement period, Station Manager data logger solves the following equation to yield a single measured value of COH:

LOG (VB/VE) x 100 x 1000 / (Sample Time (min)) x Air Flow

3. COH (2 Hr) - Coefficient of Haze 2 Hour Calculation

A. Coefficient of Haze (COH) is a measurement of particulates performed by an AISI tape sampler.

B. COH is measured in engineering units of COH, and represents a single measurement value taken at the end of each 2-hour measurement period.

C. COH 2-hour measurement periods are (0000 to 0159), (0200-0359), (0400-0559) ... (2200-2359). COH values are stored in the regular hourly average data files in the odd hour of each 2-hour measurement period.

D. COH is initialized with the procedures for using the Initialize Parameters table described in Section 3.5.2.2.

E. The following is the algorithm Station Manager data logger uses to compute COH.

1). At the beginning of each 2-hour measurement period, Station Manager data logger will cause digital output line number 8 or 16 to be enabled. Digital output line number 8 or 16 will stay enabled for approximately 5 seconds.

2). If a relay interface PC Board has been installed on the Station Manager data logger, the relay contacts on digital output line number 8 or 16 will close. If a relay interface PC Board was not installed, and if only TTL digital output lines are available, the event described in (1) above will cause the TTL output on digital output line number 8 or 16 to transition from a logical "0" state (high, or approximately 5 VDC) to a logical "1" state (low, or approximately 0 VDC).

3). Normally, users will connect the relay output line described above to the tape advance signal terminals on an AISI tape sampler. The closing of this relay will cause the AISI tape sampler to advance to the next 2-hour measurement period. Other custom interfaces can be employed to cause the TTL level signal to switch a relay device to accomplish the advance of the AISI tape sampler.

4). One minute after the beginning of a 2-hour measurement period, Station Manager data logger will store a 1-minute average value from the COH data channel. This 1-minute average will represent the beginning, or tare value, for each 2-hour COH measurement period.

5). 118 minutes later, Station Manager data logger will record a second 1-minute average data value from the COH channel. This value will be the final measurement value for the COH channel for each 2-hour measurement period.

6). At the end of every two hour measurement period, Station Manager solves the following equation to yield a single measured value of COH:

$$\text{COH/1000 feet} = \frac{540}{119\min(6.25lpm)} Log\left[\frac{Tare(or\,Beginning\,Minute\,Average)}{Final\,Minute\,Average}\right]$$

7). Since COH measurement periods are two hours long, two clock hourly average data positions will be occupied in Station Manager's data logger standard hourly average data file.

8). Station Manager data logger will record and store a data value into each of these two "clock" hourly data positions during the 2-hour COH measurement period.

a) The difference value obtained from the above equation will be stored in the first of these two hourly data positions.

b) The resultant COH data value, obtained from the solution of the above

equation, will be stored in the second clock hour data position in the COH data file on Station Manager Data logger.

4. Precipitation - Rainfall Calculation

A. Station Manager data logger can record rainfall from two different types of rainfall sensors. These include:

1).   Tipping-bucket rain gauges
2).   Continuous analog rain gauges

B. Rainfall measured with a tipping bucket rain gauge or continuous analog rain gauge is usually scaled in inches per hour ("/hr) or millimeters per hour (mm/hr).

C. The following describes how Station Manager data logger records rainfall with a tipping-bucket rain gauge.
1).   Tipping bucket rain gauges employ mercury-wetted switch contacts to signal the occurrence of a tip of a small tipping-bucket when rain is collected during a rain event. The switch contacts in the tipping bucket rain gauge apply a voltage from an external source of voltage to an analog input channel in Station Manager data logger.
2).   The maximum volume of water that can be held in the tipping bucket determines the minimum data resolution of the rainfall measurement from a tipping bucket rainfall sensor.

3).   In most commercial tipping bucket rain gauges, the volume of water collected in the tipping bucket corresponds to 0.01 inches, or 0.25 mm of rainfall.

4).   Station Manager data logger stores the value of 0.01, or 0.25, in an editable disk file. Station Manager data logger in the calculation of rainfall total uses this value. The default value stored in Station Manager data logger is 0.01. The stored value can be set to 0.01, 0.25, or other values on request.

5).   Station Manager data logger counts the number of tips of the bucket each clock hour period, and multiplies the number of tips times the value stored in the disk file. The result of this calculation is the hourly rainfall total.

6).   The user sets the engineering units of rainfall recorded by Station Manager data logger when the appropriate units are selected in Initialize Parameters table. Rainfall is typically recorded in in/hr or mm/hr. Station Manager data logger uses a standard analog input channel for the recording of a tipping bucket rain gauge.

5. Scalar HWD - Horizontal Wind Direction

A. Horizontal wind direction is a circular function with values limited to between 001 and 360 degrees.

B. The hourly calculation of wind direction average is a crossover-corrected average of the instantaneous wind direction samples.

C. A crossover algorithm for handling wind direction crossover through north is used that compares the current instantaneous wind direction value to the average of all the preceding wind direction values for the pertinent averaging period. If a difference of more than +180 degrees is found, 360 degrees is subtracted from the current value; or if a difference of less than -180 degrees is found, then 360

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degrees is added.

D. The following is the equation Station Manager data logger uses for calculating the average horizontal wind direction (WDA):

$$\textbf{WDA} = \frac{\sum_{i=1}^{N} WD_i}{N}$$

6. Scalar WS - Wind Speed Average Calculation

A. Horizontal wind speed (WSA) is scalar horizontal wind speed.

B. Horizontal wind speed (WSA) may be averaged into 1-minute, short-term, and 1-hour calculations of average scalar horizontal wind speed.

C. The following is the equation Station Manager data logger uses for calculating scalar horizontal wind speed (WSA):

$$\textbf{WSA} = \frac{\sum_{i=1}^{N} WSA_i}{N}$$

7. Sigma Standard Deviation Calculation

1. Sigma calculations are the standard deviation of selected analog input channels.

2. During initialization, the user may specify the calculation of sigma, or standard deviation for any analog input channel.

3. Sigma can be calculated and averaged into 1-minute, short-term, and 1-hour averages.

4. The following is the form of the standard equation Station Manager data logger uses for computing sigma for any analog input data channel (S):

$$\textbf{Sigma} = \left[\frac{\sum_{i=1}^{N} (S_i - S)^2}{N-1} \right]^{0.5}$$

8. Sigma Phi Calculation

A. Station Manager data logger calculates Sigma phi using the Sigma w and horizontal wind speed (WSA) data channels.

B. Sigma phi can be averaged into 1-minute, short-term, and 1-hour averages.

C. The following is the equation used in the Station Manager data logger for

calculating Sigma phi:

Sigma phi = <u>Sigma w</u>
WSA

The above equation yields Sigma phi in units of radians and it is converted to degrees by Station Manager Data logger using the following equation:

Sigma phi (degrees) = Sigma phi (radians) X 57.2958

9. Sigma Theta Calculation

A.   Sigma theta calculation is the standard deviation of the horizontal wind direction.

B.   Sigma theta is calculated from the instantaneous wind direction samples.   An algorithm similar to the crossover algorithm used for horizontal wind direction is used.

C.   Sigma theta can be calculated and averaged into 1-minute, short-term, and 1-hour averages.

D.   It has been suggested that the upper limit of Sigma theta should be limited to 103.9 degrees (Yamartino, 1984).   The equations used in the Station Manager data logger do not impose a limit to the range of possible Sigma theta values recorded to eliminate any bias that an upper limit may impose.

E.   The following is the equation Station Manager data logger uses for computing Sigma theta from horizontal wind direction (WD):

$$\text{Sigma Theta} = \left[\frac{\sum_{i=1}^{N} (WD_i - WDA)^2}{N-1} \right]^{0.5}$$

10. Sigma v Calculation

A.   Sigma v is the standard deviation of the instantaneous wind speed normal to the hourly resultant wind direction.

B.   Sigma v can be averaged into 1-minute, short-term, and 1-hour averages.

C.   The following is the equation Station Manager data logger uses for the calculation of Sigma v:

$$\text{sigma v} = \left[\frac{\left(\sum_{i=1}^{N} u_i^2\right)\cos^2 WDR - 2\left(\sum_{i=1}^{N} U_i V_i\right)(\sin WDR)(\cos WDR) + \left(\sum_{i=1}^{N} V_i^2\right)\sin^2 WDR}{N-1} \right]$$

$$\textbf{where: } u_i = WS_i \sin WD_i \quad \text{and } V_i = WS_i \cos WD_i$$

11. Sigma W Calculation

A. Sigma w is standard deviation of the average vertical wind speed (VWSA).

B. Sigma w can be averaged into 1-minute, short-term, and 1-hour averages.

C. The following is the equation used in the Station Manager data logger for calculating Sigma w:

$$\textbf{Sigma w} = \left[\frac{\sum\limits_{i=1}^{N}(VWS_i - VWSA)^2}{N-1} \right]^{0.5}$$

12. Vector WD - Resultant, or Vector Wind Direction Calculation

A. The hourly calculation of resultant or vector wind direction provides a vector average of all of the instantaneous samples of wind direction sampled each hour.

B. Vector WD can be averaged into 1-minute, short-term, and 1-hour averages.

C. The following are the equations Station Manager data logger uses for the calculation of vector wind direction:

$$\textbf{U} = \frac{\sum\limits_{i=1}^{N}[WS_i \sin(WD_i)]}{N}$$

$$\textbf{V} = \frac{\sum\limits_{i=1}^{N}[WS_i \cos(WD_i)]}{N}$$

$$\textbf{WDR} = \arctan\left(\frac{U}{V}\right) + Flow$$

$$\textbf{where: } FLOW = \left[\begin{array}{l} +180^0 \arctan\left(\dfrac{U}{V}\right) < +180^0 \\[4mm] -180^0 \arctan\left(\dfrac{U}{V}\right) > +180^0 \end{array} \right]$$

13. Vector WS - Resultant, or Vector Wind Speed Calculation

A. The hourly calculations of resultant or vector wind speed provide a vector average

of all of the instantaneous samples of wind speed sampled each hour.

B.   Vector WS can be averaged into 1-minute, short-term, and 1-hour averages.

C.   The following are the equations Station Manager data logger uses for the calculation of vector wind speed:

$$\mathbf{U} = \frac{\sum\limits_{i=1}^{N}\left[WS_i \sin(WD_i)\right]}{N}$$

$$\mathbf{V} = \frac{\sum\limits_{i=1}^{N}\left[WS_i \cos(WD_i)\right]}{N}$$

$$\mathbf{WDR} = \arctan\left(\frac{U}{V}\right) + Flow$$

$$\mathbf{where:}\ FLOW = \begin{bmatrix} +180^0\arctan\left(\dfrac{U}{V}\right) < +180^0 \\[12pt] -180^0\arctan\left(\dfrac{U}{V}\right) > +180^0 \end{bmatrix}$$

$$WSR = \left(U^2 + V^2\right)^{0.5}$$

14. VWSA - Vertical Wind Speed Calculation

A.   Vertical wind speed is the vertical component of wind flow. Vertical wind flow can be positive (upward), or negative (downward).

B.   Vertical wind speed (VWSi) can be averaged into 1-minute, short-term, and 1-hour averages (VWSA).

C.   The following is the equation Station Manager data logger uses for calculating average vertical wind speed average:

$$\mathbf{VWSA} = \frac{\sum\limits_{i=1}^{N}VWS_i}{N}$$

3.5.2.4 **Initialize Polling**

The Initialize Polling screen is used to enter information needed for the polling programs into the Station Manager Data logger set of initializations. This screen can be accessed by selecting Initialize Station from the Initialization Menu, then Initialize Polling. Figure 3-29

Figure 3-29
Initialize Polling Screen

1. This screen contains the Primary Station Name and an Alternate Station Name. The user may enter a new name or change an existing name by highlighting the entry area with the mouse.

2. The maximum number of characters for the primary and alternate station names is 8 characters.

3. Polling Passwords are not required for EMC Station Manager data loggers.

4. There is also a provision for entering a secondary password. Station Manager data loggers do not use the secondary password.

5. This screen is for entering the Primary ID Number for this Station Manager data logger. It also includes an entry area for entering a Secondary ID Number.

6. The Primary Polling ID Number is also used for ESC polling emulation. Whenever a Station Manager data logger is polled with the ESC polling protocol, it is necessary to enter the appropriate Station ID into this entry area.

3.5.2.5 Initialize Station Table

The Initialize Station screen is used to enter general information about the site into a Station Manager Data logger. To view this screen, select Initialize Station from the Initialize Station Menu. Figure 3-30

Figure 3-30
Initialize Station

1.   The Initialize Station screen contains several entry fields that can be initialized by the user. These include General Information, Local Time Zones, and Calibration Report Type.

   A.   Under General Information, there are three types of information that can be entered.

      1).   The first telephone number is the Polling Line 1 or the primary line that will be used for polling of this monitoring station.

      2).   The second telephone number is the Polling Line 2 or a secondary telephone line that could be potentially used at this monitoring station.

      3).   The third telephone is Voice Line 1. This could be a separate voice telephone line that is used at this monitoring station.

      4).   The format of telephone numbers should be: (999) 999-9999

   B.   The second entry area is used to enter the full station name, address and zip code. The description name entered here is used by Station Manager data logger as the header name in the Daily Summary Printouts.

   C.   The third entry area is a Site ID Nr, and can be a unique site identification number or name for the user's air monitoring network.

3.   Under the heading Local Time Zone is one entry area that is used to set the Local Time Zone where the monitoring station is located. Available time zones can be selected by pressing the select button on this entry area.

4.   Under the heading Calibration Report Type is the entry area for selecting the type of Calibration Report that will be printed out at this Station Manager data logger location. The selection of the report style is done by pressing the select button on this screen.

A. The first report format style is the EMC standard daily calibration summary report for ambient air quality monitoring.

B. The second report format style is the EMC standard, daily calibration summary report for Continuous Emission Monitoring Systems (CEMS).

3.5.2.6 Initialize Com Ports

Station Manager Data loggers can use multiple serial port connections. This screen is used to set the operating mode for each of the Station Manager Data logger serial communications ports. To view this screen, select the Initialization Menu, select Initialize Station, and then Initialize Com Ports. Figure 3-31
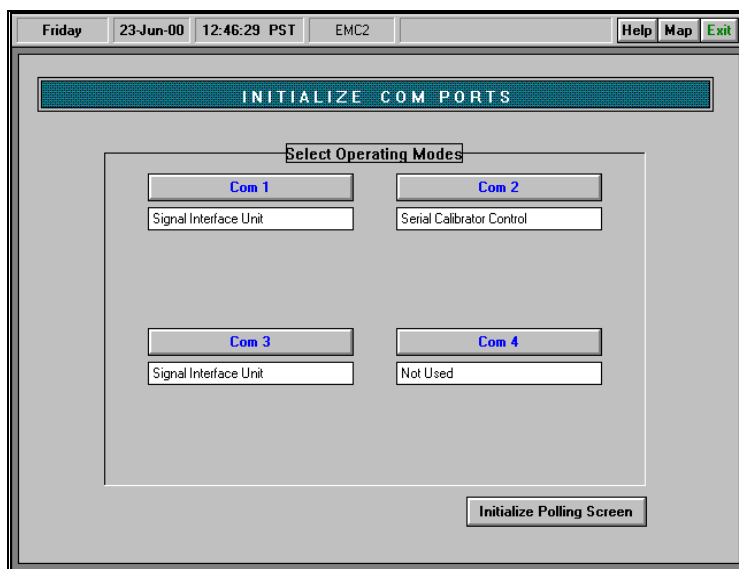
Figure 3-31
Initialize Com Ports

1. The Initialize Com Ports screen displays four Com Port selections identified as Com 1 through Com 4. Each com port has a separate pull-down list. The pull-down lists contain various selections that are possible for serial communications with the Station Manager Data logger.

    A. Not Used. This selection is entered when the connection to the Com Port is not required, or to disable the existing connection.

    B. Polling – Dial Up Line. This is the standard selection that is used for communications with Station Manager Data logger. It includes EMC's System Manager polling, ESC Polling and SUMX polling.

    C. Polling – Leased Line. This selection is used for dedicated or leased telephone line communications with the Station Manager Data logger.

    D. Signal Interface Unit. This selection is used to designate which line will communicate with Station Manager Data logger Signal Interface Unit.

    E. Serial Calibrator Control. This selection is used to assign one of Station Manager's data logger two serial communications ports to communicate with and

control an Environics 9100 or Series 100, or Dasibi 5008 calibrator. Serial Calibrator Commands are detailed in Section 4.3.4.2.

F.   Serial Data – Chevmon. This selection is used for special communications with a proprietary computer data acquisition system.

2.   Select the Exit Button to save the Com Port initialization. The user will be prompted to confirm that the modem has been connected to the appropriate Com Port and that it is powered on.

3.   The Initialize Polling Screen button is available from this screen to provide direct access for entering information needed for the polling programs, as described in Section 3.5.2.4.

3.5.2.7 Calibration Schedules

This section describes the features of the Calibration Schedules table shown below in Figure 3-32. To view this table, select Calibrations from the Main Menu and then select Calibrations Schedule.

Figure 3-32
Calibration Schedules Table

1.   The Calibration Schedules table is used to schedule the automatic occurrence of a calibration sequence. The user can initiate calibration sequences on an automatic scheduled basis with the Calibration Schedules table or manually at any time for the Initiate Calibrations screen.

A.   Calibration sequences are pre-defined and are stored in the Calibration Sequences table.

B.   Users may select sequences provided by EMC, or create custom calibration sequence to satisfy their unique calibration control and scheduling requirements. Refer to Section 3.5.2.8 for a description of the Calibration Sequences table.

2. When initially setting up a schedule for a calibration activity, the user will enter the date when the initial occurrence of the calibration sequence will occur. The Calibration Schedules table automatically keeps a running record of when the next occurrence of each scheduled calibration sequence will occur.

3. It is possible to schedule the frequency of occurrence of a calibration sequence by selecting a value in a pull-down list of possible occurrence frequencies the Calibration Schedules table. Possible selections include: Daily, Weekly, Monthly, Bi-Weekly, Semi-Monthly, or Every N Days.

4. The Calibration Schedules table contains the time of day when each scheduled calibration sequence will be performed. The user can easily adjust this time to any desired starting time.

5. The following example in Figure 3-33 illustrates how the standard Edit Mode capabilities available in all Station Manager data logger tables can be used to edit or enter new values in this table.

6. As in all Station Manager data logger tables, selecting the Edit button at the bottom of the table causes the table to display the edit region.

7. After a line has been edited, or after a new line has been created, pressing the Save Line button causes the edit region to disappear and the full table to be displayed again.

8. When exiting tables, the changes made by the user will be saved only when the Save Line button has been pressed.

Figure 3-33
Calibration Schedules Table - Edit Mode

3.5.2.8 Calibration Sequences

The following table shown in Figure 3-34 illustrates the Station Manager Data logger Calibration Sequences table:

| Monday | 16-Oct-06 | 09:43:52 PST | CEM | | Help | Map | Exit |

Calibration Sequence Table

Sequence Name	Step	Parameter Ave	Parameter Invalid	Level	Cal Flag	Length of Step	Average Interval	Recovery Interval
Daily Autocal	1	SO2		Zero	None	12 Min.	3 Min.	None
		NOX						
		NO						
	2	NO2	NOX	Span	None	20 Min.	5 Min.	None
			NO					
	3	CO	SO2	Span	None	20 Min.	5 Min.	None
			NOX					
			NO					
			NO2					

| Edit | Print |

Figure 3-34
Calibration Sequences Table

1. The Calibration Sequences table is used to initialize and store any desired combination of calibration steps that are created by the user.

2. Each calibration sequence is given a unique user-defined name.

3. Once calibration sequences have been created, they can be initiated automatically using the Calibration Schedules table described in Section 3.5.2.7. Calibration sequences can also be initiated manually at any time.

4. The Calibration Sequences table consists of columns, or fields of pertinent information needed to specify a sequence of calibration steps. The fields or columns in the table include:

    A. A list of user defined Calibration Sequence Names. Users may add or delete the names in this list.

    B. The Step number that identifies the order in which calibration steps will be performed.

    C. A single parameter or a group of parameters whose calibration responses will be recorded and during a calibration step.

    D. The single parameter or a group of parameters that would be marked down as invalid during a calibration step.

    E. A list of names that are available to describe each calibration step. The possible names include:

    Zero, Span, Precision, Level 1, Level 2, Level 3, Level 4, Level 5, Level 6, and

Level 7.

F.   The time duration, or Length of Step of each calibration step.

G.   The time duration, or Average Time when a sample is recorded during a calibration step.

H.   The time duration, or Recovery Time that can specified at the end of calibration sequence step when calibration responses will not be recorded and when data is not included in the 1-minute, short-term, or hourly average data.

5.   The number of possible steps in each calibration sequence is limited to 99 and the number of possible calibration sequences that can be created on a Station Manager data logger is 99.

6.   Each step in a sequence can apply to one or more parameters. A sequence step can be combined to apply to multiple parameters, or only one parameter.

7.   Each sequence can have a unique, user-defined name that will be recognized by other Station Manager data logger programs.

4.0 Station Manager Features

The following section provides a description of the display screens and operational features of the Station Manager Data logger. It illustrates each screen display and summarizes the details about the function of each screen display or program.

4.1 Station Manager User-Interface

The Station Manager Data logger user-interface consists of a series of graphical menus, which provide easy access to the unique screen displays in the data logger. The Main Menu is the first screen in the hierarchy of menus and screens in the Station Manager Data logger. Each sub-menu and each major functional screen is represented by an icon button on the Station Manager Main Menu screen.

Whenever a Station Manager Data logger is initially started or rebooted, it will display the following Main Menu screen shown in Figure 4-1.

Figure 4-1
Main Menu Screen

The Menu Station hierarchy starts with a Main Menu screen and leads users to sub-menus that contain a second level of screen selections. Sub-menus can contain a third Menu Level that will lead to further selections and functions. Clicking once on any of the push buttons icons shown on the Main Menu will display the selected screen or function.

An Exit button is always located at the top right corner on all screens in the Station Manager Data logger. The Exit button can be used at any time to exit or close any screen display and move to the next higher level in the Menu System. The Log button on the Main Menu is used to log a user out of the Security System. Once logged out, users must log-in again to access the Station Manager Data logger.

4.2 Station Manager Map Screen

The Map screen is an alternative method of navigating among the screen displays and functions in the Station Manager Data logger. This screen displays a hierarchical view of the major programs and screen displays within the Station Manager Data logger. The Map screen selection system is interchangeable with the selection functions of the Station Manager Menu system. Figure 4-2

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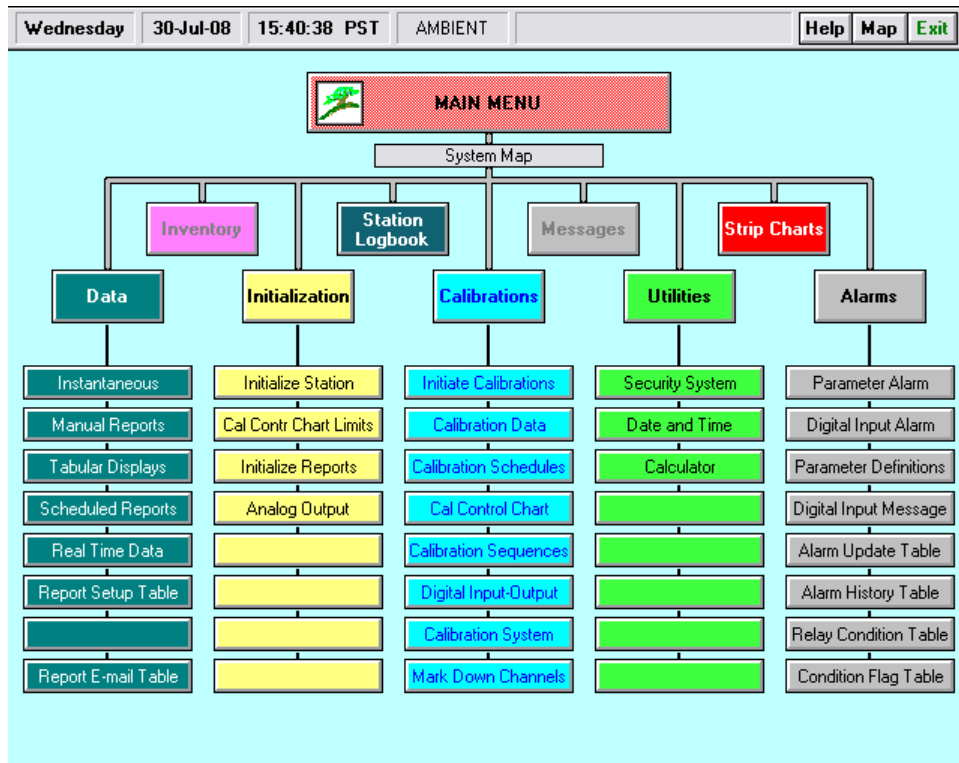
Figure 4-2
Map Screen

Open the Map screen within any screen in the Station Manager Data logger by clicking on the Map button located at the top right corner of all screens.

The Map screen is a quick and convenient way to locate different menus and screens in the Station Manager Data logger. The Map button is located on every Station Manager Data logger screen at the top right corner. Simply locate the name of a menu or screen and single click to open it. Users can return to the Map screen at any time by clicking on the Map button.

4.3 Calibration Control Program

The Station Manager Data logger calibration control program is used to initiate calibration activities. This program can also be used to control the occurrence of repetitively scheduled events.

The Station Manager calibration control program includes a main Calibration Menu for managing calibration activities for ambient air quality and CEMS monitoring stations. The calibration system is administered through the various tables and dialog boxes available under the Calibration Menu. Calibration control activities typically consist of manually initiated calibrations, manually initiated calibration sequences, and calibrations that are scheduled to run automatically on a scheduled, repetitive basis according to user-defined schedules.

To display the Calibration Menu shown in Figure 4-3, click the Calibrations button on the Main Menu.

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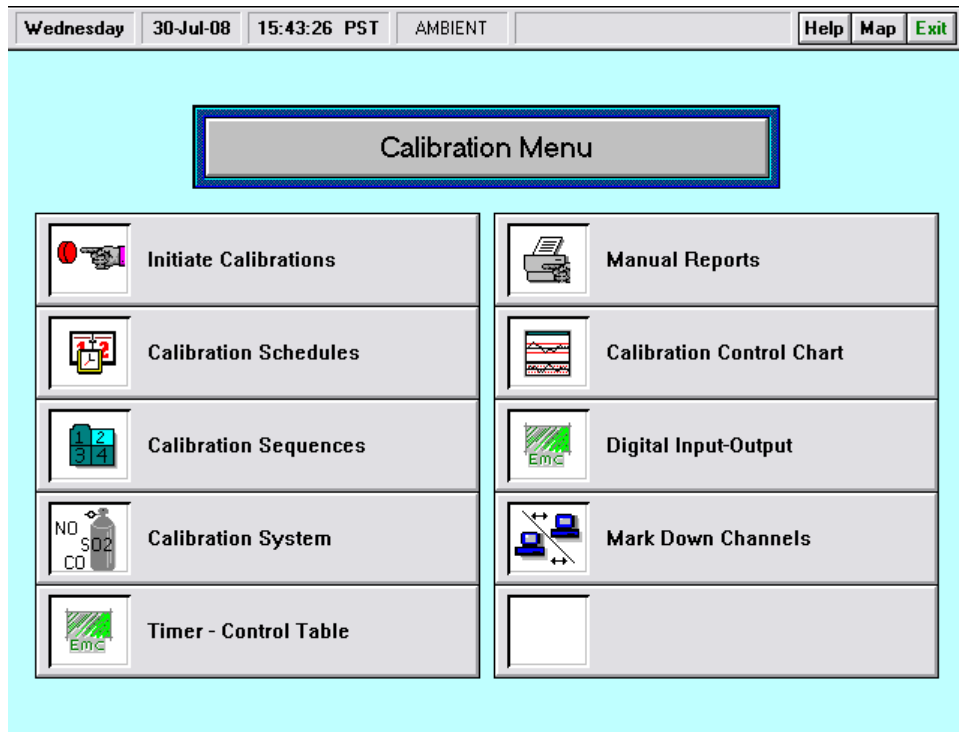
Figure 4-3
Calibration Menu

The Calibration Menu contains the following selections that are used for control of calibration activities:

• Initiate Calibrations	4.3.1
• Calibration Schedules	4.3.2
• Calibration Sequences	4.3.3
• Calibration System	4.3.4
• Timer-Control Table	4.3.5
• Manual Reports	4.3.6
• Calibration Control Chart	4.3.7
• Digital Input-Output Table	4.3.8
• Mark Down Channels	4.3.9

4.3.1 Initiate Calibrations

The Initiate Calibrations screen is primary screen in the Station Manager Data logger for accessing the dialog boxes and programs needed to perform calibration activities. It provides direct access to a Manual Calibration dialog box and the Start Calibration Sequence dialog box. It also includes access to other programs in the Station Manager Data logger, such as the Instantaneous Data Display program and the Strip Chart display program.

To display the Initiate Calibrations screen shown in Figure 4-4, click the Initiate Calibrations button on the Calibration Menu screen.
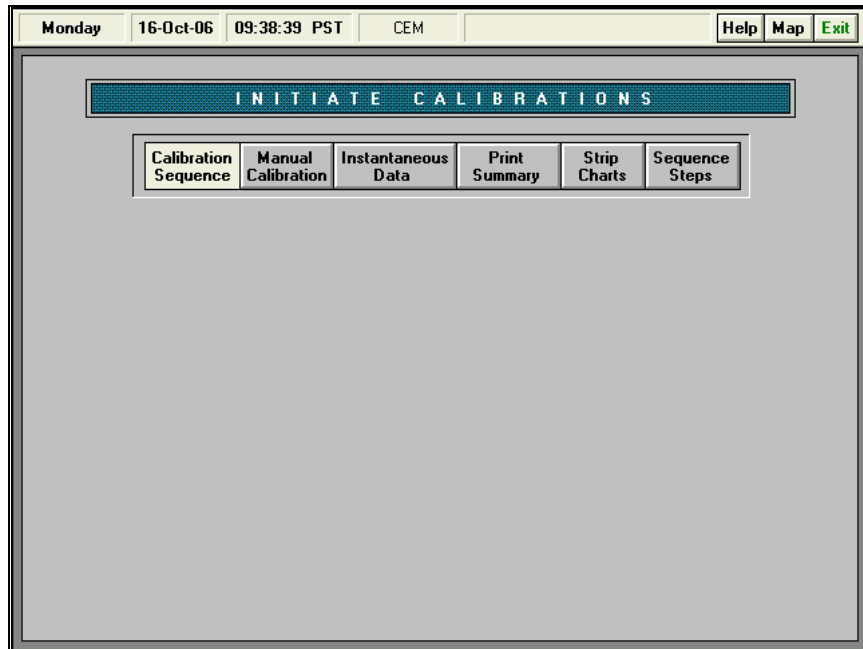
Figure 4-4
Initiate Calibrations Screen

1. The Initiate Calibrations screen is the primary screen for selecting dialog boxes that are used for and controlling Manual Calibrations and Manually initiated sequences.

2. This screen also provides easy access to the Instantaneous Data Display screen. Clicking on the Instantaneous Data selection button will quickly bring up a display of all data recorded on the Station Manager Data logger.

3. Clicking on the Print Summary button will provide access to the Calibration Data display and printing program.

4. The Strip Chart button will provide access to the Strip Chart display program.

5. The following sections describe each of the dialog boxes and display screens that can be accessed through the Initiate Calibrations screen.

4.3.1.1 **Calibration Sequence**

When the Calibration Sequence button is pressed, the Calibration Sequence dialog box shown in Figure 4-5 will appear and be displayed on top of the Initiate Calibrations Screen.
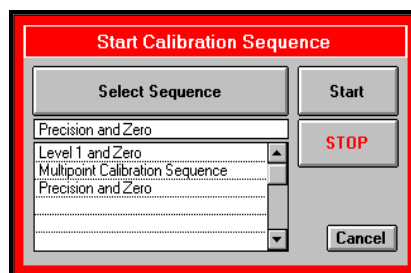
Figure 4-5
Calibration Sequence Dialog Box

a) The Calibration Sequence dialog box is used to start pre-defined calibration sequences.

b) The Select Sequence button on this dialog box has a pull-down list of available calibration sequences, which have been previously defined and stored in the Calibration Sequence table.

c) To start a calibration sequence, select a calibration sequence, the press the start button. The Start button will turn red, indicating that it has started the selected calibration sequence.

d) The calibration sequence will run through the sequence of steps defined in the Calibration Sequence table. If needed, the user can manually terminate this sequence at any time by clicking on the Stop button and answering yes to a confirming dialog box.

e) Before a calibration sequence can be initiated, either manually or automatically, the sequence must have previously been defined and stored in the data logger's Calibration Sequence table. Review Section 4.3.3 for a description of this procedure.

4.3.1.2 **Manual Calibration**

When the Manual Calibration button is pressed, the Manual Calibration dialog box shown in Figure 4-6 will appear and be displayed on top of the Initiate Calibrations Screen.
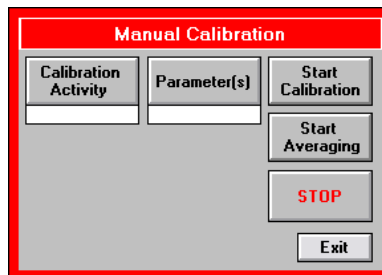
Figure 4-6
Manual Calibrations Dialog Box

a) The Manual Calibration dialog box is used start a manual calibration activity.

b) A manual calibration activity is one in which the user selects the parameter, the type of calibration activity to be performed, and then manually starts the calibration activity by pressing the Start button.

c) Click the Calibration Activity button on the dialog box to open a pull-down list of choices of different calibration activity names. Possible calibration activity names are: Zero, Span, Precision, and Level 1 through Level 7. Select the desired calibration activity by clicking on the name in this pull-down list.

d) Click the Parameter(s) button on the dialog box to open a list of parameters that have been initialized in the Station Manager Data logger. Select the desired gaseous

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parameter to be calibrated. Multiple parameters can be calibrated at one time by clicking on the Multi-Select button. After multiple parameters have been selected, click the End Selection button at the bottom of the list.

e) Press the Start Calibration button to start the calibration activity. It will depress and turn red, indicating the selected calibration activity has started.

f) When a calibration is started, appropriately defined digital outputs in the Digital Input/Output Tables will turn on a pattern of relays that control external calibrators or valves. If an RS-232C serial interface has been enabled, "Start" commands will concurrently be sent to an RS-232C serial port.

g) Once started, a manual calibration activity will stay enabled until the user presses the Stop button on the dialog box.

h) Once the analyzer being calibrated has attained a stable response during the manual calibration activity, click the Start Averaging button to begin averaging data. The averaging of calibration data responses will continue until the Stop button is pressed. The calibration data response recorded during this time interval will be stored in the Station Manager Data logger calibration data files on the Station Manager Data logger hard disk. Calibration responses can be printed out or viewed on-screen by using the Calibration Data display and printing program.

i) While a manual calibration is running, it is possible to exit or close the dialog box and still continue the calibration activity. This will permit the user to exit this screen and perform other tasks within the Station Manager data logger while a manually initiated calibration is still in progress

j) The following is a recap of the steps that are used to perform a manual calibration:

k) Select the type of calibration activity as explained above.

l) Select the parameters to be calibrated as explained above.

m) Click the Start Calibration button.

n) Click the Start Averaging button when the analyzer has attained a stable response and the user wishes to begin averaging the calibration response.

o) Click the Stop button at any time to terminate the calibration activity and the averaging of the calibration data response.

p) Click the Exit button to close the Manual Calibrations dialog box.

q) While a manual calibration is running or still in progress, it is possible to exit or close the dialog box. This will permit the user to exit this screen to perform other tasks within the Station Manager Data logger while the manual calibration is still running.

r) Stop, or terminate a Manual Calibration activity by pressing the Stop button.

4.3.1.3 Instantaneous Data Display

The Instantaneous Data Display screen provides a tabular view of all data channels recorded by the Station Manager Data logger. Click the Instantaneous Data button on the Calibrations Menu to view the Instantaneous Data Display screen shown in Figure 4-7.
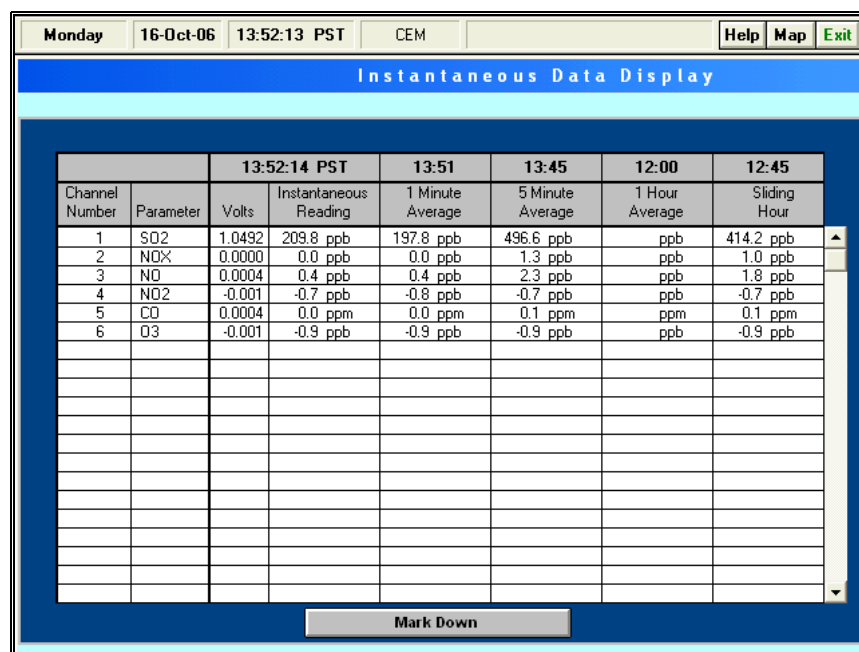
Figure 4-7
Instantaneous Data Display Screen

a. This Instantaneous Data Display screen can be accessed from either the Data Menu or the Initiate Calibrations screen.

b. The Instantaneous Data Display screen shows the channel number, the parameter name, input voltage reading for each analog input channel, and instantaneous reading in engineering units. It also shows the latest 1-minute, other averages (5-minute or 6-minute), previous 1-hour average (updated hourly), and the sliding 1-hour average (updated every five minutes) in engineering units.

4.3.1.4 **Print Calibration Summary Dialog Box**

a. Click the Print Summary button to initiate a printout of a calibration summary.

b. Select the date with the up and down arrow buttons.

c. Click the view or print button to obtain a display or printout of calibration data.

4.3.1.5 **View Strip Charts Dialog Box**

a.   The View Strip Charts dialog box is used to open and view a strip chart.
b.   Click the Select Chart Name button and click on the chart name to be displayed.
c. Click the Vertical or the Horizontal Display buttons to automatically open the selected Strip Chart.

4.3.2 **Calibration Schedules Table**

The Calibration Schedules table is used to schedule when pre-defined calibration sequences will be run. Open the Calibration Schedules table shown in Figure 4-8 by clicking on the Calibration Schedules button on the Calibrations Menu.

| Monday | 16-Oct-06 | 09:42:32 PST | CEM | | Help | Map | Exit |

Calibration Schedule Table

Calibration Sequence Name	Frequency of Occurrence	Next Cal Date	Start Time
Daily Autocal	Daily	18 - Aug - 02	10 : 51

Edit Schedule   Print Schedule

Figure 4-8
Calibration Schedules Table

1. To cause a pre-defined calibration sequence to run at a scheduled time, the user should make appropriate entries in the Calibration Schedules table.

2. The table contains four entry fields or columns.

3. The first column in the table is the pre-defined "Calibration Sequence Name." Select a sequence name from the pull-down list of pre-defined sequences. Refer to Section 4.3.3 for the procedures for creating pre-defined calibration sequences.

4. The "Frequency of Occurrence" column specifies when a sequence will run. The choices are every day, every "N" number of days, weekly, bi-weekly, or monthly. Select the desired frequency of occurrence from the pull-down list of possible choices.

5. The "Next Cal Date" specifies the next date on which the selected calibration sequence will run. Select the next starting date for the calibration sequence.

6. The "Start Time" specifies the starting time on the next calibration date. Select the starting time.

7. When the user has entered these selections and pressed the "Save" button in the Edit Region, the specified calibration sequence will repeat according to the user entries in the table.

8. Refer to Appendix A for the procedures to use the edit mode section for this and all other tables.

9. Click the Print Schedule button to printout a copy of the Calibration Schedules table.

4.3.3 Calibration Sequences Table

Click the Calibration Sequences button on the Calibration Menu screen to open the Calibration Sequences table shown in Figure 4-9. The Calibration Sequence table is used to create and store calibration sequences. The user or System Administrator can create many different types of calibration sequences. Sequences can have from 1 to 99 steps and there can be as many as 1 to 99 calibration sequences stored in this table.

| Monday | 16-Oct-06 | 09:43:52 PST | CEM | | | | Help | Map | Exit |

Calibration Sequence Table

Sequence Name	Step	Parameter Ave	Parameter Invalid	Level	Cal Flag	Length of Step	Average Interval	Recovery Interval
Daily Autocal	1	SO2		Zero	None	12 Min.	3 Min.	None
		NOX						
		NO						
	2	NO2	NOX	Span	None	20 Min.	5 Min.	None
			NO					
	3	CO	SO2	Span	None	20 Min.	5 Min.	None
			NOX					
			NO					
			NO2					

| Edit | Print |

Figure 4-9
Calibration Sequences Table

1. The Calibration Sequences table includes columns for:

    - Sequence Name - calibration sequence name.
    - Step - specifies order position in calibration sequence.
    - Ave (Average) - whether or not the parameter will have data averaged during the specified step in the calibration sequence.
    - Invalid - Parameters whose data is invalidated during a step.
    - Level - the type of calibration activity that will be performed during a specified step number.
    - Cal Flag - calibration flag that will be listed during a step.
    - Length of Step - time necessary for the calibration.
    - Average Interval - amount of time for data to be averaged.
    - Recovery Interval - amount of time necessary for a parameter to stabilize after a calibration.

4.3.4 Calibration System

The Source Value table is used to manually enter or edit calibration source (theoretical or true) values for each type of gaseous parameters that the calibration system requires. Click

on the Calibration System button in the Calibration Menu screen to open the Calibration System Menu as shown in Figure 4-10.
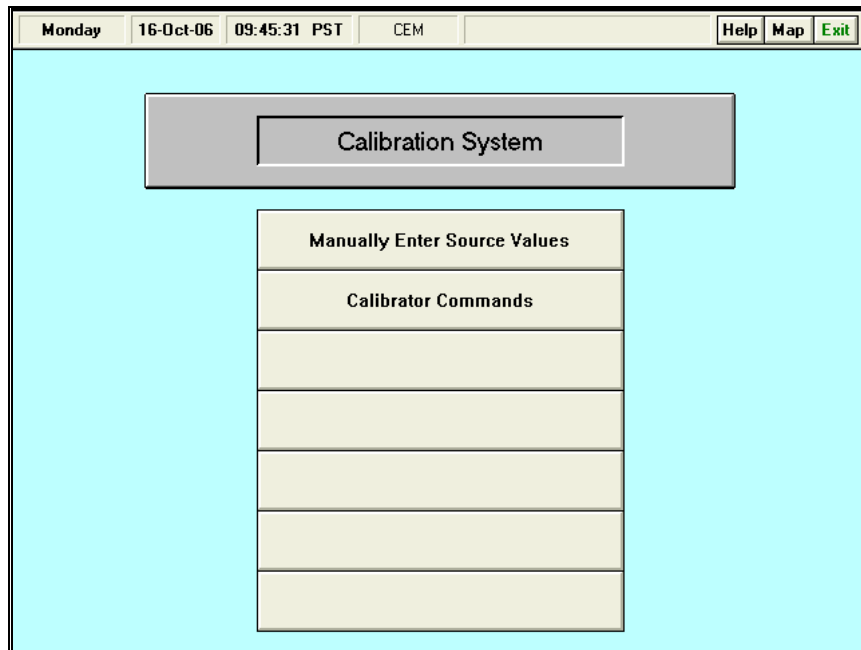
Figure 4-10
Calibration System Menu

4.3.4.1 **Manually Enter Source Values**

Click on the Manually Enter Source Values button from the Calibration System Menu to open the Source Value table as shown in Figure 4-11. The Source Value table is used to manually enter or edit source values for specific parameters. The Source Value Table displays the Parameter name, Type of Calibration, Source Value, Date, Operator Name, and Comments

Parameter	Type of Calibration	Source Value	Date	Operator Name	Comments
SO2	Zero	000 ppb	15 - Aug - 01	DZ	
NOX	Zero	000 ppb	15 - Aug - 01	DZ	
NO	Zero	000 ppb	15 - Aug - 01	DZ	
NO2	Zero	000 ppb	15 - Aug - 01	DZ	
CO	Zero	000 ppm	15 - Aug - 01	DZ	
O3	Zero	000 ppb	15 - Aug - 01	DZ	

Figure 4-11
Source Value Table

Edit Table

For help with the Edit Mode Region, please refer to Appendix Edit Mode Help.

Print Table

To print a hard copy of the Source Value table, click on the Print Table button.

Source Value History

The Source Value History able is not yet operational.

4.3.4.2 **Calibrator Commands**

The Calibrator Command table is used to send commands to a dynamic dilution calibrator through an RS-232C serial data interface. This table permits the user to enter the appropriate commands for different manufacturer's calibrators into this table and when the Station Manager Data logger performs a manual or automatic calibration activity, the calibration program will send the corresponding commands through an RS-232C serial line to the calibrator. This feature will permit direct control of different dynamic dilution calibrators with the Station Manager Data logger calibration system.

| Monday | 16-Oct-06 | 09:51:47 PST | CEM | | Help | Map | Exit |

Calibrator Commands

Type of Calibration	Parameter	Enable String	Stop String
Zero	O3	MF1=9.0E3<cr><lf>MF2=0.0E1<cr><lf>ma<cr><lf>	st<cr><lf>
	NO		
	NO2		
	NOX		
	SO2		
	THC		
	H2S		
	TRS		
Span	NO	MFT9.0E3<cr><lf>POR=1<cr><lf>CGC=6.18E1<cr><lf>bl<cr><lf>	st<cr><lf>
	NOX		
	SO2		
	THC		
Level 4	NO	MFT9.0E3<cr><lf>POR=1<cr><lf>CGC=6.18E1<cr><lf>OGC=4.0E	st<cr><lf>
	NO2		
	NOX		
Span	O3	MFT9.0E3<cr><lf>O3C=5.0E-1<cr><lf>MF2=0.0E1<cr><lf>ma<cr>	st<cr><lf>
Span	H2S	MFT9.0E3<cr><lf>POR=2<cr><lf>CGC=6.18E1<cr><lf>bl<cr><lf>	st<cr><lf>
	TRS		

| Edit Table | Print Table |

Figure 4-12
Calibrator Commands Table

For each specified type of calibration activity, an enable string of characters or text will be sent to the calibrator through the RS-232C serial line to cause a specified type of calibration activity to occur. An enable string is created by the user and stored in the Station Manager Data logger Calibrator Command table to be sent through the RS-232C serial line to the calibrator at the on-set of any specified calibration activity. Each type of the Station Manager Data logger calibration activity is specified by a parameter name and a type of calibration activity.

Calibrators typically require that a stop string of characters or text be sent to it through an RS-232C serial data line at the end of each specified calibration activity. The Station Manager Data logger will send the stop string of characters or text stored in the Calibrator Command table at the end of each specified calibration activity.

The user can edit the Calibrator Command table as needed to enter appropriate commands for the type of calibrator used. The types of calibrators supported include TEI 146C, Environics Series 100 and 9000, API, and Dasibi 5008 dynamic dilution calibrator that have an RS-232C serial data interface installed. Other manufacturer's calibrators that also require an enable string and a stop string to properly operate will also operate with the Station Manager Data logger calibrator control program.

Click the Calibrator Commands button in the Calibration System menu to open the Calibrator Commands table shown in Figure 4-12.

The Calibrator Commands table contains four entry fields: Type of Calibration, Parameters (all parameters involved in the calibration), Enable String (code string that triggers a calibration), and Stop String (code string that halts a calibration).

Edit Table

For help with the Edit Mode Region, please refer to Appendix Edit Mode Help.

Print Table

To print a hard copy of the Calibrator Commands table, click on the Print Table button.

4.3.5 Timer Controller

The following section contains a description of the Station Manager Data logger Timer-Controller program. The Timer-Controller program is used to schedule and control systems and equipment that is typically used in Continuous Emissions Monitoring Systems (CEMS).

The user may select equipment, such as solenoid valves and samplers, to be cycled for routine monitoring activities and the data channels to be marked down for the interval period. The Timer-Controller program can detect a digital input and initiate a control action. The Timer-Controller table is shown in Figure 4-13.

Figure 4-13
Timer – Controller Table

4.3.5.1 Timer Controller Table

Each line in the Timer-Controller table specifies the execution of a separate control action. The action may be repeated indefinitely, or it can be limited to occur only upon the detection of a digital input signal.

When the digital input field is selected in the table, the Station Manager Data logger will check the input and perform the selected action as long as the specified digital input line is enabled.

The following is a description of the fourteen fields in the Timer-Controller table.

a) Description – This is a user-defined name for the Timer-Controller action.

b) Next Occurrence Group – This field specifies the initial time and date for the control action on this line in the table. When the Time field is selected, the user is presented with the current time and date and toggle arrows to enter the appropriate selection. Since this type of control action is repetitive, the time entered will be the starting time and the Timer-Controller program will continue to repeat the control action indefinitely according to the repeat schedule. When the user enters the table, Station Manager will calculate the next occurrence for display in the table. To cancel an action, the user deletes the line from the table.

Sequential events may be programmed by selecting the same Time and Date for all events, and programming the Wait Timer to provide the necessary offset for the actions. The Wait Time is calculated in seconds, counting from the Time entered in the Next Occurrence group or the Repeat timer. The user may elect to not enter a Wait Time, or may reset the Wait Time to no wait by entering a zero. The editor will show a blank for entries that are zero. The Wait Timer controls the Digital Output action, Delay Averaging and Invalid Parameters fields. The Repeat field is based on the Next Occurrence group and not affected by the Wait Timer.

c) Dig In (Digital Input) –enables a digital input to trigger a control action. By selecting a Digital Input channel (channel numbers 1 through 32), the user can control events related to another system or outside activity. When selected, the Station Manager Data logger will test for the digital input every second, and once the digital input has been detected, the control actions will persist as long as the digital input line is enabled. To cancel the control action, the user deletes the line from the table.

Editing the Digital Input mode is similar to the Time Controlled events with the exception of the Next Occurrence time and date, and the Repeat Day and Minutes.

The user can select either a Timed Event or a Digital Input mode of operation. When a Time Controlled event and a Digital Input even share a digital output, priority is given to the Digital Input control action.

d) Wait Sec – defines any waiting period required before the action is initiated.

e) Turn (On/Off) Digital Output Group – specifies the digital output line, the control action and duration of the event. The Digital Output group is composed of three fields: Digital Output Number (Nr), On-Off and the Timer (Min-Sec). The Number field is used to select the specific digital output to be active, numbers 1 through 32. The On-Off field is used to select whether the digital output line is placed in the On or Off state during the control action regardless of the prior state of the Digital Output. This timer determines the length of the control action starting from the Next Occurrence group or the Wait timer. When the Minute field is selected, the user may enter up to 9999 in the Minutes field and up to 99 seconds in the Seconds field. Entering a zero will display as a blank in either field.

f) Delay Ave (Averaging) – defines the parameters for which sampling will be delayed for the time interval entered. The Delay Averaging group is used to select parameters to delay as a result of the control action, such as parameters that are briefly impacted by the switching of the digital output. Multiple parameters may be selected and marked down, or invalid for the period specified in the Sec (Seconds) field. This timer begins at the Next Occurrence time unless a Wait period has been selected.

g) Invalid – used to define one or more parameters for which sampling will be marked down as invalid for the duration of the control action. The Invalid field is used to mark down, or invalidate, parameters for the duration of the control action. Multiple parameters may be selected and will be marked down for the entire period defined in

the Digital Output group, starting at the Next Occurrence time unless a Wait period has been selected.

h) Repeat Group – specifies the interval that the control action will be repeated.

Edit Table

For help with the Edit Mode region, please refer to Appendix Edit Mode Help.

Print Table

To print a copy of the Timer-Controller table, click on the Print Table Button.

4.3.5.2 **Timer Controller and Calibrator Properties**

The Timer-Controller may manage functions shared by the Calibration Program, such as parameters flagged as invalid and control of digital output lines. Priority is given to the Calibration Program when activities take place concurrently. The following table describes the activity in the Station Manager Data logger for simultaneous actions:

Activity	Calibration	Timer-Controller
Parameter Flagged Invalid Concurrently by Both	Primary Control	Controller ignored until calibration flag released
Digital Output Line Enable Concurrently by Both	Primary Control	Controller action ignored and no change of state
Digital Input Line Enable Concurrently to Both	Primary Control	Controller action ignored and no change of state
Parameter Flagged Invalid by Timer-Controller First	Assumes Control	Controller ignored until calibration flag released
Digital Output Line Enabled by Timer-Controller First	Assumes Control	Override Controller action until released by calibrator
Digital Input Line Enabled to Timer-Controller First.	Assumes Control	Override Controller action until released by calibrator
Parameter Flagged Invalid by Calibrator First	Retains Control	Controller Action ignored until calibration complete
Digital Output Enabled by Calibrator First	Retains Control	Controller Action ignored until calibration complete
Digital Input Line Enabled to Calibrator First	Retains Control	Controller Action ignored until calibration complete

4.3.5.3 **Timer Controller Applications**

The Timer-Controller in the Station Manager Data logger offers a general purpose program for use with any function that can be controlled by a digital output and based on a timed event or input from another digital source. The expected uses in the Station Manager Data logger are for CEMS functions and several examples of this type of application are offered for the user. While these examples are available to the user, several other methods may exist to accomplish the same application.

4.3.5.3.1 **Stream Switching Example**

An example of a Timer-Controller application is a system, which switches from one sampling stream to another sampling stream. This type of CEMS operation is referred to as Stream Switching. This may occur when the Station Manager Data logger is operating continuously but selecting the sources, such as discharges from multiple vents or exhaust pipes, on a routine cycle. Figure 4-14 is an example configuration for Stream Switching:

Figure 4-14
Example Table Defined for Stream Switching

The example parameters for Stream Switching shown here are defined with a minimum number of 15 valid 1-minute data samples per hour in the Initialize Parameters table as shown in Figure 4-15:

Figure 4-15
Example Table Defined for Stream Switching

Stream Switching begins with the digital activation of an automated solenoid valve allowing the monitoring equipment to receive the first source, Stream A in this example. A built-in delay of 5 seconds allows for the clearing of the residual volume from the source piping. The data channels for the alternate sources, Stream B and C, are marked down or invalid for the sampling interval. After 5 minutes, the digital output will return to the off condition, closing the automated solenoid valve for Stream A.

The wait timer for Stream B, set to 300 seconds (5 minutes), will enable a second digital output to open a solenoid valve for Stream B sampling. Again the delay of 5 seconds allows for the residual volume in the source piping to be exhausted prior to the collection of data. The associated data channels for Stream A and C are marked invalid. After 5 minutes, the digital output will return to the off condition and the solenoid valve for Stream B will close.

The wait timer for Stream C, set to 600 seconds (10 minutes), will enable the third digital output to open the solenoid valve for Stream C sampling. The delay of 5 seconds clears the source piping and data collection begins. The data channels for Stream A and B are marked invalid and sampling for Stream C will begin. After the completion of the sampling period, the digital output will close the solenoid valve for Stream C.

The Repeat column, set to 15 minutes for all streams, will cycle back to the Stream A sampling and continue the rotation of the Stream Switching sequence.

4.3.5.3.2 Backflush Example

The routine function of flushing the source line is another example of a timed event using the Timer-Controller program. Commonly referred to as Backflush, the application involves the reverse flow of compressed air through the source piping removing the moisture or particulate material that may have been drawn into the line. Figure 4-16 is an example of scheduled Backflush activities:

| Friday | 15-Jan-99 | 11:21:44 PST | CEMS1 | | | | | Help | Map | Exit |

Timer - Controller Table

Description	Next Occurrence Time	Date	Dig In	Wait Sec	Nr	On-Off	Min	Sec	Param	Sec	Invalid	Day	Min
Backflush Stream A	00:03:00	14 Jan 99			4	On		15			FlowA	1	
											O2A		
											1SO2A		
											1NOXA		
Backflush Stream B	01:03:00	14 Jan 99			5	On		15			FlowB	1	
											O2B		
											1SO2B		
											1NOXB		
Backflush Stream C	02:03:00	14 Jan 99			6	On		15			FlowC	1	
											O2C		
											1SO2C		
											1NOXC		

| Edit | Print |

Figure 4-16
Example Table Defined for Backflush

4.3.5.3.3 Digital Input Example

When selected, the Timer-Controller tests for a digital input every second and on receipt of an input initiates the action determined in the table. An example of the use of this feature is the discharge of accumulated moisture in source piping. Figure 4-17 demonstrates a possible use of this feature.

Figure 4-17
Example Table Defined for Digital Input

The example sequence begins with the digital input from a moisture detection sensor in the source piping. The Timer-Controller flags the associated data invalid and, through a digital output, activates an automated solenoid valve allowing the reverse flow of compressed air through the source piping or the draining of an accumulator. When the sensor ceases to detect moisture, the digital input is released and the valve closed. The Timer-Controller will release the validity flags and data collection will resume as normal.

4.3.5.3.4 **PM10 Sampler Example**

The sampling of particulate material in the atmosphere is often accomplished by use of a PM-10 Sampler, using a filter media and weight measurement. The sampler is run for a period of time – usually 24 hours. Figure 4-18 demonstrates a typical entry for PM-10 sampler.

Figure 4-18
Example Table Defined for PM-10 Sampler

4.3.6 Manual Reports

The Manual Reports screen, Figure 4-19, permits the user to display, print, or export any report defined in the Report Setup Table, refer to Section 4.6.2.1.

Figure 4-19
Manual Reports Screen

- Click the Manual Reports button on the Calibration Menu to open the Calibration Data screen.
- Click the Individual Reports button and then select the pre-defined report desired. Refer to Section 4.3.6.
- Click the up and down arrow buttons to select the day, month, and year of the report to be printed.
- To print preview the report, click on the Display button. This will display the report, as it will appear after it has been printed. Clicking on the Print button allows the report to be printed from the View screen.
- Click on Exit to return to the Print Calibration Report screen.
- To print the report without previewing it, click the Print button versus the Display button.
- To export the report, click on the Export button and select desired format, typically PDF.

4.3.7 **Calibration Control Chart**

Select Calibration Control Chart from the Calibration Menu to open the Calibration Control Chart screen shown in Figure 4-20 below. This screen is used as a quality assurance tool for viewing calibration responses.
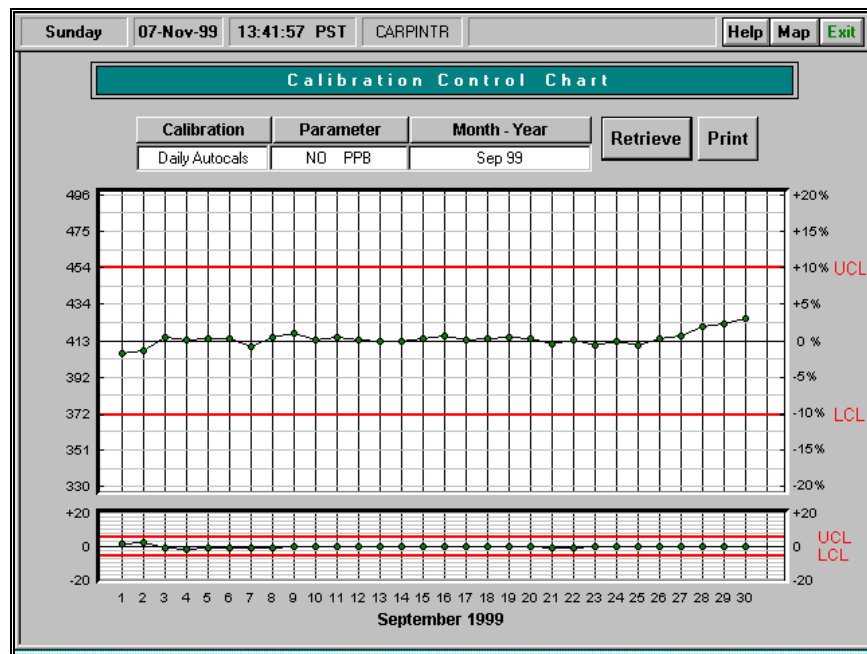
Figure 4-20
Calibration Control Chart

The Calibration Control Chart vertically displays one month's worth of calibration control data. The two red lines indicate the Upper Control Limit (UCL) and the Lower Control Limit (LCL). These lines serve to warn the user if the calibration data falls outside of the recommended span percentage area, (generally   +/- 10%). Refer to Section 4.6.3 to set the Calibration Control Chart Limits for each parameter.

To view the Calibration Control Chart:

- Calibration- select either Daily Automatic Calibration (Daily Autocals) or Precision Totals

- Parameter- select one parameter to view
- Month-year- select the time period you wish to view
- Retrieve- to view the chart
- Print- to print the results

4.3.8 Digital Input-Output Table

The Digital Input-Output Menu (Figure 4-21) is used to select which digital input or output lines will be enabled during a calibration activity
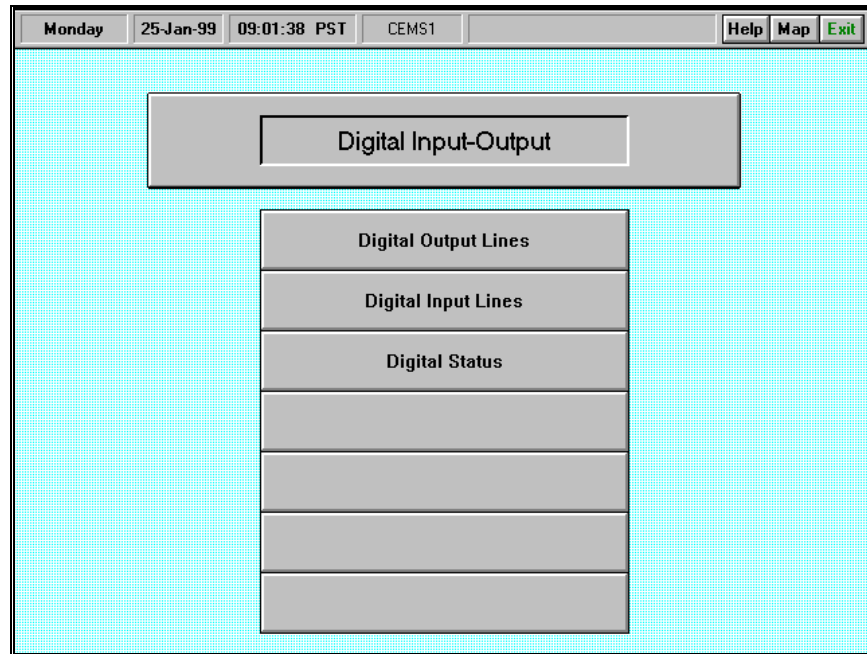
Figure 4-21
Digital Input-Output Menu

4.3.8.1 Digital Output Lines Table

This table will display 16 or 32 digital output lines when the Station Manager Data logger has been configured with 16 or 32 digital output lines. Figure 4-22

This table displays all of the possible digital output line combinations for each type of calibration activity and parameter selected. The table contains a column for displaying all parameter names, a column for displaying the calibration activity for the parameter, and 1-32 columns displaying either the "1" or "0" designation. A "1" represents an actuated, or "on" condition; a "0" represents an un-actuated, or "off" condition.

Each digital output line can be used to control external calibration equipment, zero air systems, or other equipment. When used with EMC's optional Relay Interface Board, either 16 or 32 relay contact closures can be controlled with the Digital Output Lines table in the Station Manager Data logger Calibration Control Program.

Figure 4-22
Digital Output Lines Table

Edit Table

For help with edit operations please refer to Appendix Edit Mode Help.

Print Table

Click on the Print Table button to print out the Digital Output Lines table.

4.3.8.2 Digital Input Lines Table

Digital input lines can be used to sense the occurrence of externally controlled calibration events. The Digital Input Lines table is used to specify which digital input lines will sense specific calibration events. The table will display 16 or 32 digital input lines when the Station Manager Data logger has been configured with 16 or 32 digital input lines. Figure 4-23

Figure 4-23
Digital Input Lines Screen

This table displays all of the possible digital input line combinations for each type of calibration activity and parameter selected. The table contains a column for displaying all parameter names, a column for displaying the calibration activity for the parameter, and 1-32 columns displaying either the "1," "0" or "X" designations.

During initialization and setup, the user will enter values into the Digital Input Lines table to configure and setup the Station Manager Data logger to sense external calibration events. In the Digital Input Lines table the user will associate a 1, 0, or X value for each combination of "Parameter" and "Calibration Activity" needed using the pull-down lists in this table.

After the Digital Input Lines table has been initialized, if a digital input line senses a logical "1" input (or actuated state), the Station Manager data logger will interpret this condition as the occurrence of the calibration event specified in the Digital Input Lines table. When this occurs, the Station Manager data logger will flag data for that specified parameter and perform averaging of data for during the last 5 minutes of the period when the digital input line is set to the logical "1" condition. The Station Manager Data logger will store the averaged calibration data response into its calibration files for that parameter.

When a digital input line senses a logical "0" input (or un-actuated state), the Station Manager data logger will interpret this condition as meaning no calibration activity is taking place during the time period when the digital input line sense a logical "0." The Station Manager Data logger will not perform flagging of data, or store calibration data responses. If the user enters an "X" into the Digital Input Lines Table, the Station Manager Data logger will not pay attention to either the logical "1" or "0" states for the parameter and calibration activity specified in the table. No flagging of data and storage of data will occur when an "X" is entered into the Digital Input Lines table. This table displays all of the possible digital input line combinations for each type of calibration activity and parameter selected.

4.3.8.3 Digital Status Screen

The Digital Status screen displays the current condition of any active Digital Input and Output lines, and is updated instantaneously with the changes to any digital state. Figure 4-24

Figure 4-24
Digital Status Screen

4.3.9 Mark Down Channels Screen

The Mark Down Channels screen is used to manually mark one or more data channels off-line for a selected period of time. Click the Mark Down Channels button in the Calibration Menu to open the Mark Down Channels screen as shown in Figure 4-25.

The Mark Down Channels screen shows two sets of five columns. The columns are Parameter, Input Channel, On Line, Temporary Off Line, and Long Term Off Line. The Parameter column shows all parameters connected to the Station Manager Data logger. These columns show all parameters connected to the Station Manager Data logger, the parameter channel numbers, and whether the channels are on line or off line.

The Mark Down Channels screen also has two other buttons: Mark All Channels On Line, and Set Temporary Time.

Figure 4-25
Mark Down Channels Screen

To set any one of the parameters to On Line, Temporary Off Line, or Long Term Off Line columns simply click in the column to the right of the parameter to be changed. After selecting a column a checkmark will appear signifying that that parameter is now on or off.

Mark All Channels On Line

To turn on all channels click on the Mark All Channels On Line button.

Set Temporary Time

To choose the length of the temporary off line time, click on the Set Temporary Off-Line button. This will open a list of different intervals of time to select from. Select the desired interval. Then check the Temporary Off Line column title box. The new interval of time will be listed there.

Clicking on Exit located at the top right corner of the screen at any time will close the Mark Down Channels screen and return the Station Manager data logger to the Calibration Activities Menu.

4.4 **Strip Charts**

Selecting the Strip Charts button from the Station Manager data logger Main Menu will open the Select Chart screen. The Select Chart screen shown in Figure 4-26 is used for selecting the name of a pre-defined strip chart and the appropriate time or date of the strip chart the user wishes to display.

The Strip Chart Program is a highly realistic strip chart display or trending program. The strip chart program is used to visually validate and observe data recorded by the Station Manager data logger.
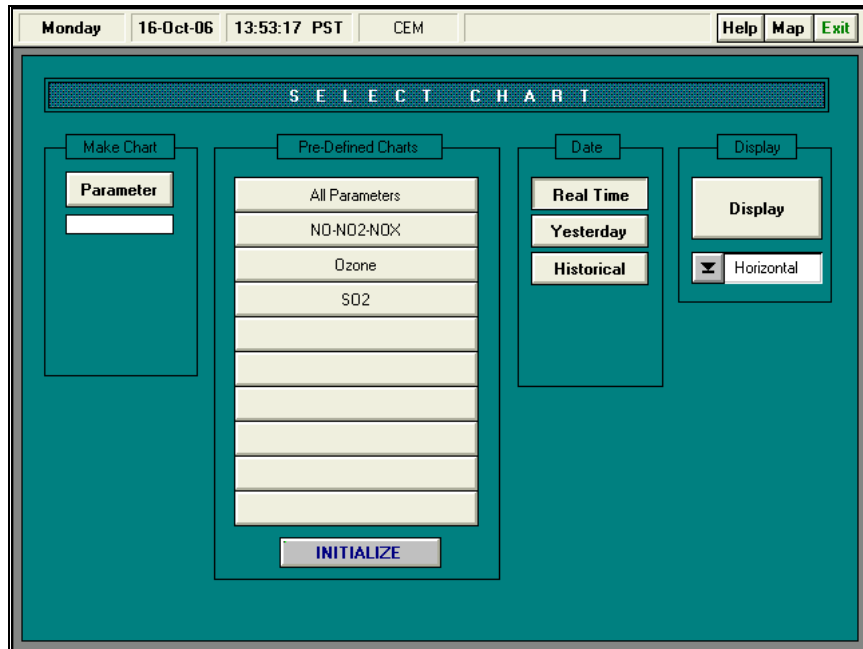
Figure 4-26
Select Chart Screen

4.4.1 **Chart Selection**

The Select Chart screen is composed of several pull-down lists and selection buttons. These include: a Pre-Defined Charts menu, Date Select, Make Chart menu, and a Display button.

4.4.1.1 **User Defined Strip Chart**

The user is able to define their own parameters desired on the strip chart.

4.4.1.1.1 **Make Chart Selection Box**

The Make Chart menu is located at the top left side of the Select Chart screen. This menu is used to select the parameter/s to be displayed on the strip chart. Clicking on the Parameter button will open the parameter list. From there the choices are either opening a chart with only one parameter or opening a chart with multiple parameters.

Choosing Single Parameters

Click on a parameter from the list will select that parameter to be displayed on the strip chart.

Choosing Multiple Parameters

To select multiple parameters:
• Click on the Multi button located at the bottom of the parameter list.
• Click on all of the parameters to be displayed on the strip chart.

4.4.1.1.2 **Date Select Menu**

The Date Select menu, centered at the top of the Chart Select screen is used for selecting the date of the chart the user wants to view. The menu contains choices of real-time data, yesterday's data or historical data.

Real-Time Data

Clicking on the Real-Time data button sets the strip chart program to display data on the strip chart as it is being recorded along with the rest of today's data.

Yesterday Data

Clicking on the Yesterday button automatically sets the strip chart to display the previous day's data for the selected parameters.

Historical Data

To select a date for viewing click on the Historical button. Clicking on the up and down arrows directly below the displayed date changes the day, month, and year.

4.4.1.1.3 Display Chart Button

The Display button opens the strip chart on the screen. To change the view between the horizontal and vertical views click on the arrow below the Display button. To open the chart, click on display.

The Pre-Defined Charts menu is used to format frequently used strip charts. Up to 10 pre-defined charts may be created and stored in the Strip Chart Program. To use a Pre-Defined Chart:

Click on the button pre-defined chart to be viewed.
- Select the chart date.
- Click on the display button

4.4.1.2 Pre-Defined Strip Chart

If the same set of parameters are desired each time the strip chart is brought up, the user is able to set up a list of pre-defined charts with single or multiple parameters.

4.4.1.2.1 Initialize Pre-Defined Charts

To create a Pre-Defined Chart, press the Initialize button at the bottom of the Pre-Defined Charts menu. This opens the Initialize Chart screen shown in Figure 4-27. Clicking on the Exit button in the top right hand corner of the screen at any time will close the Initialize Pre-Defined Charts screen.

Creating A Pre-Defined Chart

Click on a blank Chart Name buttons on the left-hand side of the screen. (See Figure 4-27)
Type the new chart name in the message box. Press "Enter" or click on OK. The chart name button should now have the new chart name printed on it.
Click on the parameter box directly to the right of the chart name button.
Click on a parameter from the parameter menu.
Click on a color from the color palette. This color will represent the parameter when the strip chart is displayed.

The parameter box should now show the color and parameter name.
To add another parameter to this chart, click on the next parameter box and repeat these steps.

Deleting a Parameter or Chart

To delete a parameter or chart, click on the delete button located on the bottom left side of the screen. Next, click on the chart or parameter to be deleted.
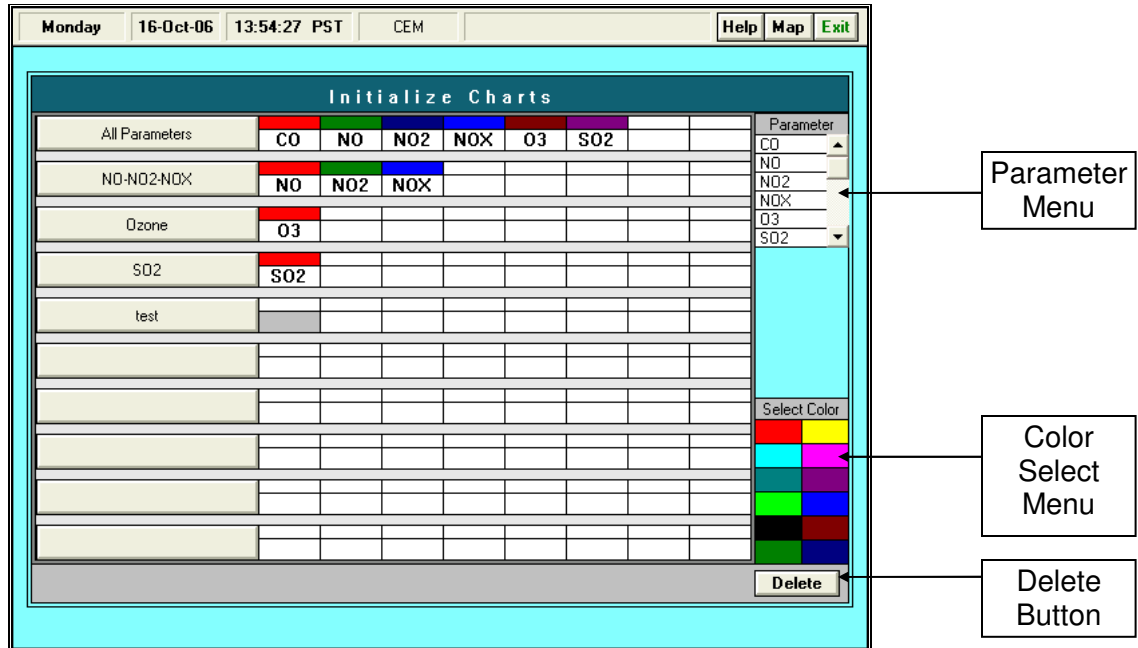
Figure 4-27
Initialize Pre-Defined Charts Screen

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4.4.2 Strip Chart Screen

The Strip Chart program can display strip charts in either a vertically and horizontally orientation as shown in Figure 4-28 and Figure 4-29. The strip chart shows calibrations, sequence steps, and chart annotation, and many other features explained in the following section.
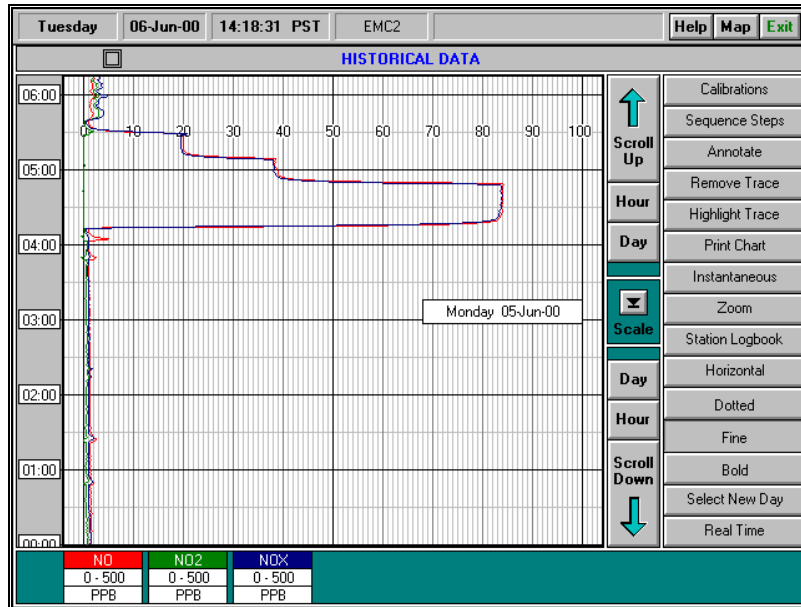
**Figure 4-28
Vertical Strip Chart Screen**
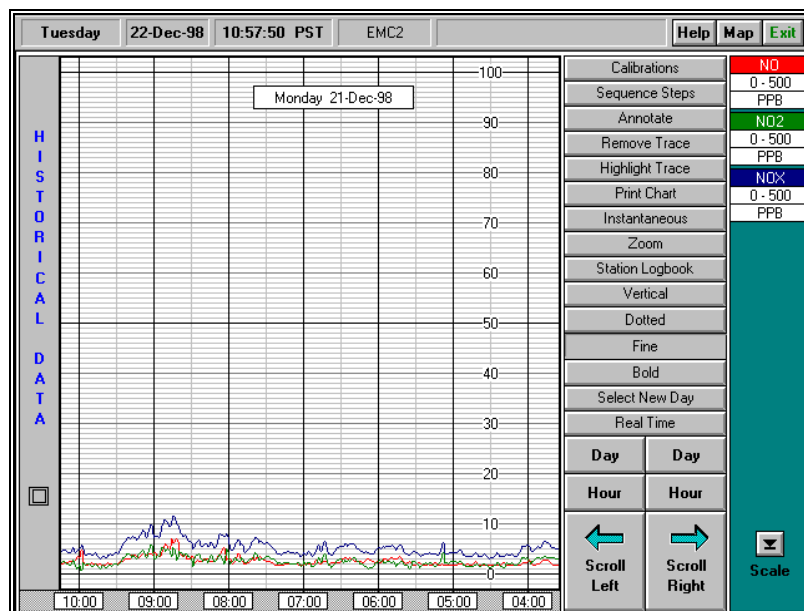
**Figure 4-29
Horizontal Strip Chart Screen**

4.4.2.1 **Strip Chart Scroll Bars**

<u>Scroll Up/Down</u>

The Scroll Up/Down buttons move the strip chart either forward or backward at fifteen-minute intervals.

<u>Hour</u>

The Hour buttons move the strip chart either forward or backward one hour.

<u>Day</u>

The Day buttons move the strip chart either forward or backward one day.

4.4.2.2 **Strip Chart Options**

<u>Calibrations</u>

Clicking on the Calibrations button in a strip chart opens a dialog box that contains two buttons: Calibration Sequence and Manual Calibration. The Select Calibration dialog box shown in Figure 4-30 permits users to initiate and control calibration activities while they are viewing and operating the Strip Chart Program.
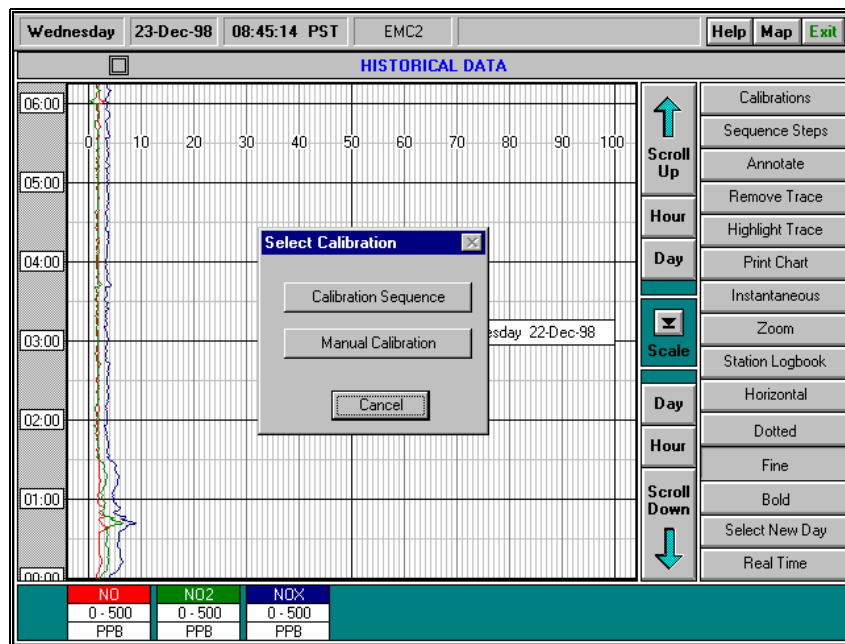
Figure 4-30
Select Calibration

<u>Select Calibration</u>

When the Calibration Sequence button or the Manual Calibration button is pressed, the same Calibration Sequence or Manual Calibration dialog box that is available from the Initiate Calibration screen in Section 4.3.1 will appear. Clicking on the appropriate buttons on either

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of these two calibration dialog boxes will initiate and control a pre-defined calibration sequence or a manual calibration activity.

Calibration Sequence

The Calibration Sequence dialog box shown in Figure 4-31is the identical dialog box used in the Calibration program for initiating and controlling a pre-defined calibration sequence. Users can initiate and control calibration activities directly within the Strip Chart Program. Details about the operation and set up of calibration sequences is provided in Section 4.3.1.
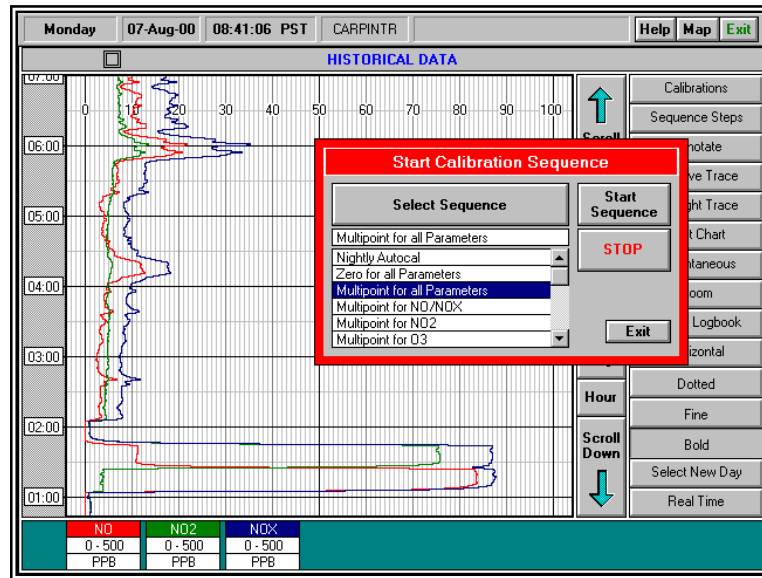
Figure 4-31
Start Calibration Sequence – while viewing a Strip Chart

The Manual Calibration dialog box shown in Figure 4-32 is the identical dialog box used in the Calibration program for initiating and controlling a manual calibration activity.

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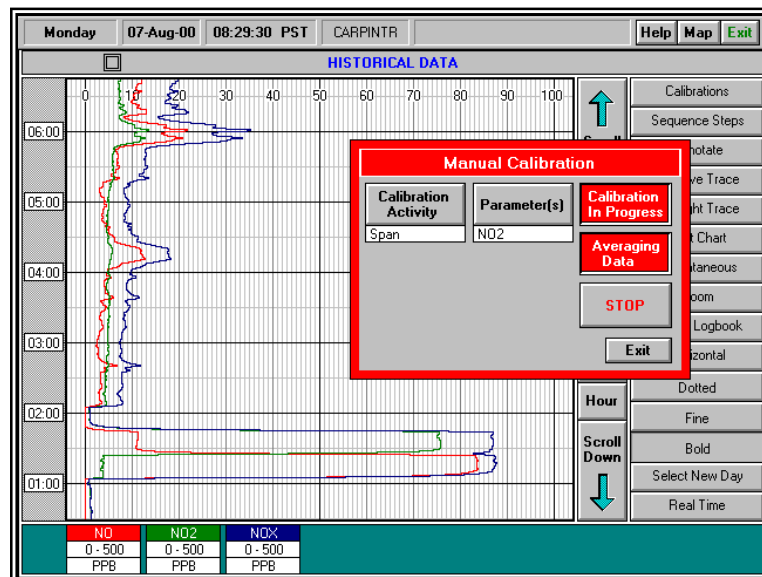
Figure 4-32
Start Manual Calibration – while viewing a Strip Chart

Chart Annotations

The Chart Annotation feature in the Strip Chart Program is used for making user-annotations on either Vertical or Horizontal Strip Charts. Chart annotations are time-stamped and once created, become a permanent part of a pre-defined strip chart. After strip charts are polled and stored on the EMC System Manager central data management system, users in the main office are able to view and printout strip chart containing annotations that were made on a strip chart at remote monitoring stations. Figure 4-33 illustrates a chart annotation on a Horizontal Strip Chart.
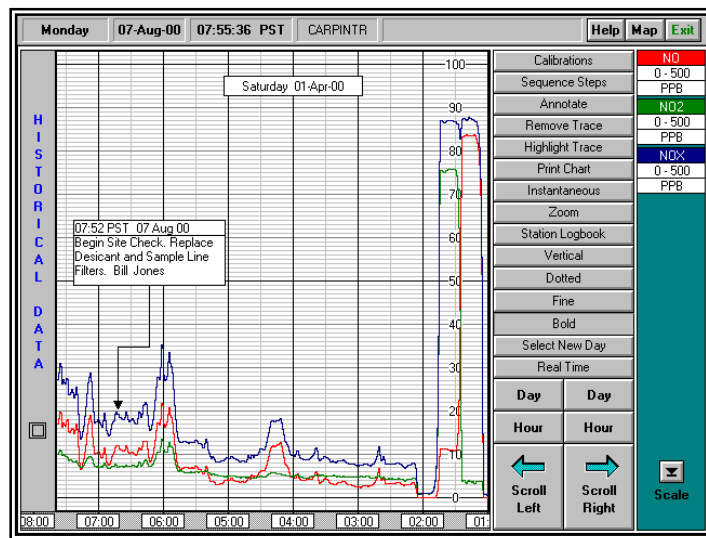
Figure 4-33
User Chart Annotation – Horizontal Strip Chart

Figure 4-34 illustrates a chart annotation on a Vertical Strip Chart.
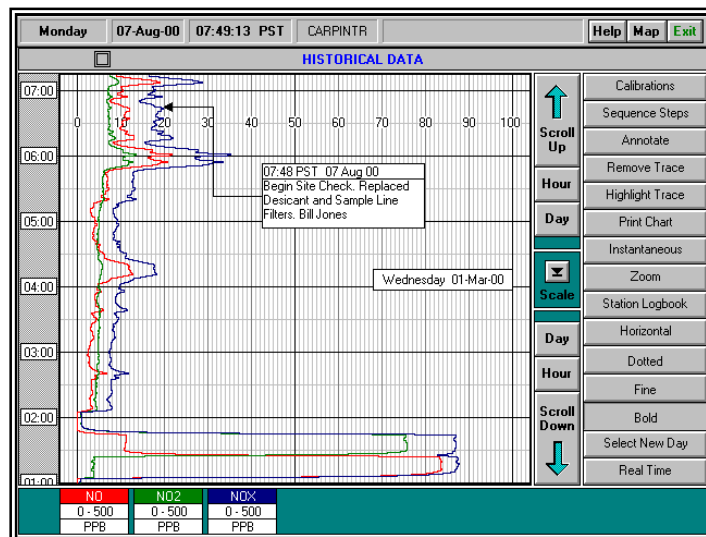
Figure 4-34
User Chart Annotation – Vertical Strip Chart

Chart Annotation

The following are the procedures for making a chart annotation on a Vertical or Horizontal Strip Chart.

- Click on the Annotate button to open the Annotate Dialogue Box.
- When the dialog box is open, a box outline will also appear on the strip chart display.
- Position the box outline by moving or re-positioning the mouse on the strip chart. When the outline is in the desired position, press the left mouse button. The outline will now be changed to the annotation display box that has the date and time of the annotation displayed in it.
- Click on the Edit button and type in the text to be entered into the annotation display box.
- If necessary, it would be possible to resize the annotation display box. Click on the Resize/Move button and then position the mouse pointer over the outline of the annotation display box. When the mouse pointer changes to an arrow with two points hold down the left mouse button and drag the outline to the desired width/length. Release the mouse button.
- It is possible to move the annotation display box to a different position on the strip chart. This is done by clicking on the Resize/Move button and positioning the mouse pointer over the outline of the annotation display box. When the mouse pointer changes to a four-pointed arrow hold down the left mouse button and drag the box to the desired new position. Release the mouse button.
- NOTE: Once OK is selected, and the annotation dialogue box closes, the annotation becomes a permanent part of that strip chart. It may not be edited, resized, moved, or removed after the OK button is pressed. If the user presses the Cancel button prior to pressing OK, the chart annotation will be deleted and removed from the screen.
- Before OK can be selected an arrow must be drawn to the part of the strip chart that the annotation display box refers to. To do this, click on the Arrow button and then click on the relevant part of the strip chart. If a mistake is made (before OK is selected), simply click on the Arrow button again, and then click on the correct part of the strip chart. The entire arrow will move.

Remove Trace

The Remove Trace button will remove a desired parameter trace from the strip chart. To remove a trace:

- Click on the Remove Trace button.
- Click on that parameter box that signifies the parameter trace to be removed. The parameter box should now show no color and the trace removed.
- To return the trace to the screen click on the Remove Trace button again. This will return the Strip Charts screen to normal viewing.

Highlight Trace

The Highlight Trace button allows a parameter trace to be highlighted. To highlight a trace:

- Click on the Highlight Trace button.

- Click on that parameter box for the parameter trace to be highlighted. The parameter boxes and traces of all other parameters should be shown in light gray, highlighting the one selected parameter.
- To undo the highlight feature click on the Highlight button again. This will return the Strip Chart screen to normal viewing.

Print Chart

The Print Chart button is used to print the strip chart selected. To print a chart:

- Click on the Print Chart button.
- A print box will open which lists three options: Entire Day, 00-11 Hr, and 12-23 Hr.
- Click on the Print button to print, Cancel to quit.

Instantaneous

The Instantaneous button is used to open the Instantaneous Data Display screen from the Strip Chart screen. The Instantaneous Data Display is described in Section 4.3.1.3.

Zoom

The Zoom button is used to enlarge a specific portion of the strip chart for easier viewing. There are two different ways to pick a section of chart to enlarge. To zoom in on a section of chart:

- Click on the Zoom button.
- Direct the mouse pointer onto the strip chart.
- Press and hold down the left mouse button. The pointer will change into a box. Direct the box to the section of chart to be enlarged.
- Release the mouse button. The Strip Chart screen will now enlarge the selected portion of chart.

To define your own zoom selection boundaries:

- Click on the Zoom button.
- Direct the mouse pointer to the beginning of the area to be enlarged.
- Press and hold down the right mouse button and move the pointer.
- Release the mouse button. The Strip Chart screen will now enlarge the selected portion of chart.

To quit the zoom feature click the Zoom button again to return the Strip Chart screen to normal viewing.

Station Logbook

The Station Logbook button allows the logbook to be opened from the Strip Chart screen. The Station Logbook screen is described in Section 4.5.

Horizontal/Vertical

The Horizontal/Vertical button is used to change the orientation of a strip chart. If the strip chart is currently horizontally oriented then the button will read vertical. If the strip chart is vertically oriented then the button will read horizontal. To change the orientation of the chart, simply click on the button.

Dotted/Fine/Bold

The Dotted button is used to change all parameter traces from fine to dotted line. The Fine button is used to change all parameter traces to fine lines. The Bold button is used to make all parameter traces bold.

Select New Day

The Select New Day button is used to select a new day for a Strip Chart. To select a new day:
- Click on the Select New Day button. The Select Day box will appear.
- Click on the toggle buttons to select a date.
- Click OK to view the new chart, select Cancel to quit.

Real Time

The Real Time button is used to view data being recorded at this instant. To view real time data click on the Real Time button.

4.5 **Station Logbook**

Selecting the Station Logbook button from the Station Manager data logger Main Menu will open the Station Logbook screen. Click on the Exit button located at the top right of the screen to close the Station Logbook screen and return to the Main Menu. The Station Logbook is shown in Figure 4-35.

Figure 4-35
Station Logbook Screen

The Station Logbook screen consists of the time and date column and the explanation column.

4.5.1 **Station Logbook Edit Buttons**

The Station Logbook Edit Buttons consist of New Entry, Edit Current Entry, Power Failure Log, and Print.

New Entry

The New Entry button is used to enter a new entry into the logbook. A new window will appear for the user to input information in to the logbook and a Time Stamp will be logged with each entry automatically.

Edit Current Entry

The Edit Current Entry button is used to make changes in previously made entries. Changes can only be made to the current day's logbook. Previous days may only be viewed.

Power Failure Log

The Power Failure Log screen is used to record and keep track of all power failures that occur at the site. The Power Failure Log screen reports for each power failure the yearly total, the start date and time, the ending date and time, a record of who acknowledged each power failure, the duration, and the number of invalid hours. To print out the Power Failure Log screen click on the Print button. For instructions on the use of the Power Failure Log screen refer to Section 4.11. To leave the Power Failure Log screen at any time click on the Exit button located at the top right side of the screen.

Print

The Print button will bring up a separate screen with multiple options to print the logbook entries. Figure 4-36

- Print Current Entry allows the user to print the most recent logbook entry.
- Print Current Day allows the user to print the logbook entry for the entire day.
- Print Current Month allows the user to print the entire logbook entry for the month.
- Print From allows the user to select a specific logbook date range to print.
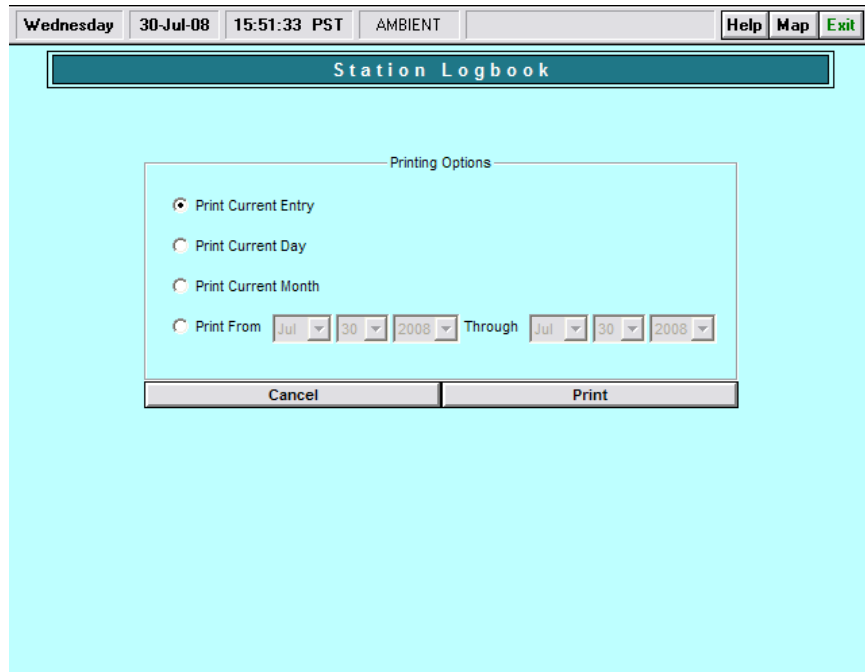
Figure 4-36
Print Station Logbook

4.6 Initialization

Clicking on the Initialization button from the Station Manager data logger Main Menu will open the Initialization menu shown in Figure 4-37. The Initialization Menu provide authorized user-access to all of the screens and program necessary to set up and initialize a Station Manager data logger. The procedures for the initial setup of the Station Manager data logger are provided in Section 3.5.
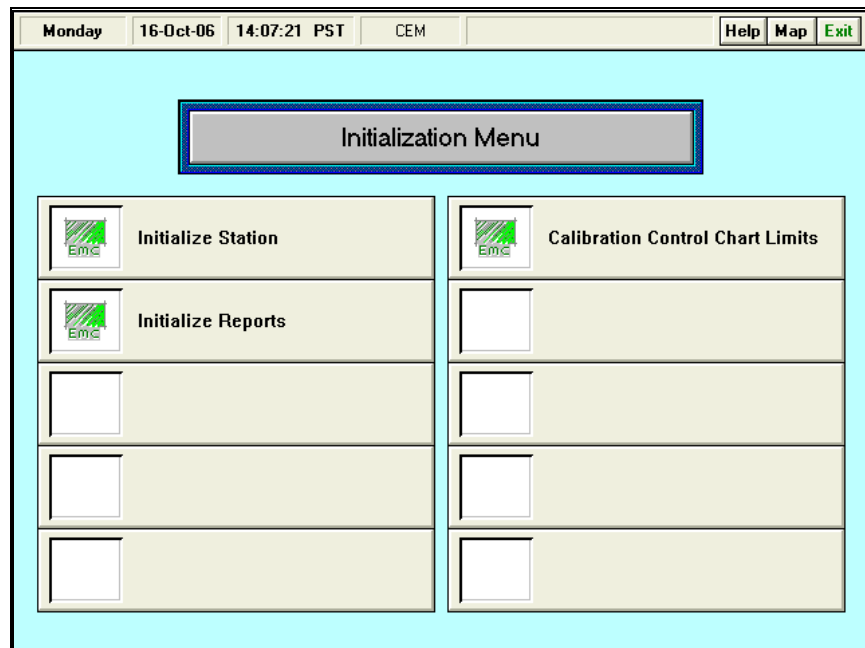
**Figure 4-37
Initialization Menu**

The Initialization Menu contains six options:

- Initialize Station   **4.6.1**
- Initialize Reports   **4.6.2**
- Calibration Control Limits   **4.6.3**
- Analog Output Table   **4.6.4**

4.6.1 **Initialize Station**

The most frequently used initialization options are available in the Initialize Station menu. Click on the Initialize Station button to view the menu, shown in Figure 4-38:
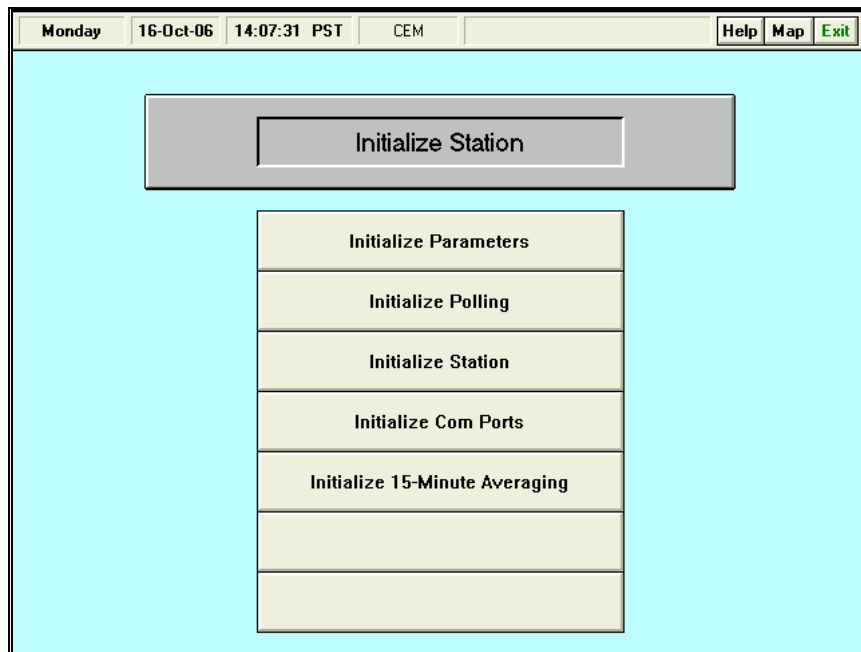
**Figure 4-38
Initialize Station Screen**

4.6.1.1 **Initialize Parameters**

The Initialize Parameters screen shown in Figure 4-39 is used to define each data channel recorded by a Station Manager data logger.

Figure 4-39
Initialize Parameters Screen

The following is a brief description of the columns in the Initialize Parameters Table:

- Parameter – the parameter name defined by user or selected from a list.
- Averaging Method – the calculation method used for each data channel.
- Input Chan (Channel) – the analog input channel number, or calculated channel.
- Data Format – the position of the decimal point in the each recorded data average.
- Units – the engineering units.
- Full Scale – the full-scale value of each data channel in engineering units.
- Zero – the zero value of each data channel in engineering units.
- Max (Maximum) value – the setting for a high limit flagging of a data channel.
- Min (Minimum) value – the setting for a low limit flagging of a data channel.
- F.S. (Full-Scale) Volts – the maximum voltage input for each channel.
- Min (Minimum) Samples – number of valid samples needed for a valid data average.
- Rate Of Change – a setting for flagging data when one sample to the next exceeds a value.

Edit Table

Refer to Appendix A for the procedures to use the edit mode section for this and all other tables.

Print Table

To print a copy of the Initialize Parameters screen, click on the Print Table button.

4.6.1.2 Initialize Polling Table

The Initialize Polling screen is used to enter information related to regional modem communications, polling and for naming the initialization tables. The Initialize Polling screen is shown in Figure 4-40.

Please Note: The Station name entered in the Primary Name box will identify this configuration and set up for the initialization in the Install and Copy Utilities screens.

Figure 4-40
Initialize Polling Screen

A description of the polling fields is as follows:

- Primary Station Name – identifies and uniquely names the initialization files for this system and provides the name that is displayed on the screen menu bar.
- Alternate Station Name – allows for an additional name for polling, such as a unique identifier assigned by an administrating agency.
- Primary Password – for serial communication, accepting up to six alphanumeric characters or blank spaces.
- Secondary Password – available for system polling by alternate sources such as an administrating agency.
- Polling ID's – provides for a numerical code for controlled access by external polling systems and administrating agencies.
- Select Operating Modes - opens the Initialize Com Ports screen, described in Section 3.5.2.6, which is used to designate the operating modes for the Com Ports.

To edit any of these fields, click on the box next to the title, this will place a cursor inside of the box, and type in the information. When completed, click on Exit. Polling changes take effect upon re-starting the system.

4.6.1.3 **Initialize Station Table**

The Initialize Station screen is used to enter general information about the site into a Station Manager data logger. For more information on the Initialize Station screen, refer to Section 3.5.2.5.

4.6.1.4 Initialize Com Ports

Clicking on the Initialize Com Ports button in the Initialization menu opens the Initialize Com Ports screen. For more information on the Instantaneous screen, refer to Section 3.5.2.4.

4.6.2 Initialize Reports

Selecting Initialize Reports from the Initialization Menu will display the screen shown in Figure 4-41 below. This section describes how to format 1-hour reports.
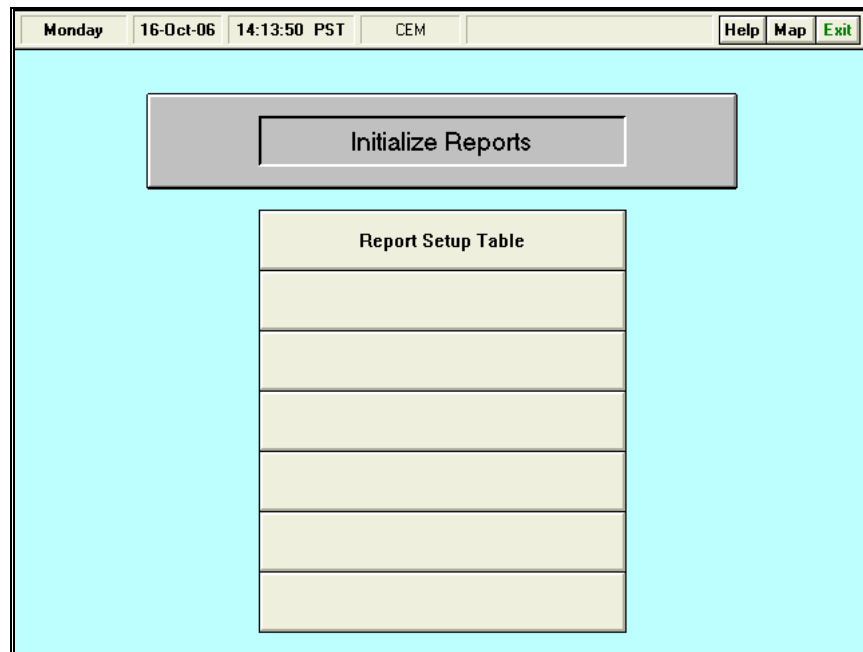
Figure 4-41
Initialize Reports Menu

4.6.2.1 Report Setup Table

The Report Setup Table, shown in Figure 4-42, allows the user to create desired reports from the pre-determined list of Report Templates provided.

Figure 4-42
Schedule Daily Printouts Screen

There are multiple reports types to select from in the Report Setup Table, to begin creating reports, follow the directions listed:

- Click on Edit button to begin creating reports.
- Click on the New Line button to create a new report.
- Select a report format from the drop down list under Report Template.
- Create a report name to be associated with the desired report.
- Select the parameters desired on the specified report.
- Once all the parameters are selected, click Save Line.
- Repeat the process to create other reports

Edit Table

Refer to Appendix A for the procedures to use the edit mode section for this and all other tables.

Print Table

To print a copy of the Report Setup table, click on the Print Table button.

4.6.3 Calibration Control Chart Limits

Selecting Calibration Control Chart Limits from the Initialization Menu will display the screen shown in Figure 4-43 below. This screen allows the user to set the span percentages used in the Calibration Control Chart described in Section 4.3.7.
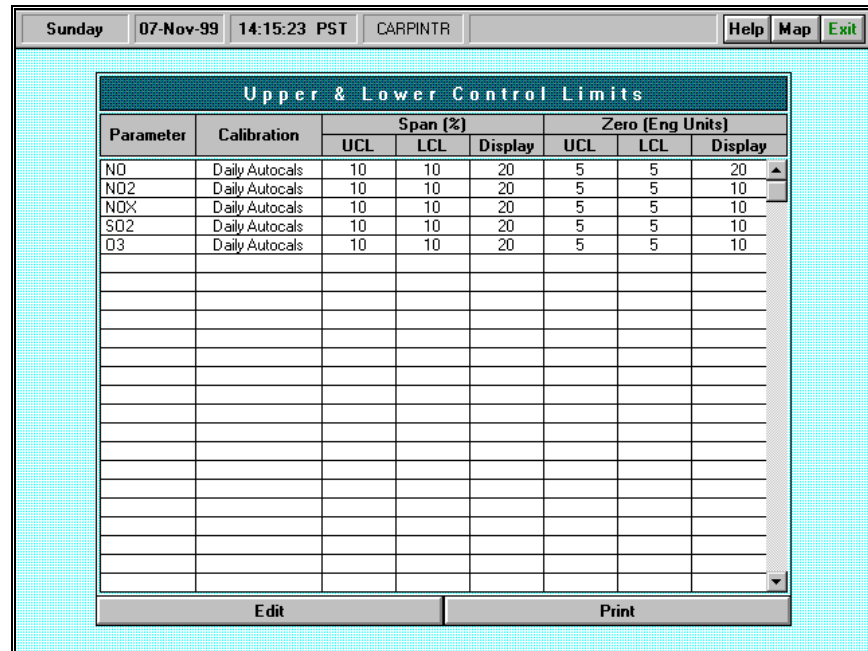
Figure 4-43
Calibration Control Chart Limits

To set a parameter's span percentage:

- Select Edit
- Parameter- select one parameter
- Calibration- select the type of calibration, either Daily Autocals or Precision
- Span (%)- indicate the Upper Control limit (UCL), Lower Control Limit (LCL) and the percentage area to be displayed. Note: Limits are generally set to 10%, 10% and 20%.
- Zero (Eng Units)- indicate the UCL, LCL and percentage area to be displayed. Note: Zero limits are generally set to 5%, 5% and 10-20%.

4.6.4 **Analog Output Table**

Selecting Analog Output Table from the Initialization Menu will display the following table. This table allows the user to set each parameter to a specific analog output channel. Figure 4-44

Figure 4-44
Analog Output Table

To set a parameter's output channel:
• Select Edit
• Select the Parameter
• Select the Analog Output Channel
• Select the desired Voltage
• Click Save Line

Edit Table

Refer to Appendix A for the procedures to use the edit mode section for this and all other tables.

Print Table

To print a copy of the Analog Output table, click on the Print Table button.

4.7 **Quality Assurance**

The Quality Assurance Menu provides access to quality assurance programs that can are available on the Station Manager data logger. These programs include the Calibration Control chart and the Excel Export programs

Click on the Quality Assurance button on the Station Manager data logger Main Menu to open the Quality Assurance Menu shown in Figure 4-45.
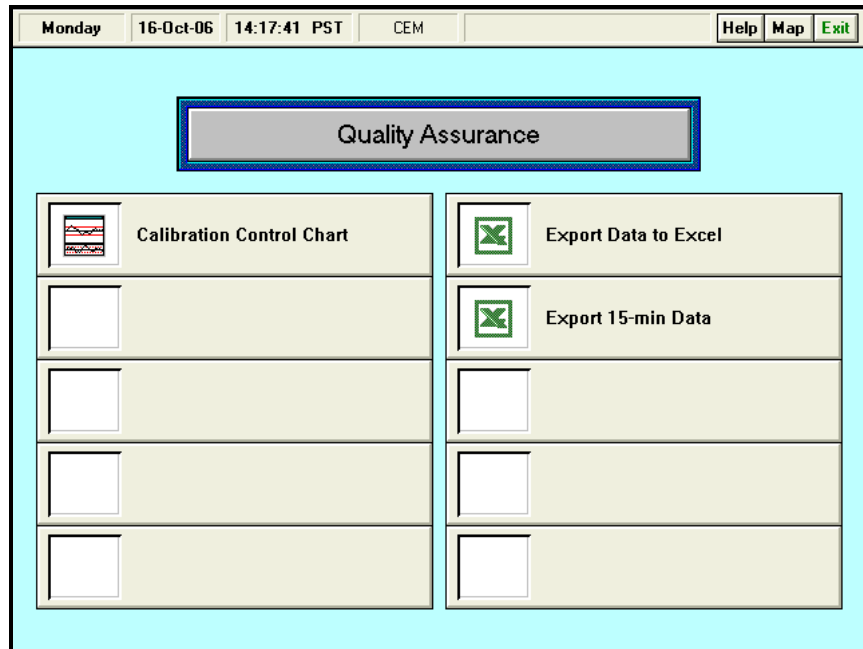
Figure 4-45
Quality Assurance Menu Screen

The Station Manager data logger Quality Assurance Menu contains four selections:

- Calibration Control Chart **4.7.1**
- Export Data to Excel **4.7.2**
- Export 15-min Data **4.7.3**

4.7.1 **Calibration Control Chart**

The calibration control chart shown in Figure 4-46 is used for visually evaluating and performing a quality assurance check of the calibration zero and span responses of gaseous analyzers with a Station Manager data logger. Section 4.3.7 provides details about operating this program.
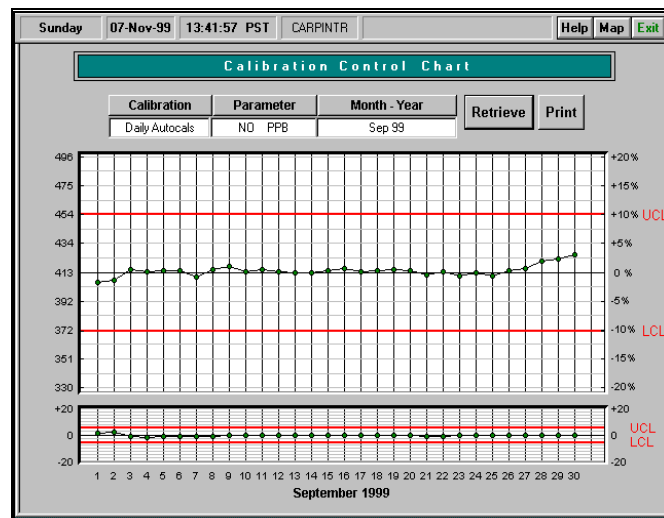
Figure 4-46
Calibration Control Chart

4.7.2 **Excel Exports**

EMC has developed two custom Excel Macro Programs, which are embedded in an Excel
.XLA spreadsheet that permits users to easily select monitoring data and import and save this
data into an Excel spreadsheet. Once data has been saved into Excel, users can copy the
spreadsheet data as a .XLS spreadsheet for use on another PC.

The Station Manager data logger can be configured with Microsoft Excel installed. When it is
properly installed, Excel can be launched from within the Quality Assurance Menu on a
Station Manager data logger by clicking on the Export Data to Excel button on this menu.

A valid licensed version of Microsoft Excel must be installed on the Station Manager data
logger to operate this program. EMC can initially supply Microsoft Excel pre-installed on a
Station Manager data logger, or assist users in upgrading their existing Station Manager PC
to operate Excel.

Export Data To Excel

The Export Data to Excel feature is capable of exporting, 1-minute, 5 or 6-minute (depending
on the customer's configuration), and 1-hour averages. Figure 4-47 illustrates the selection
fields to export data to excel.

To export data to excel, follow these steps:

- Select the averaging type, 1-minute, 5 or 6-minute, or 1-hour.
- Select the format in which the export will be configured. The single column option will
  display all the data in one column. The Data Matrix option will display the data in a
  matrix, for the entire month.
- Select the desired parameter to export.
- Select the desired Month and Year.
- Select the desired Starting Day to export, Starting Hour, and Starting Minute.
- Select the desired Ending Day to export, Ending Hour and Ending Minute.
- NOTE the option to Display Flag and Data at the bottom of the selection box. This is
  a feature for the user to decide if only the invalid data's flag shall appear or if the user
  would like the actual value to be displayed with the invalid flag's data. With this option
  NOT selected, only a flag will be displayed on invalid data. With this option selected,
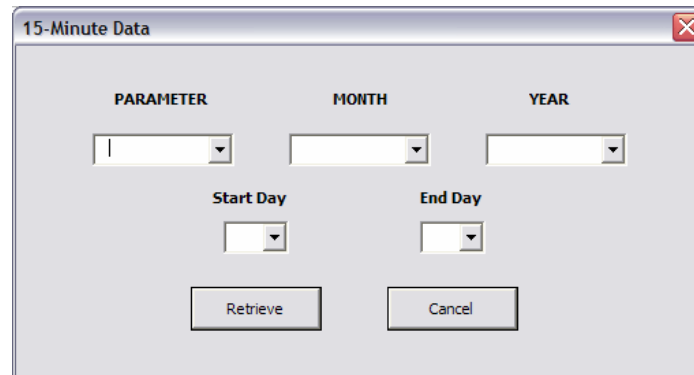 BOTH the value and the flag will be displayed on invalid data.

Figure 4-47
Export Data To Excel

4.7.3 Export 15-Minute Data

The Export 15-Minute Data requires special configurations to be set up in order for this feature to function. This program is capable of exporting 15-minute data to excel. Please contact EMC to set up this feature or to find out if your system was pre-configured with this option. Figure 4-48 illustrates the selection fields to export data to excel.

To export data to excel, follow these steps:

- Select the desired parameter to export.
- Select the desired Month and Year.
- Select the desired Starting Day and Ending Day to export.

Figure 4-48
Export 15-Minute Data

4.8 Data

The Data Menu provides access to the various types of data display and printout programs available in the Station Manager data logger. Clicking on the Data button from the Station Manager data logger Main Menu will open the Data Menu shown in Figure 4-49.
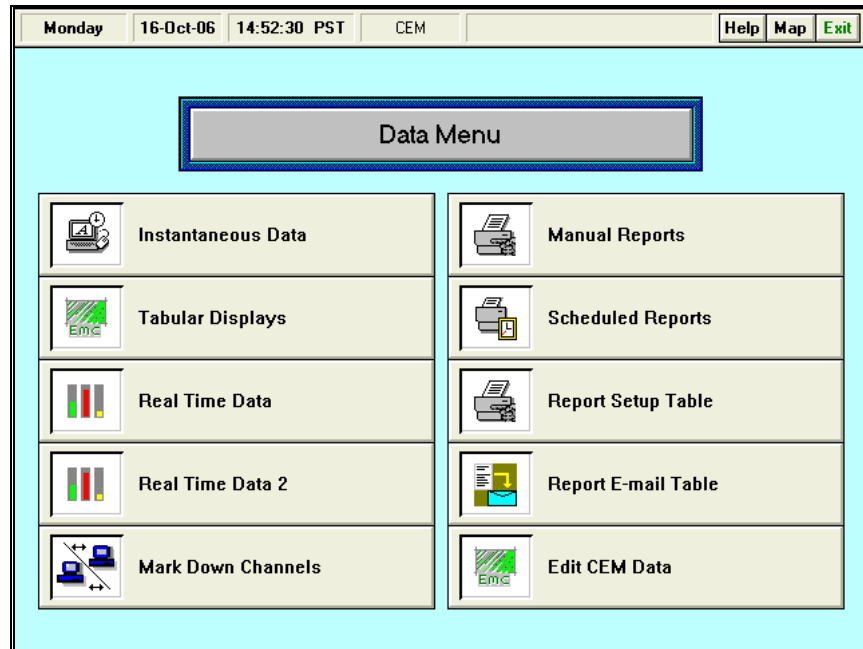
Figure 4-49
Station Manager Data Menu

The Station Manager data logger Data Menu contains eight options:

•	Instantaneous Data	**4.8.1**	•	Scheduled Report	**4.8.6**
•	Tabular Displays	**4.8.2**	•	Report Setup Table	**4.8.7**
•	Real Time Data	**4.8.3**	•	Report Email Table	**4.8.8**
•	Mark Down Channels	**4.8.4**	•	Data Editor	**4.8.9**
•	Manual Reports	**4.8.5**			

4.8.1 **Instantaneous Data**

Clicking on the Instantaneous Data button in the Data Menu will open the Instantaneous Data screen shown in Figure 4-50. This screen displays instantaneous and 1-second data for up to 18 channels of data on one screen. This screen also displays other types of data such as the voltage input to each channel, the most current "1-minute" average, the most current "Short Term" average, the most current "sliding hourly average" (is a rolling hourly average based on your short term average values), and the most current "1-hour" clock hourly average.
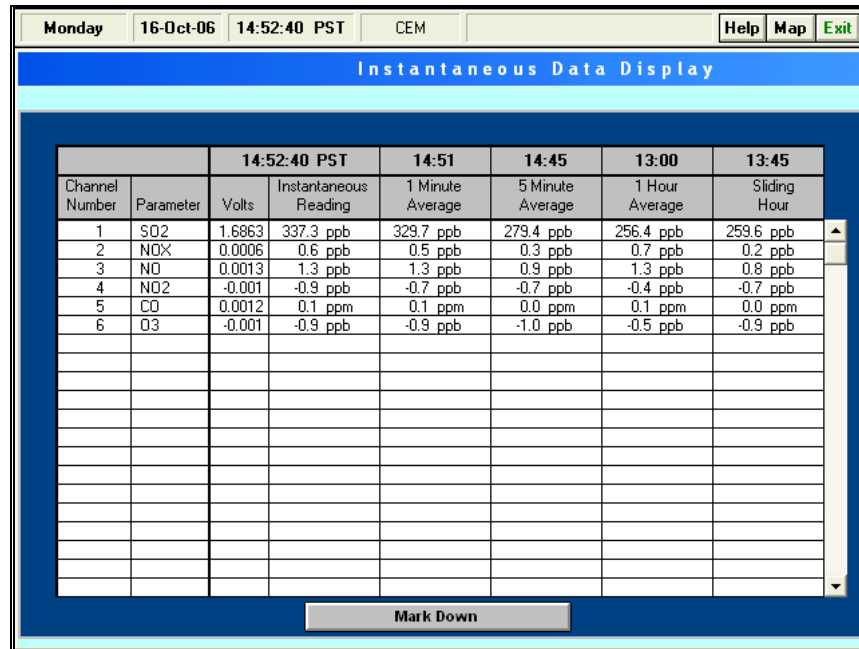
Figure 4-50
Instantaneous Data Display Screen

For a complete description of the Instantaneous Data Display Screen, please refer to Section 4.3.1.3.

4.8.2 **Tabular Displays**

Selecting the Tabular Displays button from the Data Menu will open the Tabular Displays menu as shown in Figure 4-51 below.
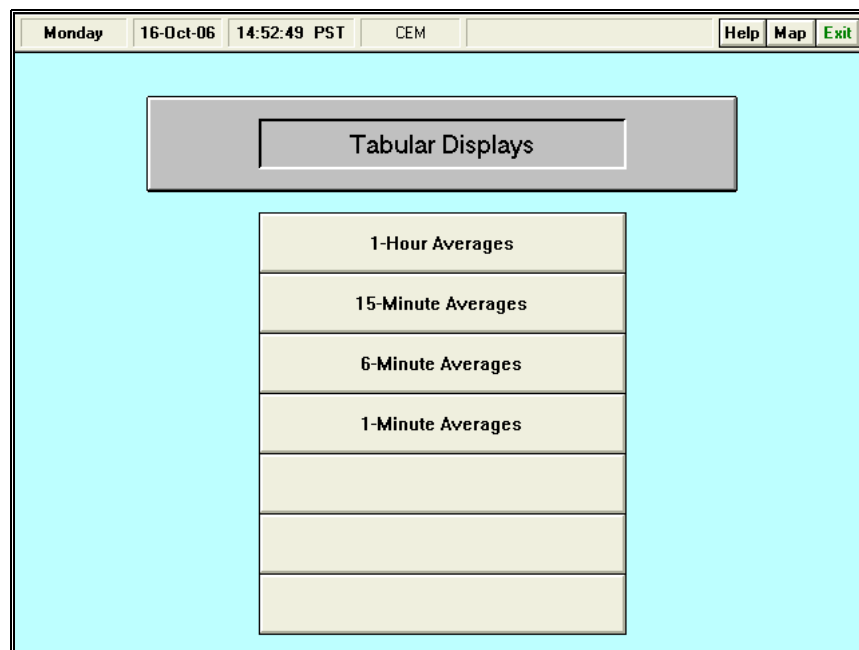
Figure 4-51
Tabular Displays Menu

4.8.2.1 **1-Hour Averages**

Clicking on the 1-Hour Averages button in the Tabular Displays Menu will open the 1-Hour Averages screen as shown in Figure 4-52 below.

Figure 4-52
1-Hour Averages Screen

The 1-Hour Averages screen consists of a Real-Time button, Historical button, Print Screen button, and several data columns used for viewing 1-Hour parameter data. At the top of each of the data columns are buttons marked either "None" or with a parameter name. Clicking on one of these buttons will open a list of parameters to choose from. Selecting a parameter name will place that name on the button and the Station Manager data logger will then display that parameters 1-Hour Averages.

Real-Time

The Real-Time button shows the current 1-Hour data as it is being averaged.

Historical

The Historical button allows previously recorded days averages to be viewed in the 1-Hour Averages screen.

To select a date:

- Click on the Historical button to will open the Select Date box.
- Click on either Yesterday or Select Day. If Select Day is selected, toggle arrows will appear. Choose the date using the up and down arrows.
- Click OK to accept, Cancel to quit.

Print Screen

Clicking on the Print Screen button to print a copy of the 1-Hour Averages screen.

4.8.2.2 **15-Minute Averages**

Clicking on the 15-Minute Averages button in the Tabular Displays Menu will open the 15-Minute Averages screen is shown in Figure 4-53 below.

Figure 4-53
15-Minute Averages Screen

The 15-Minute Averages screen consists of a Real-Time button, Historical button, Print Screen button, and several data columns used for viewing Short-Term parameter data. Clicking on Exit at any time will return the Station Manager data logger to the Data Menu.

At the top of each of the data columns are buttons marked either "None" or with a parameter name. Clicking on one of these buttons will open a list of parameters to choose from. Selecting a parameter name will place that name on the button and the Station Manager data logger will then display that parameter's 15-Minute Averages.

Real-Time

The Real-Time button shows the current 15-Minute data as it is being averaged.

Historical

The Historical button allows previously recorded days averages to be viewed on the 15-Minute Averages screen. To select a date:

- Click on the Historical button to open the Select Date box.

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- Click on either Yesterday or Select Day. If Select Day is selected, toggle arrows will appear. Choose the date using the up and down arrows.
- Click on OK to accept, Cancel to close.

Print Screen

Clicking on the Print Screen button will cause the Station Manager data logger to print a copy of the 15-Minute Averages screen.

4.8.2.3 **5-Minute Averages**

Clicking on the 5-Minute Averages button in the Tabular Displays Menu will open the 5-Minute Averages screen is shown in Figure 4-54 below.

Figure 4-54
5-Minute Averages Screen

The 5-Minute Averages screen consists of a Real-Time button, Historical button, Print Screen button, and several data columns used for viewing Short-Term parameter data. Clicking on Exit at any time will return the Station Manager data logger to the Data Menu.

At the top of each of the data columns are buttons marked either "None" or with a parameter name. Clicking on one of these buttons will open a list of parameters to choose from. Selecting a parameter name will place that name on the button and the Station Manager data logger will then display that parameter's 5-Minute Averages.

Real-Time

The Real-Time button shows the current 5-Minute data as it is being averaged.

Historical

The Historical button allows previously recorded days averages to be viewed on the 5-Minute Averages screen. To select a date:

- Click on the Historical button to open the Select Date box.

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- Click on either Yesterday or Select Day. If Select Day is selected, toggle arrows will appear. Choose the date using the up and down arrows.
- Click on OK to accept, Cancel to close.

Print Screen

Clicking on the Print Screen button will cause the Station Manager data logger to print a copy of the 5-Minute Averages screen.

4.8.2.4 1-Minute Averages

Clicking on the 1-Minute Averages button in the Tabular Displays menu will open the 1-Minute Averages screen as shown in Figure 4-55 below.

Tuesday	06-Jun-00	15:05:39 PST	EMC2				Help	Map	Exit

1-MINUTE AVERAGES

EMC2

Real Time	Historical		O3	NO	NO2	NOX	RH	STM	5017H
Date	Hour	Min	PPB	PPB	PPB	PPB	%	C	PPB
06 Jun 00	1500	04	No Data	No Data	No Data	No Data	No Data	No Data	No Data
		03	No Data	No Data	No Data	No Data	No Data	No Data	No Data
		02	No Data	No Data	No Data	No Data	No Data	No Data	No Data
		01	No Data	No Data	No Data	No Data	No Data	No Data	No Data
	1500	00	No Data	No Data	No Data	No Data	No Data	No Data	No Data
		59	No Data	No Data	No Data	No Data	No Data	No Data	No Data
		58	No Data	No Data	No Data	No Data	No Data	No Data	No Data
		57	No Data	No Data	No Data	No Data	No Data	No Data	No Data
		56	33	8	18	22	78.1	26.47	0
		55	36	9	20	24	78.1	26.43	0
		54	32	9	19	23	77.9	26.37	0
		53	34	8	13	17	77.9	26.36	0
		52	35	8	10	14	77.9	26.36	0
		51	35	8	10	13	77.9	26.31	0
		50	37	9	10	14	77.9	26.36	0
		49	36	9	11	15	77.8	26.37	0
		48	36	8	11	15	77.9	26.36	0
		47	36	7	13	16	77.8	26.28	0
		46	36	7	14	17	77.8	26.19	0
		45	33	7	11	14	77.7	26.18	0
		44	37	8	11	14	77.7	26.19	0
		43	37	8	13	16	77.6	26.22	0
		42	35	8	13	17	77.7	26.18	0
		41	38	9	14	18	77.6	26.18	0

Print Screen

Figure 4-55
1-Minute Averages Screen

The 1-Minute Averages screen consists of a Real-Time button, Historical button, Print Screen button, and several data columns used for viewing 1-Minute parameter data. Clicking on Exit at any time will return The Station Manager data logger to the Data Menu.

At the top of each of the data columns are buttons marked either "None" or with a parameter name. Clicking on one of these buttons will open a list of parameters to choose from. Selecting a parameter name will place that name on the button and The Station Manager data logger will then display that parameter's 1-Minute Averages.

Real-Time

The Real-Time button shows the current 1-Minute data as it is being averaged.

Historical

The Historical button allows previously recorded days averages to be viewed on the 1-Minute Averages screen. To select a date:

- Click on the Historical button to open the Select Date box.
- Click on either Yesterday or Select Day. If Select Day is selected, toggle arrows will appear. Choose the date using the up and down arrows.
- Click OK to accept, Cancel to close.

Print Screen

Clicking on the Print Screen button will cause The Station Manager data logger to print a copy of the 1-Minute Averages screen.

4.8.3 **Real Time Data**

The Real Time Data screen is used as a secondary instantaneous data screen. This screen allows the user to select any combination of parameters from the parameter initialization list to be viewed. This screen also serves as a visual status of both the parameters reading and Digital Statuses of the input and output bits. Figure 4-56.
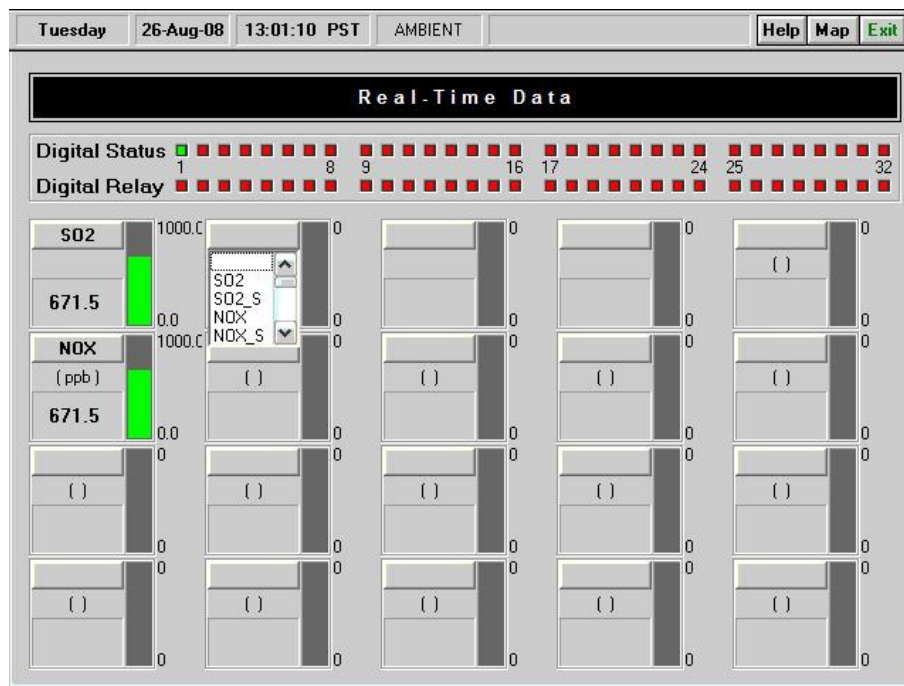
Figure 4-56
Real Time Data

- To select/switch parameters, simply click on the box where the parameter name is located and select the parameter desired from the drop down menu.

4.8.4 **Mark Down Channels**

The Mark Down Channels screen is used to manually mark one or more data channels off-line for a selected default period of time. Refer to Section 4.3.9 for more information about the operation of this program.

4.8.5 **Manual Reports**

The Manual Reports screen allows the user to display, print, or export any report defined in the Report Setup Table. Refer to Section 4.3.6 for more information about the operation of this program.

4.8.6 **Scheduled Reports**

The Scheduled Reports screen allows the user to schedule pre-defined reports to be printed, exported, or emailed out. Figure 4-57

Print Report

To schedule a report to print automatically at a specified time, follow the directions listed.

- Click Edit.
- Select the desired Report Name from the drop down menu. Note: Only pre-defined reports already set up in the Report Setup Table will be available, refer to Section 4.6.2.1 for more information about setting up a report.
- Select the desired days the report will print out.
- Select the desired time you would like the report to print, Hours and Minutes. Multiple hours may be selected to print the report however the minutes must remain the same.
- Select print from the Action selection.
- Click Save Line.

Repeat the steps to set up other reports.

Export

To export a report automatically at a specified time, follow the directions listed.

- Click Edit.
- Select the desired Report Name from the drop down menu. Note: Only pre-defined reports already set up in the Report Setup Table will be available, refer to Section 4.6.2.1 for more information about setting up a report.
- Select the desired days the report will print out.
- Select the desired time you would like the report to print, Hours and Minutes. Multiple hours may be selected to print the report however the minutes must remain the same.
- Select the type of format you would like to export to from the Action selection.
- Click Save Line.

Repeat the steps to set up other reports.

Email

To email a report automatically at a specified time, follow the directions listed.

- Click Edit.
- Select the desired Report Name from the drop down menu. Note: Only pre-defined reports already set up in the Report Setup Table will be available, refer to Section 4.6.2.1 for more information about setting up a report.
- Select the desired days the report will print out.

- Select the desired time you would like the report to print, Hours and Minutes. Multiple hours may be selected to print the report however the minutes must remain the same.
- Select Export to PDF from the Action selection. Refer to Section 4.8.8 on how to set up the email addresses the Reports will be email to.
- Click Save Line.

Repeat the steps to set up other reports.

Figure 4-57
Scheduled Reports Table

4.8.7 Report Setup Table

The Report Setup screen allows the user to create desired reports from the pre-determined list of Report Templates provided. Refer to Section 4.6.2.1 for more information about the operation of this program.

4.8.8 Report Email Table

The Report Email screen allows the user to set up the desired email addresses of the recipients the emails will go out to. Figure 4-58

To set up the email addresses and the report to be emailed, follow the instructions listed.

- Click Edit.
- Type in a Report Name which will appear as the Subject line on the email.
- Type in the File Name, which must match the file name being exported. Therefore if the user created a report to be called Daily Averages in the Report Setup Table, the File Name must be "Daily Averages.pdf".
- Type in the Recipient's Email address.

- If the user would like this report to be CC'd to other people, type in the CC List the addresses of the other recipients separating each address using <>;<>. In the example shown below, <ctsou@emcslo.com>;<test@gmail.com>.
- Click Save Line.
- Repeat the steps if other reports are to be emailed out as well.

Figure 4-58
Schedule Daily Printouts Screen

4.8.9 **Data Editor**

The Data Editor screen allows the user to manually edit historical Hourly data. Notice there are 3 ways to change data, Figure 4-59:

a) You can edit multiple hours of data by multiplying the current data by a certain factor.

b) You can replace a single hour's worth of data.

c) You can edit the flags on the data.

Figure 4-59
Data Editor

4.8.9.1 **Edit Multiple Hours**

- Select the parameter you wish to edit from the drop down menu.
- Select the starting Day and Time for which you want to start changing the data and an ending Day and Time. Anything selected in that time frame including the actual selected date and time will be changed.
- Enter in a multiplying number. This is the value you wish to multiple the current data by.
- Click "Execute". This will go through and multiply the data by the entered value and recalculate the hourly data.
- If you click on "View Log", it will show you a history of everything that has been done.

4.8.9.2 **Replace Single Hour**

- Select the parameter you wish to edit from the drop down menu.
- Select the Day and Hour of the data in which you want to replace.
- Enter the new value to replace the selected hour's data.
- Click "Execute". This will go through and replace the selected hour's data by the entered value and recalculate the hourly data.
- If you click on "View Log", it will show you a history of everything that has been done.

4.8.9.3 **Replace Flag(s)**
- Select the parameter you wish to edit from the drop down menu.
- Select the starting Day and Time for which you want to start changing the data and an ending Day and Time. Anything selected in that time frame including the actual selected date and time will be changed.
- Under "Flags", select the flag you want to be replaced.

- Under "Replacement", select the flag you want the current one to be replaced with.
- Click "Execute". This will go through and replace the selected flag with the new flag and recalculate the hourly data based on the flag's validity. ***Refer to Station Manager Validity Flag List***
- If you click on "View Log", it will show you a history of everything that has been done.

4.9 **Alarms**

The Alarms program in the Station Manager data logger provides alarm and warning status notifications based on pre-defined events. When a Station Manager data logger detects an alarm or warning condition based on the user-defined criteria in the Parameter Alarm Table, it will create an event record in the Alarm History table and perform the function identified in the Alarm Parameter table. The user may identify one of two levels - Warning or Alarm - and initiate a specific function for the required response. For notifications, the Station Manager data logger is capable of activating a digital output status, sending pager messages, transmission of fax messages, transmission of emails, and can support voice dialing notifications. The Digital Output feature may be used to activate relay-controlled equipment such as an audible or visual warning device. The Paging feature may notify key personnel of an unusual event or condition requiring intervention. The transmission of faxes or emails is a good way to keep track of alarm history events without having to be on site. The voice dialing feature is a great way to immediately notify any key personnel of all the details entailed in the unusual event or condition requiring intervention. Figure 4-60.
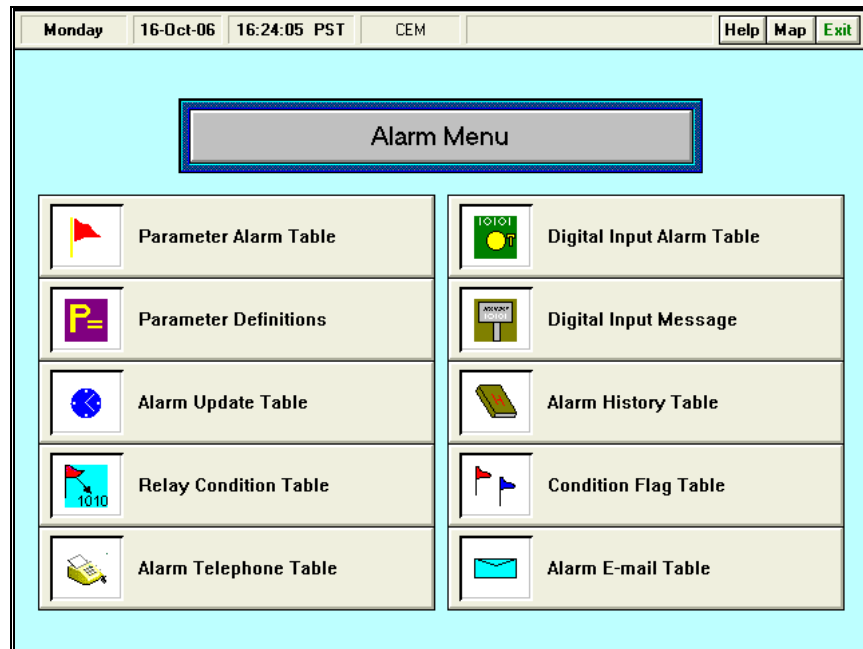
Figure 4-60
Alarm System Menu

4.9.1 **Parameter Alarm Table**

The Parameter Alarm table allows the user to define the parameters that trigger an Alarm or Warning condition. Figure 4-61

| Monday | 16-Oct-06 | 16:26:16 PST | CEM | | | Help | Map | Exit |

Parameter Alarm Table

On-Off	Parameter	Data Type	Rule	Threshold	AlarmType	Action	Recipient
Off	SO2	1 Hr	= or >	100	Alarm	Email	Charlie
On	SO2	1 Hr	>	100	Alarm	Display	Station Manage
On	SO2	1 Hr	>	100	Alarm	Email	Charlie
On	SO2	1 Hr	>	100	Alarm	Enable Digital Output	Line Nr 1

| Edit | Quit Edit | New Entry | Edit Line | Delete Line | Insert Line | Save Line |

On-Off	Parameter	Data Type	Rule	Threshold	AlarmType	Action	Recipient
On	SO2	1 Hr	>	100	Alarm	Alarm History Only	Line Nr 1

Figure 4-61
Parameter Alarm Table

Use the following to initialize an Alarm or Warning:

- Select the On/Off condition - click on the choice for the alarm.
- Select the Parameter - a pull down screen will identify the initialized parameters and the user may choose a parameter for the alarm by clicking on the selection.
- Select the Data Type - a pull down screen will identify the available periods and the user may click on the timing choice for the alarm condition.
- Select the Rule column - less than, greater than and/or equal to the assigned threshold is displayed in a pull down box.
- Select the Threshold - this will allow the user to enter an empirical number for the parameter.
- Select the type of alarm - Warning or Alarm, based on the user-defined criteria for these terms. This selection does not change the available actions for the parameter.
- Select the Action column - Call Pager and Enable Digital Output are supported on general release versions with the additional choices available on customized versions of the Station Manager data logger.
- Select Recipient - enter the name identifier from the Alarm Telephone table for the intended receiver of the action. This selection will also define the digital output line to relay-controlled equipment, such as an audible or visual warning device.

After completing the edit, use the Save Line feature to enter the information into the Parameter Alarm table. The Alarm will become available when the Station Manager data logger is re-started. Clicking on the Print button prints the displayed Parameter Alarm table.

4.9.2 Parameter Definitions Table

This feature allows the user to input specific details for each parameter including the analyzer's make and model number. This information is the transferred over to the alarm email function allowing the recipient of the email to have specific details of the parameter and analyzer in alarm condition. Figure 4-62

Figure 4-62
Parameter Definitions Table

4.9.3 Alarm Update Table

The Alarm Update table will allow the user to set the frequency of notification for the alarm condition based on the selected average interval. "After Every Interval" will cause the Station Manager data logger to take action with each alarm event, and "After First Interval" will effect action only after the first event. The Station Manager data logger will continue to log the events in the Alarm History table for user reference. The Alarm Update table controls the Action column of the Alarm Parameter table. Figure 4-63

Figure 4-63
Alarm Update Table

4.9.4 **Relay Condition Table**

The Relay Condition table allows the user to trigger a digital output (relay) to close based on a pre-defined parameter threshold. This feature, if desired, will allow the user to trigger an audible alarm, visual alarm, or in certain applications can trigger a pump to come on. Figure 4-64

Figure 4-64
Relay Condition Table

- Select the Parameter - a pull down screen will identify the initialized parameters and the user may choose a parameter for the alarm by clicking on the selection.
- Select the Rule column - less than, greater than and/or equal to the assigned threshold is displayed in a pull down box.
- Select the Threshold - this will allow the user to enter an empirical number for the parameter.
- Select the Digital Output - channel to be triggered based on the alarm.
- Click Save Line.

4.9.5 Alarm Telephone Table

The Alarm Telephone table allows the user to customize the character data string sent to a pager. Figure 4-65

Figure 4-65
Alarm Telephone Table

Use the following information to setup a pager device:

- Select Recipient and enter a unique name identifier for the notification.
- Select Device and click on Pager in the pull-down screen. The other listed devices are only available on customized versions of the Station Manager data logger.
- Select the Leading column for entering number codes required for accessing an outside line from a PBX system. This column may be left blank if not required.
- Select the Telephone Number column and enter the number to be called; the Station Manager data logger will ignore non-numerical characters such as "–".
- Select the Wait period and a pull down screen will present a toggle to select the number of seconds for delay before dialing the pager string. This wait period is typically 3 to 5 seconds but depends on the local telephone connection speed or the paging system requirements.

- Select Pager String to enter the numerical message to be delivered. The Station Manager data logger will support the "∗" and "#" keys for this feature. Certain paging systems may require additional access codes, such as a PIN, and the additional Wait period and Pager String column is provided to support these systems. These additional columns may be left blank if not required.

After completing the edit, use the Save Line feature to enter the information into the Alarm Telephone table.

4.9.6 Digital Input Alarm Table

The Digital Input Alarm table allows the user to establish an alarm based on the digital output sent from another system. Based on the status of the digital input, anything capable of sending out a voltage greater than 5 V is capable of triggering an alarm. Figure 4-66

Figure 4-66
Digital Input Alarm Table

- Select the On/Off condition - click on the choice for the alarm.
- Select the Digital Input – click on the corresponding input channel the alarm is wired to.
- Select the Corresponding Condition – always select "none".
- Select the Action – click the desired action based on the input alarm.
- Select the Recipient – select the name identifier for the intended receiver of the action.
- Select the Message – always select "N/A".

4.9.7 Digital Input Message Table

This feature enables the user to input the desired message to be displayed for the corresponding alarm set in the Digital Input Alarm Table. Figure 4-67

Figure 4-67
Digital Input Message Table

- Select the Number – the corresponding digital input channel the alarm message is associated to.
- Select the Message – input the desired alarm message to be displayed in association to the digital input alarm table.

4.9.8 Alarm History Table

With the trigger of an Alarm or Warning condition, the Station Manager data logger records the event in the Alarm History table, including the date and time of the occurrence and the selected parameters. Subsequent alarm events will be recorded to the table, but notifications or digital output is based on the Alarm Update table. Figure 4-68

Figure 4-68
Alarm History Table

Line items in the Alarm History table may be deleted by clicking on the Delete button of the table; the system will prompt the user to select a line item and will delete records up to and including the selected line.

Edit Table

Refer to Appendix A for the procedures to use the edit mode section for this and all other tables.

Print Table

To print a copy of this screen, click on the Print Table button.

4.9.9 Condition Flag Table

The Condition Flag table allows users to set a threshold condition in which a parameter will be flagged as invalid until the triggering parameter's condition is met. Figure 4-69

Figure 4-69
Condition Flag Table

To set a parameter's condition requirements for flagging:

- Select the Parameter - a pull down screen will identify the initialized parameters and the user may choose a parameter for the alarm by clicking on the selection.
- Select the Condition - less than, greater than and/or equal to the assigned threshold is displayed in a pull down box.
- Select the Value – input the threshold value in which the second parameter will be flagged as invalid.
- Set the Parameter Flagged – click on the second parameter which will be flagged based on the first parameter's condition.
- Save line

Edit Table

Refer to Appendix A for the procedures to use the edit mode section for this and all other tables.

Print Table

To print a copy click on the Print Table button.

4.9.10 **Alarm Email Table**

The alarm email allows the user to set up the recipients who will receive alarm emails when alarms occur. Figure 4-70

Figure 4-70
Alarm Email Table

- Select the Name – input a name identifier for the recipient.
- Select the Recipient – input the recipient's email address.
- Select the CC List – if the alarm needs to go to more than one recipient, the CC List may be used. To input more than one address in the CC List, separate each email address with <>;<>. i.e. <ctsou@emcslo.com>;<test@gmail.com>
- Click Save Line.

4.10 **Utilities**

The Utilities Menu provides access to several utilities and programs, such as the Station Manager data logger Security System and Archive programs. It also includes several Microsoft Windows utilities, including the Windows program for setting the PC date and the Microsoft Windows Calculator program. Clicking on the Utilities button in the Station Manager data logger Main Menu will open the Utilities Menu shown in Figure 4-71.

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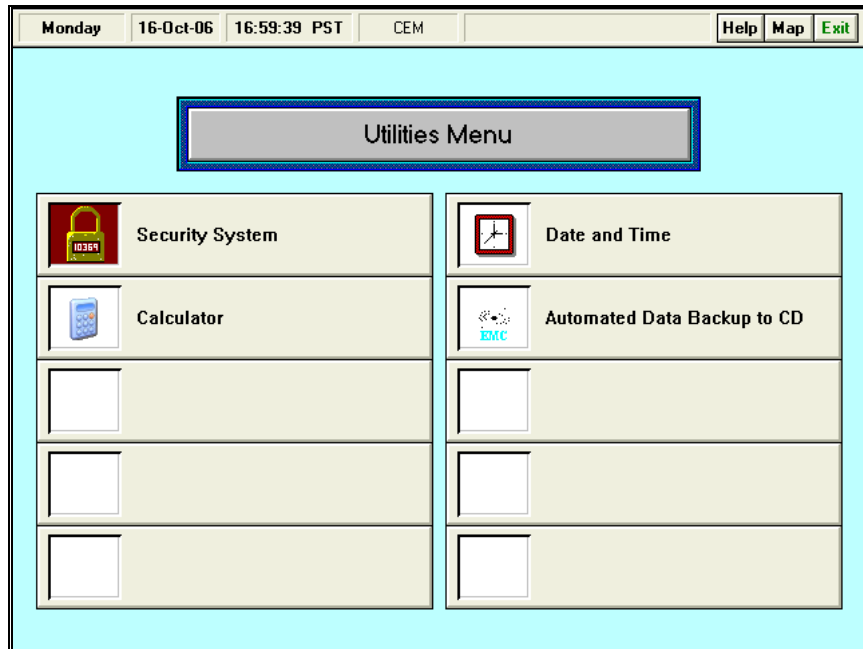
Figure 4-71
Utilities Menu Screen

The Utilities Menu contains seven options:

• Security System	**4.10.1**	• Date and Time	**4.10.3**
• Calculator	**4.10.2**	• Automated Data Backup	**4.10.4**

4.10.1 Security System

Clicking on the Security System button from the Utilities Menu opens the Security System Menu as shown in Figure 4-72. Access to many of the menu selections in the Security System Menu is restricted according to what user group the currently logged-in user is assigned. If the permissions for that particular user are not set to allow the user access, then the message "Permission Denied" will appear on the screen.
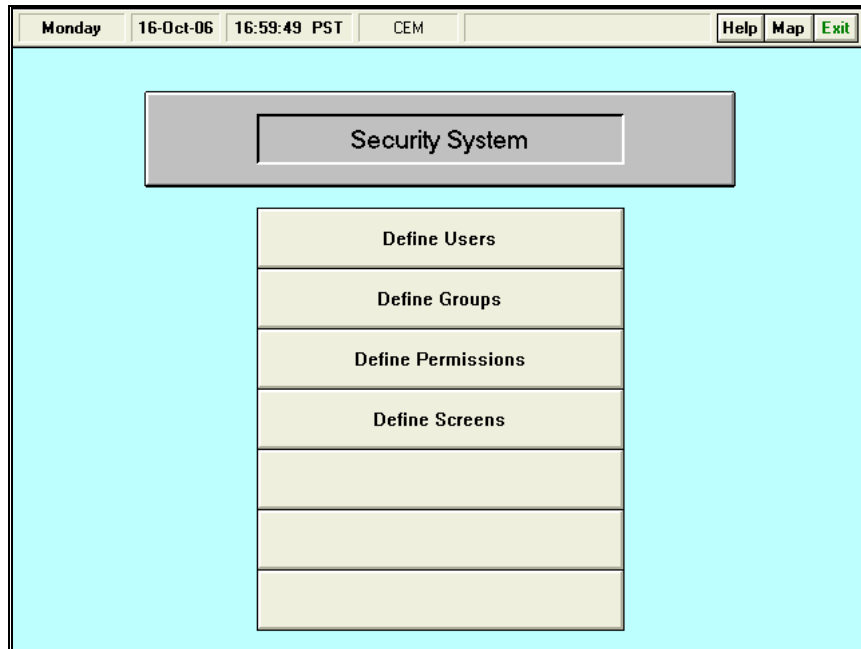
Figure 4-72
Security System Menu

When setting up the Security System in a Station Manager data logger, begin by defining the permissions, then define groups, and then define users. Each successive screen uses definitions or names that are defined in the previous screen.

4.10.1.1 **Define Users**

Clicking on the Define Users button from the Security System Menu opens the Define Users table. If a user does not have permission to view this screen, then the message "Permission Denied" will appear on the screen. The Define Users table lists for each user allowed into the system, their User Name, Initials, Password, Time Out, and Group Name. If Group Names have not already been defined, exit the Define Users screen and enter the Define Groups screen (explained in section 4.12.1.2).

Edit Table

Refer to Appendix A for the procedures to use the edit mode section for this and all other tables.

Print Table

To print a copy of the Define Users screen click on the Print Table button.

4.10.1.2 **Define Groups**

Clicking on the Define Groups button from the Security System Menu opens the Define Groups table, as shown in Figure 4-73. If a user does not have permission to view this screen, then the message "Permission Denied" will appear on the screen.

Figure 4-73
Define Groups Screen

The Define Groups table contains two columns. The first column lists the different Group Names. The second column lists all of the Permissions that are granted to each of the Groups Names. There may be several different permissions listed for each group name. These permissions will have been defined from the Permissions screen. If Permissions have not already been defined, exit the Define Groups screen and enter the Define Permissions screen (explained in section 4.12.1.3).

Edit Table

Refer to Appendix A for the procedures to use the edit mode section for this and all other tables.

Print Table

To print a copy of the Define Groups screen click on the Print Table button.

4.10.1.3 **Define Permissions**

Clicking on the Define Permissions button from the Security System Menu opens the Define Permissions table, as shown in Figure 4-74. If a user does not have permission to view this screen, the message "Permission Denied" will appear.

Figure 4-74
Define Permissions Table

The Define Permissions table contains three columns. The first column is the Permission Name. The second column is the Screen Name column. The third column is the Edit/View column. In this screen, one permission name is defined for one or more different station names. This permission name will then later be used in the Define Groups table to define what type of access each group will have.

Edit Table

Refer to Appendix A for the procedures to use the edit mode section for this and all other tables.

Print Table

To print a copy of the Define Permissions screen click on the Print Table button.

4.10.1.4 **Define Screens**

Clicking on the Define Screens button from the Security System Menu opens the Define Screens table, as shown in Figure 4-75. The Define Screens table ties a screen name to the executable file name. This table contains two columns: Screen Name and Executable Name.

Figure 4-75
Define Screen Table

Edit Table

Refer to Appendix A for the procedures to use the edit mode section for this and all other tables.

Print Table

To print a copy of the Define Screen Table click on the Print Table button.

4.10.2 **Calculator**

Clicking on the Calculator button from the Utilities Menu will open the calculator. Figure 4-76
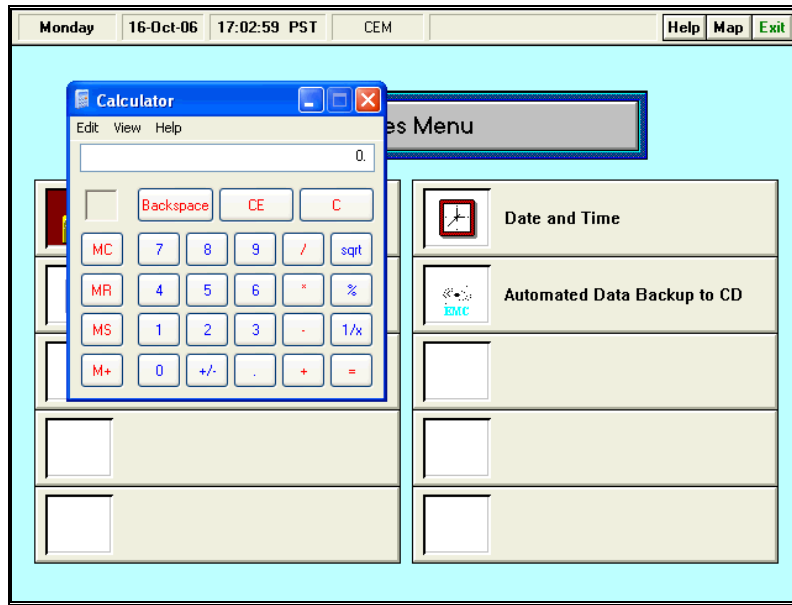
Figure 4-76
Calculator Screen

This Calculator is operated identically to any regular calculator. There are two different calculator types: Scientific and Standard. Select which type to use by clicking on the Calculator's view menu, and then clicking on either scientific or standard.

To close the calculator click on the minus sign box in the upper left corner of the calculator box. Click on Close. The Station Manager data logger will return to the Utilities Menu.

4.10.3 Date and Time

Clicking on the Date and Time button in the Utilities Menu opens the Date/Time Box. The Date/Time Box is used to display and set the date and time. Figure 4-77
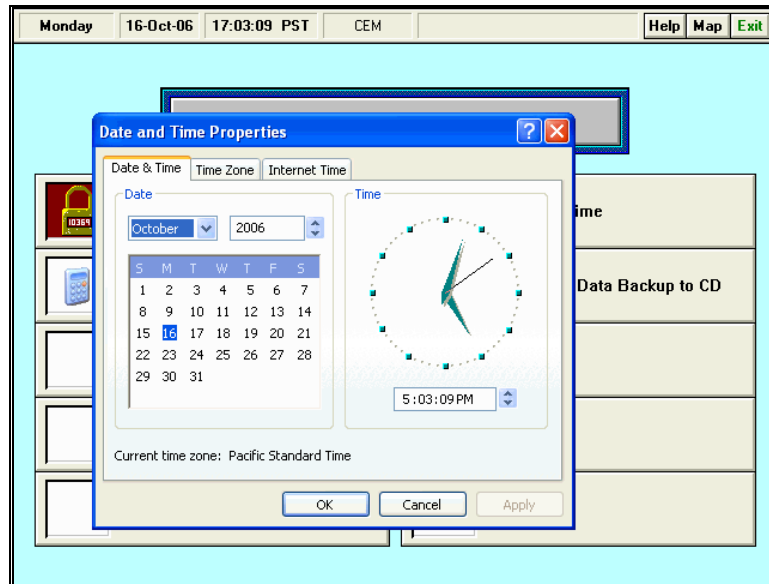
Figure 4-77
Date and Time Screen

Date

The Date box displays the current date with a monthly calendar. The month is changed by a pull down list and the year is changed by clicking on the up and down arrow buttons located on the right side of the year box. The day is selected by clicking on the calendar date desired.

Time

The Time box displays the current time and allows it to be changed by clicking on the up and down arrow buttons located on the right side of the box. The user may also directly enter the time in the box. Click on OK to restart the clock.

Time Zone

The Time Zone box displays the time zone for the time displayed in the Date/Time box. It also allows the time zone to be changed by clicking on the arrow button on the right side of the Time Zone box and then selecting a new time zone designation. The "Automatically adjust clock for daylight saving changes" should never be selected.

Internet Time

The Internet Time allows the user to sync the PC clock with an Internet Time server. This feature will sync with the Internet server once a week to ensure the PC's clock is correct. This function only works if the PC is connected to the internet via TCP/IP.

Click on OK to accept all settings, Cancel to quit.

4.10.4 Automatic Data Backup

The Automatic Data Backup program is used to schedule automatic backups of all the critical files necessary to rebuild the Station Manager PC should anything happen to it. This feature

also enables the user to manually back up all the data, which backs up exactly the same information as the automatic backup would. Figure 4-78

Figure 4-78
**Manual Data Backup Screen**

To auto archive data:
- By default, this feature is disabled. Select enable to begin the automatic backup.
- Select the time the backup would take place.
- Select how often the backup is to occur. This option can range from "00" which will back up every day to as long as "29" which will back up once a month.
- Select the Drive the backup is to store the data. By default this is set to the CD-ROM drive however can be changed to any media type including a Flash Drive.

To manually archive data:
- Select the Drive the backup is to store the data. By default this is set to the CD-ROM drive however can be changed to any media type including a Flash Drive.
- Click on Manual Backup. When clicked, the backup process will begin immediately.

4.11 Power Failures

The Power Failure Log is the log file that contains all of the power failures that are recorded on a Station Manager data logger. In addition to recording power failures in this log file, the Station Manager data logger also writes a record of each power failure in the Station Manager Logbook. Clicking on the Power Failures button in the Station Manager data logger Main Menu opens the Power Failure Log Screen shown in Figure 4-79.
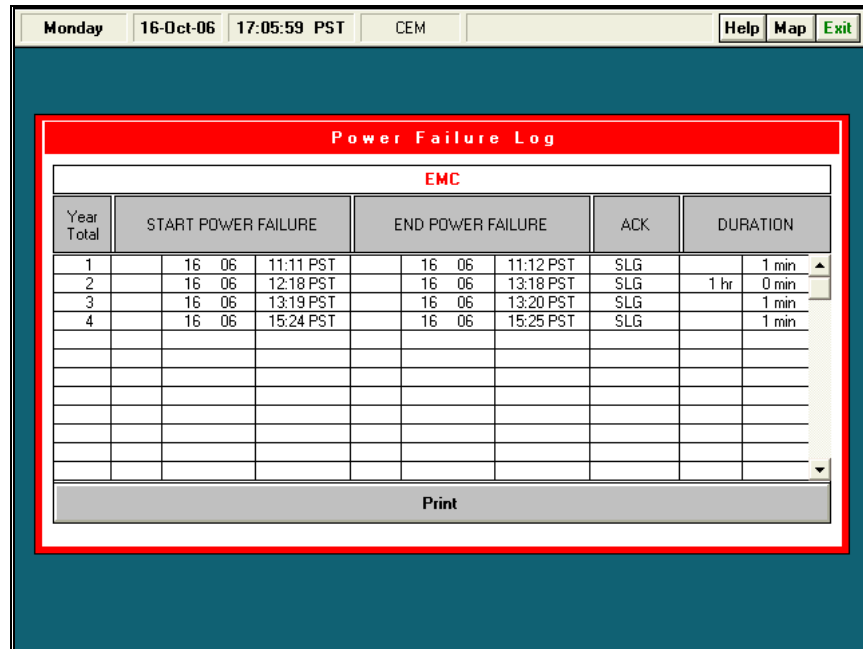
Figure 4-79
Main Power Failure Log Screen

The Power Failure Log screen contains a year total column, start and end power failure columns, ACK (acknowledge) column, Duration column, and a Print button.

The Year Total column provides the total number of power failures and shows the order of occurrence of the power failures. The Start Power Failure and End Power Failure columns give the start and end times, days, and dates of each power failure. The ACK column is used to show the initials of the technician that acknowledged the power failure. The Duration column gives the length of the power failure in hours and minutes.

<u>Print</u>

Clicking on the Print button will cause the Station Manager data logger to print out a copy of the Power Failure Log.

5.0 Troubleshooting

As you use your Station Manager data logger, you may occasionally experience a problem with either the hardware or software. The first thing to do is diagnose the problem, following the guidelines in this section. This section only contains a short explanation of problems and solutions, if the solutions do not fix the problem, or if the problem is not addressed, contact EMC customer service at (805) 226-2275 or the computer manufacturer for hardware problems.

Problem	Probable Cause	Diagnosis	Solution
Data Logger does not respond when polled.	Problem with modem	Unplug the modem from the data logger and leave the modem connected to the phone line. Dial into the	1. Power cycle the modem and the PC. 2. If modem still does not

Problem	Probable Cause	Diagnosis	Solution
		modem's telephone number and see if it answers. If the modem does not answer, problem is probably due to phone line or a defective modem.	answer, check the phone line. 3. If the phone line is OK, replace modem. 4. Confirm the Com Port is correctly selected in the initialization Com Port Screen.
	Problem with data logger com program.	Failure of EMCCOM32.EXE	5. Verify EMCCOM32 application is running in the task bar. If not, contact EMC.
The modem answers, but it is not able to communicate with the data logger.	Problem with the communications module in the startup group.	Modem answers, but cannot communicate with the data logger.	1. Power cycle the modem and the PC. 2. If modem still does not answer, check the phone line. 3. If the phone line is OK, replace modem. 4. Confirm the Com Port is correctly selected in the initialization Com Port Screen. 5. Verify EMCCOM32 application is running in the task bar. If not, contact EMC.

Problem	Probable Cause	Diagnosis	Solution
Unstable analog input signals.	Problem with signal wiring.	Determine that all unused input channels have ground jumpers installed on unused channels.	Short out all unused analog signal input channels. Connect a ground jumper between the "Hi", "Lo", and "AGND" input terminals of all unused inputs.
		To determine if the data logger is not the cause of the unstable analog inputs, insert	Inset a known voltage from a steady voltage source and simultaneously measure it

		a voltage source into each analog input channel. Be sure to connect a ground jumper between the "Lo" and "AGND" input terminals on the channel selected to perform this test.	with a DVM. If the voltage input is steady and the data logger's instantaneous data display is unstable, the problem is due to the analog input multiplexer PC board in the data logger.
SIU not communicating with data logger	SIU may not be set up correctly in the Initialize Com ports screen.	To determine if the com ports set up correctly, view the initialize com port screen. Signal Interface Unit should be listed under the appropriate com. Port.	1. If the SIU is not listed under the appropriate com. Port: Change the com port to the appropriate operating mode, and reboot. 2. Unplug the power supply to the SIU for 5 seconds and plug it back in. Reboot PC. 3. Run ADAM Utility to verify that the PC can communicate with the SIU. 4. If the SIU is installed correctly, the problem is may require technical support from EMC.

6.0 Glossary

1-Minute Averages	The average of sixty 1-second samples collected from any directly measured or calculated data channel for a 1-minute period.
5-Minute Averages	The average of five 1-minute averages for any directly measured or calculated data channel for a 5-minute period.
15-Minute Averages	The average of five 1-minute averages for any directly measured or calculated data channel for a 15-minute period.
1-Hour Averages	The average of sixty 1-minute samples collected from any directly measured or calculated data channel for a 60-minute period.
Alarms	Action from Station Manager used to alert personnel of a problem with the data or equipment, or exceedance of user-defined levels, that cause the activation of a relay to enable external equipment such as audible or visual warning device. Alarm conditions can also cause on-screen message display or dial-out fax messages.
Ambient	Local geographic conditions in the vicinity of the air monitoring station.
Analog	A description of voltages or signals that vary over time, such as the signal output from an analyzer or sensor.
Annotate	The act of writing or making a permanent comment on a strip chart.
Arithmetic Averaging	The standard averaging method for data collection and most commonly used for air quality, meteorological and CEMS monitoring, which consists of summing all data samples and dividing by the number of samples.
ATM	A commonly used parameter name, "Ambient Air Temperature".
Auditor	A level of permission with the Security System, which allows the user access to different levels of the Station Manager data logger designated as an "Auditor."
Automatic Calibration	A routine scheduled calibration initiated by Station Manager with Calibration Schedule Program.
Backup	An archive of data collected to a hard disk, floppy or Zip cartridge.
Calibration Activity	A calibration event that occurs alone or as part of a calibration sequence or manual calibration controlled by the Station Manager data logger.
Calibration Command String	A command string within the Station Manager data logger serial calibration control program, which initiates or terminates a calibration activity.
Calibration Data	The calibration data responses recorded by a Station Manager data logger.
Calibration Results	The calibration data responses recorded by a Station Manager data logger

during a calibration activity.

Calibration Schedule   The schedule of when a list of pre-defined calibration sequences will be run.

Calibration Sequence   A list of pre-defined calibration steps defined by a user and stored in the Calibration Sequence Table.

Calibration Step   A single calibration activity that is one part, or a step in a calibration sequence.

Calibrations   The method of causing calibration gases to be introduced into the sample stream of analyzers to verify and calibrate their responses to known standards.

Calibrator Commands   A string of commands that Station Manager data logger uses to operate a calibration through the Calibrator Control System.

CEMS   Continuous Emissions Monitoring Systems for stack or emissions monitoring that are typically used for regulatory compliance.

Channel   An input or output channel assigned in a Station Manager data logger and designated as a measured parameter.

Checklist   A list of duties or periodic maintenance activities performed by an operator or technician in a monitoring station.

CO   Carbon Monoxide; a poisonous, odorless gas that is formed in the incomplete combustion of carbon materials.

COH   Coefficient of Haze; the measurement of particulate material performed by an AISI tape sample or similar measurement system, usually recorded over a period of time such as 1-hour or 2-hours.

Com Port   A computer RS-232C serial data port used for serial data communications.

Consumables   Items or materials that are routinely used and replaced in a monitoring station.

Daily Checklist   The systematic list of operations and equipment checks that are to be performed on a routine daily basis.

Data Format   Refers to the format of data averages and includes the position of the decimal point in the data, if any.

Data Matrix   A printout of monitoring data that is formatted in a matrix or on a spreadsheet, usually 24 hours by 31 days.

Digital Input Lines   Digital input signal lines that receive a binary code information from peripheral equipment to the Station Manager data logger, usually TTL inputs or digital voltage level inputs.

Digital Output Lines   Digital output signals from a Station Manager data logger to peripheral equipment such as calibrators and analyzers in the form of TTL outputs or relay contact closures.

Digital   A form of signal transmission that uses a binary code such as 0 or 1

Dummy Channel   A fictitious or dummy data channel that may be initialized in a Station Manager data logger for the purposes of formatting data.

Duration of Step   The length of time or duration of a step in a Calibration Sequence.

Edit Mode   The Editing Region in all of the tables used in the Station Manager data logger.

EST   An arbitrarily assigned parameter name, External Station Temperature.

Every N Day   The time interval or duration between a selected calibration activity. N is replaced by the number of days. Example: Every 9 Days.

File   A collection of information stored on floppy or in computer data files on a hard disk of the Station Manager data logger.

Data Flags   A validity flag that is stored with each data average stored in the Station Manager data logger data files.

Frequency of Occurrence   The statistical summation of readings that occur when the wind is coming from different compass directions.

Gain   The ratio of increase of output over input in an amplifier; such as in the adjustment of the Analog to Digital Converter Board.

Ground   A common return signal path for an electric circuit, also the electrical return to earth.

H2S   Hydrogen Sulfide; a poisonous and flammable gas occurring from the decay of carbon matter with a strong rotten egg-like smell in lower concentrations.

Initialization   The assignment of data channels as parameters, calibration sequences, report output, set up charts and polling in a Station Manager data logger.

Initialize   The procedures used to set-up and configure data channels recorded by Station Manager data logger.

Input Channel   Any directly measured parameter recorded by a Station Manager data logger.

Install Initializations   The procedure of installing a set of pre-programmed setups or initializations used by a Station Manager data logger.

Instantaneous Data   A 1-second updated reading recorded by a Station Manager data logger.

Inventory System   A program in the Station Manager data logger, which lists the equipment, consumables, and spare parts at a monitoring station.

IST   An arbitrarily assigned parameter name, Internal Station Temperature.

Jumper   An electrically conductive part that is used to connect two or more points on a circuit board. When the jumper is installed, the circuit is shorted (closed). When the jumper is removed, or connected only to a single pin, the circuit is open.

Length of Average   The time duration or amount of time a calibration remains at its stable point during a calibration activity, usually pre-programmed into a calibration sequence in a Station Manager data logger.

Level 1 thru Level 7	A list of available names that represent types of possible calibration activities that can be controlled and initiated by a Station Manager data logger.
Log In	The action of logging in to the Security System.
Manual Calibration	A calibration activity that is manually enabled or actuated by an operator or technician in a monitoring station.
Media	A type of storage device in a Station Manager data logger PC; usually a 3.5 inch floppy disk, ZIP cartridge, or CD-ROM drive.
Monthly Archive	A Station Manager utility program used to back-up or archive one or more months of all data files on a removable media, such as floppy or ZIP cartridge.
NO	A commonly used parameter name, Nitric Oxide; a colorless, poisonous gas resulting from the oxidation of nitrogen or ammonia.
NO2	A commonly used parameter name, Nitrogen Dioxide.
NOX	A commonly used parameter name, Oxides of Nitrogen.
O2	A commonly used parameter name, Elemental Oxygen
O3	A commonly used parameter name, Ozone: a complex form of oxygen that has 3 oxygen atoms. Characterized by pungent odor.
Pacific Standard Time	This is the UTC time minus 8 hours. This time does not change during the winter months. Commonly referred to as Standard Time or PST.
Parameter Initialization Table	A Station Manager data logger table used to set up or initialize all data channels recorded by the data logger.
Parameter	The name of any data channel recorded by a Station Manager.
Password	A pre-defined name that allows user access to a Station Manager.
Peripheral	Any external device connected to a Station Manager data logger, such as a printer, modem, or other electronic device.
Polling	The method of remotely retrieving data from a Station Manager data logger.
Potentiometer	A device to increase or decrease resistance, also known as "Trim Pot" for the adjustment of span or zero responses in a Station Manager data logger.
Power Failure Log	A table or log, which tracks power failures.
Precipitation	The measurement of mist, rain, sleet or snow deposited in measuring devices and recorded by a Station Manager data logger.
Precision	A type of calibration activity or level defined by the USEPA for criteria pollutant monitoring.
Print Averages	The printing of 1-hour, 1-minute, and other time-interval data averages.

Print Style	The format for output printouts. Station Manager data loggers print three styles: ten, eight or five columns across a page.
PRS	A commonly used parameter name, Atmospheric Barometric Pressure.
RAINF	A commonly used parameter name, that designates rainfall or precipitation measurements.
Recovery Interval or Recovery Time	The time duration or interval after the end of a calibration step, which allows the response of the analyzer to return to normal ambient measurement conditions.
RH	A commonly used parameter name, Relative humidity, the measurement of moisture in the atmosphere.
Senior Technician	A level of permission, which allows user access to different levels or screen displays in a Station Manager data logger.
Setup Program	An installation or Setup Program in a PC.
Sigma Theta	The standard deviation of horizontal wind direction.
Sigma Phi	The standard deviation of vertical wind direction.
Sigma V	The standard deviation of wind speed normal to resultant wind speed direction.
Sigma	The standard deviation of signals recorded by any data channel.
SIU	Signal Interface Unit.
Sliding Hour	A 1-hour average which is updated every five minutes. A sliding hour begins at a 5-minute clock time and ends 60 minutes later at a corresponding 5-minute clock time.
SO2	Sulfur Dioxide; a toxic gas with a pungent odor formed in the combustion of sulfur-based compounds.
Source Value	The true or known concentration of a calibration gas.
Span	The name of a calibration response step, usually an up-scale reading that is approximately 80% of the analyzer full-scale response.
Standard Deviation	The statistical difference between a value in a frequency distribution and a fixed value.
Station Logbook	A program in the Station Manager data logger used for recording operator notes and operational information.
Step Number	The number of a discrete step in a sequence of calibration steps.
STM	A commonly used parameter name, Internal Station Temperature in a monitoring station.
Strip Chart	A program in the Station Manager data logger, which graphs or displays recorded data in a Strip Chart or Trend Recorder form of display.

System Administrator   A designated individual within an organization which uses the Station Manager data logger and is assigned unlimited user privileges to view and operate programs and screen displays in a Station Manager data logger or System Manager central data management system.

Technician I, III, III   An individual within an organization that has a designated a level of permission in a Station Manager data logger, usually with limited access and permissions.

Test Voltages   A voltage source or level that is introduced into a Station Manager data logger to verify that the data logger is responding correctly.

Threshold Table   A user-defined table, which sets alarm levels and other conditions used by the Monthly Data Report in a Station Manager data logger.

Trim Pot   A Potentiometer used for adjusting setting on circuit boards.

TRS   A commonly used parameter name, Total Reduced Sulfur.

TTL   An abbreviation for Transistor-Transistor Logic; a standardized form of digital logic commonly used in computer equipment and electronic circuitry.

Vector   A quantity that has magnitude and direction.

Velocity   Time and rate of motion in a given direction.

VWS   A commonly used parameter name, Vertical Wind Speed.

VWSA   A commonly used parameter name, Vertical Wind Speed Average.

WDA   A commonly used parameter name, Wind Direction Average.

WDR   A commonly used parameter name, Wind Direction Resultant.

WDV   A commonly used parameter name, Wind Direction Vector.

WSA   A commonly used parameter name, Wind Speed Average.

WSP   A commonly used parameter name, Wind Speed.

WSR   An arbitrarily assigned parameter name, Wind Speed Resultant.

WSV   An arbitrarily assigned parameter name, Wind Speed Vector.

Zero   The name of predefined steps used by the calibration system for a user defined concentration level, usually obtained when a gas that does not cause the analyzer to respond has been introduced into an analyzer sample stream.

7.0 Index