



Site Monitor & Controller

Remote Monitoring & Control Unit

User Manual

CI-SITE/MC-0

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Daniels Electronics Inc. • Victoria, BC • Canada

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Document: Daniels Electronics Site Monitor & Controller User Manual

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PREFACE

This document describes the installation and operation of Daniels Electronics' Site Monitor & Controller main module hardware version 800-100-0001R03 and later.

The Site Monitor & Controller is a remote site monitoring and control product.

For systems integrated with TASC *siteVIEW* monitoring software, please refer to *siteVIEW* manual TA-D0C-0004A6

It is assumed that the reader is familiar with monitoring and control system concepts and has experience with the Windows™ operating system.

All screenshots were taken using software running under Microsoft Windows XP Professional™. The appearance on your computer may differ depending on your operating system.

Hardware and software described in this document are subject to ongoing development and improvement. Consequently there may be minor discrepancies between the information in this document and the performance and design of the hardware and software.

Terms used in this manual are explained in the Glossary.



Before connecting any equipment to the Site Monitor & Controller, the user is advised to read the Installation Procedure section of this document in its entirety. Application of voltages in excess of the built-in protection could seriously damage the Site Monitor & Controller and the equipment connected to it.

TABLE OF CONTENTS

PREFACE.....	I
LIST OF FIGURES.....	V
LIST OF TABLES	VI
1.0 PRODUCT DESCRIPTION	1
1.1 Applications.....	3
1.2 Site Monitor & Controller Main and Optional Modules	4
1.2.1 Site Monitor & Controller Main Module	4
1.2.2 Dual RS232 Serial Ports.....	4
1.2.3 Analog RF and 4-W Modem Plug-in Module Option	5
1.2.4 External Output Relays.....	5
2.0 INSTALLATION PROCEDURE	6
2.1 Rack Mount Option & Power Save Mode	6
2.2 Visual Indicators on the Main Module	7
2.2.1 LED Indicators	7
2.3 Connecting to the Digital Inputs	8
2.4 Analog Channel Voltage Inputs	9
2.4.1 Analog Channel Jumper Configuration	10
2.4.2 User Ranges.....	11
3.0 CONFIGURATION	12
3.1 The Site Monitor & Controller Configuration Utility (SCCU).....	12
3.2 Installing SCCU On Your Computer	13
3.2.1 SCCU Main Window.....	13
3.2.2 The SCCU Tool Bar.....	14
3.2.3 Tool Tips.....	14
3.3 Configuring System Operation	15
3.3.1 Power Save Features	17
3.3.2 Enable Power Save	17
3.3.3 Sleep/Log Period	17
3.3.4 COS Wakeup.....	18
3.3.5 OK / Cancel	19
3.4 Configuring the Communication Ports	20
3.4.1 FFSK Properties	21
3.4.2 Setting The TX Output Level.	23
3.4.3 Set Level.....	23
3.4.4 OK / Cancel	24
3.5 Configuring Contact Input Channels.....	25
3.5.1 Input Signal Configuration	26
3.5.2 Local Output Control.....	27
3.5.3 Input to Output Mapping	29
3.5.4 Local Control With No Network Message	29

3.6	Configuring Analog Channels	30
3.6.1	Range.....	31
3.6.2	User X	32
3.6.3	High & Low Set Points and Hold Timers.....	32
3.6.4	Invert Set Points	33
3.6.5	Mapping an Analog Channel	33
3.6.6	Local Channel Control	33
3.6.7	Output Delay.....	33
3.6.8	Logging Options	34
3.6.9	OK / Cancel	34
3.7	Configuring Temperature Channels	35
3.7.1	High & Low Set Points And Hold Timers	36
3.7.2	Mapping a Temperature Channel	36
3.7.3	Local Channel Control	37
3.7.4	Output Delay.....	37
3.7.5	Logging Options	37
3.7.6	OK / Cancel	37
3.8	Configuring Outputs	38
3.8.1	OK / Cancel	39
3.9	Saving A Configuration To Disk	40
3.10	Loading A Configuration From Disk	40
3.11	Setting The System Date And Time	41
3.11.1	PC Clock.....	41
3.11.2	Update.....	42
3.11.3	Cancel	42
3.12	View Status Window	42
3.12.1	Input Channel Status	42
3.12.2	Analog Channel Status	43
3.12.3	Temperature Channel Status.....	44
3.12.4	Output Channel Status	44
3.13	Preparing An OFF-LINE Configuration	45
3.14	Analog RF/4-W Modem Setup	46
3.14.1	The 4-Wire Interface.....	46
3.14.2	Setting The FFSK Properties For 4-Wire Line Use.....	48
3.14.3	Transmit And Receive Levels	48
3.15	Analog RF	49
3.15.1	Carrier Detection	50
3.15.2	Setting the TX output level.....	51
3.15.3	Setting The RX Input Level.....	52
4.0	SETTING UP AND TESTING A NETWORK	53
4.1	Using SCCU to Test a Master or Gateway Module	53
4.2	Making Changes in a Live Network	54
4.3	Resetting the Non-Volatile RAM (NVR)	54
4.4	Connecting the Optional Temperature Sensors	55
4.5	Tasks	56
4.5.1	Introduction to Tasks	56
4.5.2	Task Interval.....	56
4.5.3	Task Action.....	57

4.6	Data Logger Functions	58
4.6.1	Introduction to Data Logger Functions	58
4.6.2	System Panel	60
4.6.3	Sample Time Panel	61
4.6.4	Min/Max Time Panel	62
4.6.5	Enabling Logging	63
4.6.6	Contact Input Channel Logging	65
4.6.7	Run Status	66
4.6.8	Reading The Log	66
4.6.9	Log Files	66
4.6.10	Reading Airtime And Contact Accumulators	67
4.7	Tips For Setting Up A Network	69
4.7.1	Terminating Analog Inputs	69
4.7.2	Using Analog Inputs To Supplement Contact Inputs	69
4.7.3	Using A Channel As A Local Delay Timer	70
4.7.4	Sharing A Radio Channel With The Site Monitor & Controller	70
4.7.5	Without Sub-Audio (CTCSS/DCS) Signaling	70
4.7.6	With Sub-Audio (CTCSS/DCS) Signaling	70
4.7.7	Upgrading The Application Firmware	71
4.7.8	Errors during Flash Loading	73
5.0	SITEVIEW MONITORING SOFTWARE	74
6.0	SPECIFICATIONS	75
7.0	GLOSSARY OF TERMS	76
8.0	APPENDIX 1 – CONNECTOR ASSIGNMENTS	77
	Input/Output Connector	77
	Connector P1 – I2C Expansion port	77
	Connector P2 – Module Expansion port	77
	Connector CN8 – LED Indicator Expansion connector (if fitted)	77
	Connector CN11 – LCD Expansion connector (if fitted)	78
	Connector CN12 – Relay Expansion connector (option)	78

LIST OF FIGURES

Figure 1 -- Site Monitor & Controller with Multi-station Deployment	1
Figure 2 -- siteVIEW Software Monitoring a Site Monitor & Controller Network	1
Figure 3 -- Site Monitor & Controller System in Multi-Point-to-Point Application	2
Figure 4 -- Site Monitor & Controller over Private Serial Link	2
Figure 5 -- Site Monitor & Controller Main Module	4
Figure 6-- Analog RF & 4-W Modem Plug-in Module.....	5
Figure 7 -- Rack Mount Panel Face	7
Figure 8 -- Site Monitor & Controller Input Devices.....	9
Figure 9 -- SCCU Main Window	13
Figure 10 -- SCCU Tool Bar	14
Figure 11 -- Typical System Configuration Form	15
Figure 12 -- Power Save Option Configuration Window	17
Figure 13 -- Port Selection	20
Figure 14 -- Serial Port 1 Configuration.....	20
Figure 15 -- Baud Rate Selection	21
Figure 16 -- BINMP Protocol Selection	21
Figure 17 -- FFSK Module Configuration	22
Figure 18 -- BINMP Protocol Selection	22
Figure 19 -- Analog Modem Level Setting.....	24
Figure 20 -- Selecting Contact Inputs	25
Figure 21 -- Input Channel Configuration.....	26
Figure 22 -- Output Channel Selection.....	28
Figure 23 -- Set/Reset Output Selection	29
Figure 24 -- Analog Input Selection.....	30
Figure 25 -- Analog Channel Selection	31
Figure 26 -- User-selected Ranges for External Resistors.....	31
Figure 27 -- Timer/Function Options	34
Figure 28 -- Temperature Channel Configuration	35
Figure 29 -- Temperature Sensor Channel Selection	35
Figure 30 -- Output Channel Selection.....	38
Figure 31 -- Pulse 1 Output Mode Selection	39
Figure 32 -- File Name and Path Selection	40
Figure 33 -- File Open Icon for loading a configuration.....	40
Figure 34 -- Site Monitor & Controller CCF Configuration File Type.....	41
Figure 35 -- Date & Time Control Window	41
Figure 36 -- Calendar Date Selection Window.....	42
Figure 37 --Current Status Contact Input Channels Window	43
Figure 38 -- Current Status Analog Channels Window.....	43
Figure 39 -- Current Status Temperature Channels Window.....	44
Figure 40 -- Typical Output Channel Status Window	44
Figure 41 -- Output Channel Status Window & Refresh	45
Figure 42 -- Off-Line Configuration Window.....	45
Figure 43 -- Configuration Ports Serial 1 Selection.....	46
Figure 44 -- 4-Wire Wireline Plug-in Module	47
Figure 45 -- VHF/UHF Radio Plug-In Module Connection	49
Figure 46 -- Analog Modem Level Set.....	51
Figure 47 -- RX Input Level Diagram.....	52
Figure 48 -- Test Connect Window.....	54
Figure 49 -- Temperature Sensor.....	55
Figure 50 -- Task Set-Up Form	57

Figure 51 -- Data Logger Set-up Window.....	59
Figure 52 -- System Panel.....	60
Figure 53 -- Sample Time Panel	61
Figure 54 -- Minimum/Maximim Time Panel.....	62
Figure 55 -- Analog Channel Log Enabler.....	63
Figure 56 -- Logger Threshold Crossing Option.....	63
Figure 57 -- Logging Option Signal Selection	65
Figure 58 -- Air-timer & Contact Input Channels	68
Figure 59 -- System Flash Upload Menu.....	72
Figure 60 -- Open Flash ROM File Window	72
Figure 61 -- Flash Loading Progress Bar Window	72
Figure 62 -- Flash Loader Update Status Display	73
Figure 63 -- Sample of Incorrect Flash File	73
Figure 64 -- Sample of Damaged File Message	73
Figure 65 -- Basic Site Monitor & Controller Module.....	76

LIST OF TABLES

Table 1 -- Analog Input Jumper.....	10
Table 2 -- Analog Input Jumper Configurations.....	10
Table 3 -- Jumper Settings for Externally Supplied Resistor Network	11
Table 4 -- Suggested External Resistor Network Values	11

1.0 PRODUCT DESCRIPTION

The Site Monitor & Controller system is an industrial temperature-rated monitoring and control system that works well in many applications. A Site Monitor & Controller system may be deployed in stand-alone applications with one master station and many out-stations as shown below.

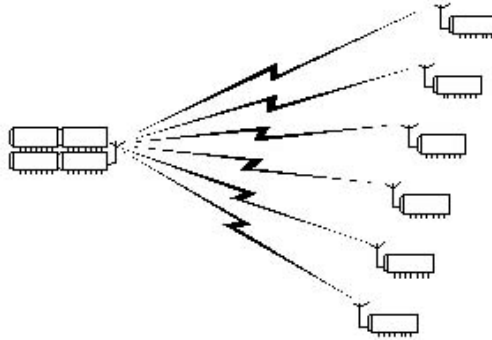


Figure 1 -- Site Monitor & Controller with Multi-station Deployment

A computer running siteVIEW monitoring and control software may control and monitor an entire network of Site Monitor & Controllers via a gateway site.

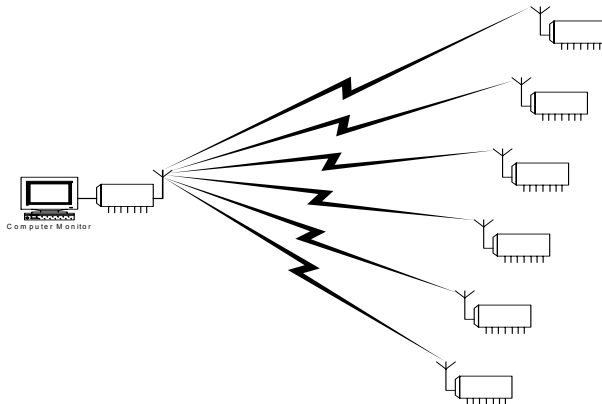


Figure 2 -- siteVIEW Software Monitoring a Site Monitor & Controller Network

The Site Monitor & Controller system may also be deployed in multi-point-to-point (MPP) applications where none of the stations are slaves.

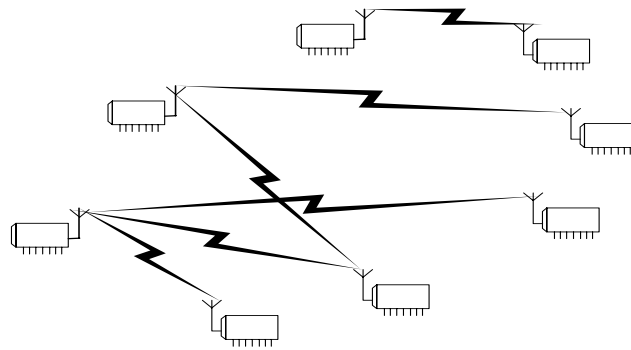


Figure 3 -- Site Monitor & Controller System in Multi-Point-to-Point Application

The Site Monitor & Controller system may be used in basic control applications where a switch or relay closure somewhere in the 'network of stations' is transferred as an event to another station's output to operate a relay. The key to these types of applications is input mapping. Input mapping allows any input event or a change in voltage to be sent to affect an output at any other station in the network.

The Site Monitor & Controller system may be used with many transmission media including RS232 serial channels, VHF & UHF analog radio, and 4-wire leased-line facilities.

The Site Monitor & Controller system may be used over a single private serial link to transfer inputs to outputs in a bi-directional manner (point to point). Applications include the transmission of alarm and contact information over fiber serial channels.



Figure 4 -- Site Monitor & Controller over Private Serial Link

The Site Monitor & Controller module has the following inputs and outputs:

- Eight digital 'contact' inputs capable of accepting a wide input voltage range (up to 60V) from contact closures, passive switches or solid state switching devices.
- Eight open drain output channels, each capable of switching up to 50V at 150mA.
- Eight analog input channels. Each channel can be programmed to generate an event whenever the voltage rises above a set point or falls below a set point (2 points per channel). The module may be programmed to affect output(s) at a distant station when an input event occurs.

- Eight-channel direct reading temperature bus when equipped with optional sensors.

A Site Monitor & Controller network may contain up to 254 stations.

The Site Monitor & Controller system, when used in conjunction with a Windows™-based computer running TASC *siteVIEW* software, may perform tasks in stand-alone situations or system-wide. Some examples of tasks are:

- Report selected voltage levels at different sites in the system.
- Report selected temperatures at different sites in the system (when temperature option is fitted).
- Report alarms or abnormalities in a system.
- Perform automatic local site control.

1.1 Applications

The Site Monitor & Controller's software capabilities, combined with the flexible interfacing scheme allows a Site Monitor & Controller system to be deployed as a solution in many monitoring and control applications.

The system may be deployed in simple applications where command and control information is transported over a VHF/UHF radio link, wire-line circuits, or fiber optic cabling.

Applications are found in monitoring and control of remote assets such as:

- communication sites (door open; intrusion, temperature, back-up battery voltage)
- oil and gas well equipment (flow rates, generator, voltage)
- oil and gas production and transport facilities (flow rates, pump-off, pressure, RPM)
- management of fresh and waste water (tank level, pump actuation)

1.2 Site Monitor & Controller Main and Optional Modules

1.2.1 Site Monitor & Controller Main Module

The Site Monitor & Controller main module provides interfacing for 8 digital 'contact' inputs capable of accepting contact closures such as passive switches and relays as well as active devices. The module also provides 8 'open drain' FET output channels suitable for driving a wide range of loads, such as relays, indicators and contactors. A 10-bit A/D converter provides an eight-channel interface for reading analog voltages. The main module also has an eight-channel temperature sensor bus. Optional temperature sensors are available.

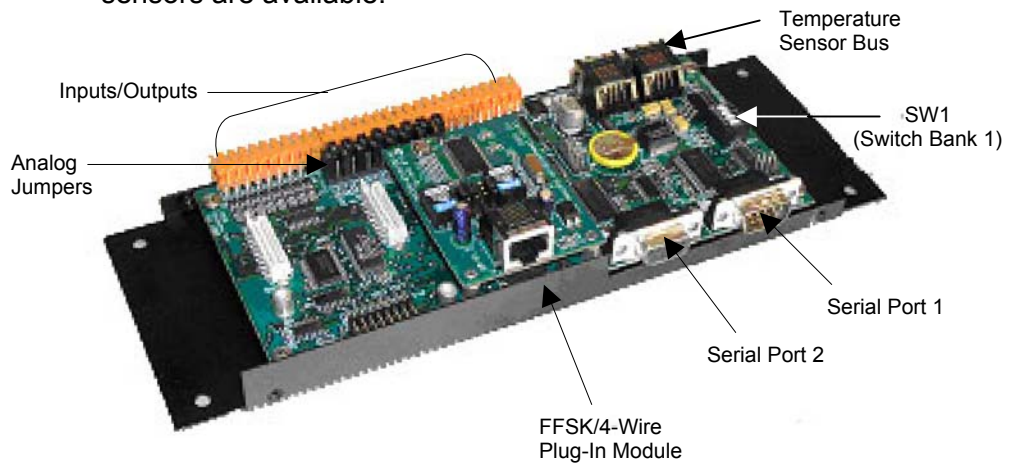


Figure 5 -- Site Monitor & Controller Main Module

The wiring of the input and output can be found in the Appendix.

1.2.2 Dual RS232 Serial Ports

The main module provides two independent synchronous/asynchronous RS232 serial ports. The serial ports can be used to:

- configure the module locally (on site, through a serial cable) by running the Site Monitor & Controller Configuration Utility (SCCU) software from a desktop or laptop computer
- in gateway mode, it can provide the communication interface to a data radio in order to communicate with other Site Monitor & Controllers in a network
- in gateway mode, it can provide the communications interface to a centralized computer running TASC siteVIEW alarm monitoring and control software

1.2.3 Analog RF and 4-W Modem Plug-in Module Option

The analog RF (Radio Frequency) and 4-wire modem plug-in module provides robust FFSK data signaling to other Site Monitor & Controllers or to a centralized computer running siteVIEW software. The FFSK signaling can be carried over analog VHF/UHF radio systems or over wireline facilities.

The module is configurable as an unbalanced high-impedance interface, typically for connecting to an analog radio. It may also be configured as a 600-ohm balanced interface, typically for connecting to 4-wire E+M circuits and leased lines.

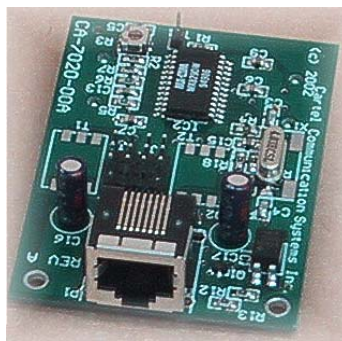


Figure 6-- Analog RF & 4-W Modem Plug-in Module

1.2.4 External Output Relays

The Site Monitor & Controller main module provides 8 'open drain' FET outputs, each capable of driving up to 50V at 150mA. For applications that require isolated dry-contact outputs, a customized external relay bank may be ordered.

2.0 INSTALLATION PROCEDURE



On newer Site Monitor & Controller main modules (800-100-0001R03 and later), the power supply input connection has been reversed from earlier versions. Please be sure that the positive voltage is indeed on the positive input (+) and the negative (common) voltage is on the negative input (-).

2.1 Rack Mount Option & Power Save Mode

The Site Monitor & Controller can be supplied in a 19" (inch) rack mount single-height (1U) enclosure. This 19" rack mount option can accommodate up to two Site Monitor & Controller modules. On the face of the rack panel are two rows of three LED indicators. The top row is for the Site Monitor & Controller board mounted on the left side of the rack enclosure (facing the rack from the front). The bottom row is for the Site Monitor & Controller board mounted on the right side of the rack, if provided. The LEDs are labeled as follows:

- Green: "AWAKE" (flashes when unit is fully on)
- Amber: "SLEEP" (flashes when unit is in power save mode. If not configured for power save mode, it is OFF)
- Red: "TX" (ON when the unit is transmitting data)

Physical access to the serial port is accomplished by removing the front faceplate. If the Site Monitor & Controller is configured to be in power save mode, a switch is available behind the rack mount front panel to wake up the board so that configuration changes can be made. This switch is attached to the right side of the rack mount LED board that is accessed by removing the front faceplate. To wake up the left-mounted Site Monitor & Controller board, hold the switch in the up position for at least the duration of the sleep cycle, typically several seconds.

To wake up the right-mounted Site Monitor & Controller board, hold the switch in the down position for at least the duration of the sleep cycle, typically several seconds.

The green LED will remain on when the switch is released, indicating that the board is now awake. Once the board has woken up, activity from the configuration utility (SCCU) will keep the board awake. When the Site Monitor & Controller senses inactivity for two minutes, the board will automatically revert to power save mode if configured to do so.

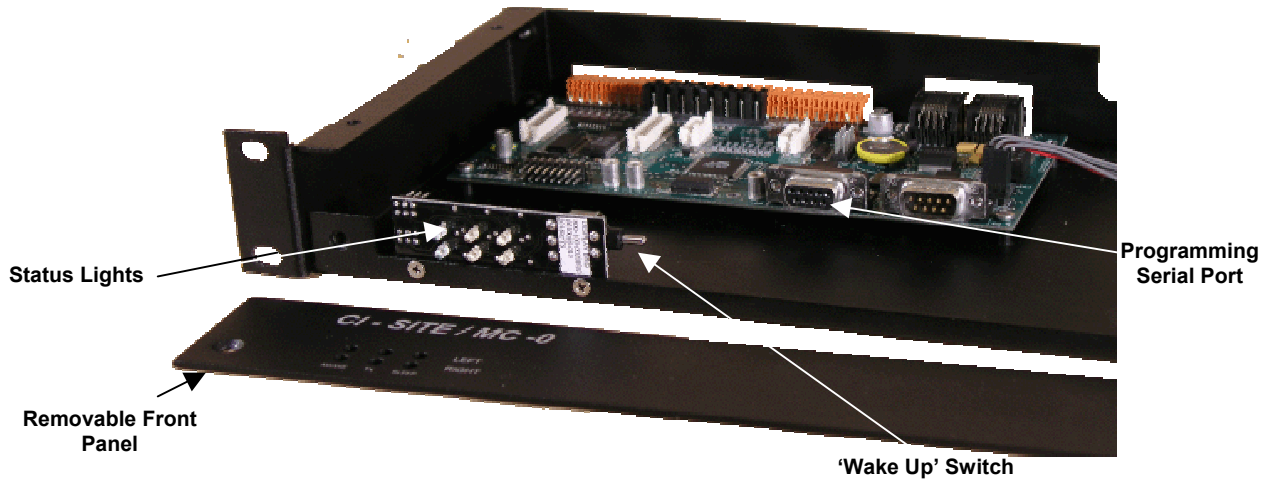


Figure 7 -- Rack Mount Panel Face

2.2 Visual Indicators on the Main Module

2.2.1 LED Indicators

There are three LED indicators on the Site Monitor & Controller main module:

- The green LED flashes at approximately one-second intervals when the module is operating normally
- The red LED is illuminated when the module is transmitting data
- The amber LED indicates sleep mode.

Power Up

During power up and initialization of the module the red and green indicators flash together for approximately 5 seconds. When initialization of the module is complete, the green LED flashes at approximately one-second intervals.

Bootstrap (Uploading new firmware into flash memory)

During flash uploading, the red and green indicators flash together for the duration of the upload. When the upload is complete, the green LED flashes at approximately one-second intervals.

Normal Operation

During normal operation, the green LED flashes at approximately one-second intervals.

Power-Save Operation

The Site Monitor & Controller is capable of running in a power-save mode. In this mode, the green LED will flash dimly at the rate set by the Sleep/Log period. For further information, refer to the Power Save Features section.

2.3 Connecting to the Digital Inputs



The Site Monitor & Controller module cannot accept voltages on its inputs that are negative with respect to ground. Application of negative voltages to the digital and analog inputs will damage the module.

The Site Monitor & Controller module contact input channels accept any voltage from +2.1V DC to +60V DC as a logical high input. Any voltage below +2.0V DC is considered to be a logical low input. When an input is unterminated or floating, i.e. the equipment driving the Site Monitor & Controller input is open circuit, then the input to the module is logically high.

The physical interface to the Site Monitor & Controller module is very adaptable to most applications. Each of the module's 8 'contact' type input channels on the main module are capable of accepting a dry switch or contact closure, and may be programmed to be normally open or normally closed. The input channel is also capable of accepting a wide input voltage range. The input channel may be driven by many types of devices, as shown below:

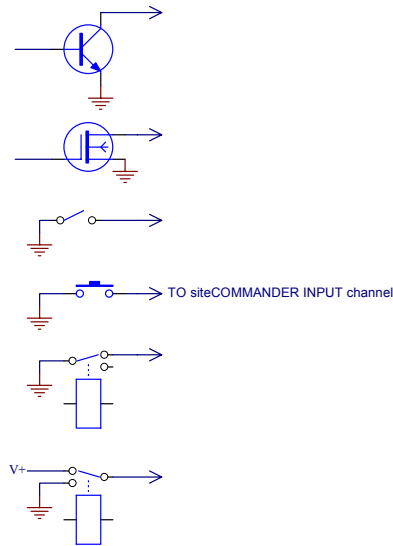


Figure 8 -- Site Monitor & Controller Input Devices

The Site Monitor & Controller module may be programmed to work with push buttons, switches and signals, which close momentarily. An application may require that the momentary closure of a switch latch an event rather than just toggle between two states. When the input is programmed as a ‘toggle input’, a momentary closure will latch an event and the next momentary closure will un-latch the event. This subject is covered in more detail in the following sections of this document.

2.4 Analog Channel Voltage Inputs



The Site Monitor & Controller module cannot accept voltages on its inputs that are negative with respect to ground. Application of negative voltages to the digital and analog inputs will damage the module.

The module provides fixed input ranges of 0-2.56V, 0-5.12V, 0-25.0V and 4-20mA depending on jumper settings. Four user ranges of X2, X4, X10 and X20 can also be programmed based on a 5 V internal reference.

2.4.1 Analog Channel Jumper Configuration

Each analog channel may be set to a different range via jumpers J1 to J16 in conjunction with the SCCU utility. Each channel has two jumpers noting that the order of jumpers is reversed, i.e. J1 & J2 correspond to the highest analog channel:

Channel	Jumper block
8	J1 / J2
7	J3 / J4
6	J5 / J6
5	J7 / J8
4	J9 / J10
3	J11 / J12
2	J13 / J14
1	J15 / J16

Table 1 -- Analog Input Jumper

Each pair of jumpers configures one of four programmed ranges.

Channel	0-2.56V	0-5.0V
1	J16-1 to J16-2, J15 Out	J16-1 to J16-2, J15 Out
2	J14-1 to J14-2, J13 Out	J14-1 to J14-2, J13 Out
3	J12-1 to J12-2, J11 Out	J12-1 to J12-2, J11 Out
4	J10-1 to J10-2, J9 Out	J10-1 to J10-2, J9 Out
5	J8-1 to J8-2, J7 Out	J8-1 to J8-2, J7 Out
6	J6-1 to J6-2, J5 Out	J6-1 to J6-2, J5 Out
7	J4-1 to J4-2, J3 Out	J4-1 to J4-2, J3 Out
8	J2-1 to J2-2, J1 Out	J2-1 to J2-2, J1 Out
	*range also selected by SCCU	* range also selected by SCCU

Channel	0-25V	4-20mA
1	J16-3 to J16-2, J15-1 to J15-2	J16-1 to J16-2, J15-2 to J15-3
2	J14-3 to J14-2, J13-1 to J13-2	J14-1 to J14-2, J13-2 to J13-3
3	J12-3 to J12-2, J11-1 to J11-2	J12-1 to J12-2, J11-2 to J11-3
4	J10-3 to J10-2, J9-1 to J9-2	J10-1 to J10-2, J9-2 to J9-3
5	J8-3 to J8-2, J7-1 to J7-2	J8-1 to J8-2, J7-2 to J7-3
6	J6-3 to J6-2, J5-1 to J5-2	J6-1 to J6-2, J5-2 to J7-3
7	J4-3 to J4-2, J3-1 to J3-2	J4-1 to J4-2, J3-2 to J3-3
8	J2-3 to J2-2, J1-1 to J1-2	J2-1 to J2-2, J1-2 to J1-3
	* range also selected by SCCU	* range also selected by SCCU

Table 2 – Analog Input Jumper Configurations

When a range is selected via the jumper block, the corresponding range must also be set via the SCCU utility.

2.4.2 User Ranges

The user may select one of four external analog ranges by supplying an external 'potential divider' resistor network. 1% tolerance resistors should be used. To configure a channel for an externally supplied resistor network, set the jumpers as shown in the chart below.

Channel	Jumper block
1	J16-1 to J16-2, J15 Out
2	J14-1 to J14-2, J13 Out
3	J12-1 to J12-2, J11 Out
4	J10-1 to J10-2, J9 Out
5	J8-1 to J8-2, J7 Out
6	J6-1 to J6-2, J5 Out
7	J4-1 to J4-2, J3 Out
8	J2-1 to J2-2, J1 Out

Table 3 -- Jumper Settings for Externally Supplied Resistor Network

2X	4X	10X	20X
Ra = 10KΩ Rb = 10KΩ	Ra = 30KΩ Rb = 10KΩ	Ra = 90KΩ Rb = 10KΩ	Ra = 190KΩ Rb = 10KΩ

Table 4 -- Suggested External Resistor Network Values

3.0 CONFIGURATION

3.1 The Site Monitor & Controller Configuration Utility (SCCU)

The Site Monitor & Controller configuration utility is called the SCCU. The SCCU utility provides a means to set the module's many operating parameters from a personal computer.

Once a configuration has been edited or changed, it is written back into the Site Monitor & Controller's configuration memory.

The computer system must meet the following minimum requirements:

- Pentium II 200 MHz CPU
- Serial port
- 128MB RAM
- CD-ROM Drive
- 10MB of free hard disk space
- Windows™ 98 Second Edition, WinNT4.0 (Service Pack 4 or higher), Windows ME, Windows 2000 or Windows XP operating system

The SCCU can be used to configure a Site Monitor & Controller module in three ways:

Direct - Via a serial cable connection between the module and the SCCU computer

Over The Air – Once the basic configuration has been programmed, the module may be reconfigured remotely via the primary transmission medium

Off-Line Edit Mode - A configuration may be prepared in advance and saved to disk on the SCCU computer for later uploading to the module

When connecting directly, connect the programming cable between Serial Port 1 and the nominated serial port on your computer (COM1, COM2 etc).

When first shipped, the Site Monitor & Controller module's configuration is set to the factory defaults. When the configuration is downloaded, you may edit any of the parameters and upload them back into the module.

3.2 Installing SCCU On Your Computer

SCCU is supplied on CD. Place the CD in the computer CD ROM drive. If the CD does not automatically run, use Windows Explorer to access the setup.exe file and double click on it. Follow the on-screen instructions.

3.2.1 SCCU Main Window

When SCCU is first started, a number of items are shown grayed out in the main window.

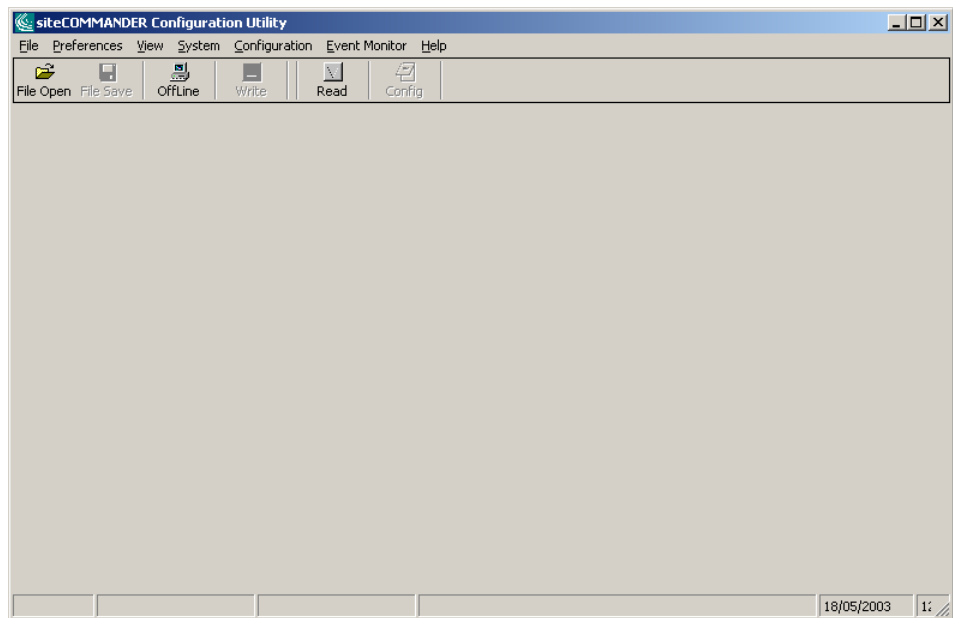


Figure 9 -- SCCU Main Window

3.2.2 The SCCU Tool Bar



Figure 10 -- SCCU Tool Bar

The Tool Bar provides one-click access to common functions. These are:



File Open: Provides access to previously saved configuration files. Configuration files can be opened, loaded into SCCU and then uploaded to the Site Monitor & Controller module.



File Save: Allows an SCCU memory configuration to be saved as a disk file. This button will be disabled (grayed out) when SCCU is first launched, since the SCCU memory will contain no useful information.



OffLine: Allows a defaulted configuration to be edited in the SCCU memory without being connected to a Site Monitor & Controller module. The edited configuration may be saved to disk using the File Save button.



Write: Writes a SCCU memory configuration into the Site Monitor & Controller module. The tool will be disabled (grayed out) when SCCU is first launched, since the SCCU memory will contain no useful information.



Read: Reads a Site Monitor & Controller module's configuration into the SCCU. The PC communication port must first be selected and a cable connected to Serial Port 1 on the Site Monitor & Controller module.

3.2.3 Tool Tips

Resting the mouse on a tool or item will provide a tip as to what the function of the tool or item is.

3.3 Configuring System Operation

System configuration items are those that affect the whole module operation. A typical system configuration form is shown below.

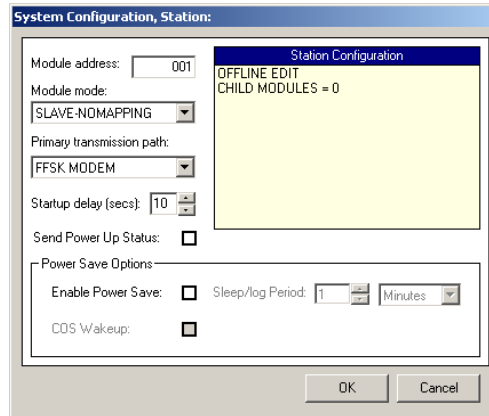
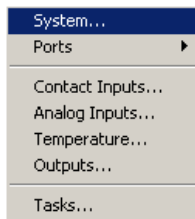
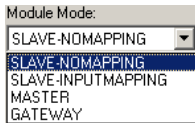


Figure 11 -- Typical System Configuration Form



Once connected to a Site Monitor & Controller module, the station configuration is shown in the Station Configuration panel. Information on the Site Monitor & Controller module firmware revision, any plug-in modules that are fitted, and temperature channel sensors will be shown in this panel. The Station Configuration panel is an informational panel only. The System Configuration window may also be accessed by selecting System in the configuration menu.



Module Address: This is the unique address that that is allocated to the module. The address may be set to between 1 and 254 inclusive. Addresses 0 and 255 are normally reserved for modules configured as MASTER or GATEWAY and for site management purposes.

Module Mode: A module or modules that make up a station may operate in one of four primary modes as follows:

The **SLAVE-NOMAPPING** mode is used when the module is to be used as a SLAVE in a network with the TASC siteVIEW monitoring software running at a single gateway station. In the SLAVE-NOMAPPING mode the module does not perform any input to output channel or station mapping, but can perform mapping to local outputs. All events are sent directly to the Master station with no mapping information because the destination of all events is the TASC siteVIEW monitoring software.

The **SLAVE-INPUTMAPPING** mode is used when the module is to be used as a SLAVE in a network with a single Master station and the module is to perform input to output channel mapping. This configuration is designed where an input change will affect an output at the Master site.

The **MASTER** mode is used when channel mapping is desired with switches, relays, lamps etc. A system may be deployed with multiple Masters in an application.

The **GATEWAY** mode is used when TASC siteVIEW monitoring software is used to monitor a network of Site Monitor & Controllers. A single Site Monitor & Controller must be connected to the PC and configured as a Gateway in order to provide the 'air interface' between the PC and the analog radio or wire-line network.

If this module will be the master in a system or network with a traditional (single) master and multiple slaves, then select MASTER. Note that selecting MASTER will reset the Module Address to 000 – but the user may still change the address. If the application will have several SLAVE modules and a single MASTER then the address must be set at zero. If this module will be used in a multi master application (MPP), then each MASTER must be allocated a unique address. If the module will be a slave in this network, select SLAVE by clicking on the tool. Note that the Module Address may then be set between 1 and 254. Be sure to set a unique address for each slave module in the system.

One of the many features of the Site Monitor & Controller module is the ability of the system to be deployed in a multipoint to point application (MPP). In MPP applications, a Site Monitor & Controller module is capable of communicating with any other MASTER configured module in the network. In MPP applications there is no slave, it is a 'multi-master' network. If the module will be used in a Point-to-Multipoint network then choose the MASTER setting. Be sure to allocate a unique address for each MASTER module in the MPP application, other than zero.

Startup Delay: It is recommended to program a start up delay into each Site Monitor & Controller. This allows other peripheral equipment in the station sufficient time to stabilize after power has been applied to the site. Input and Analog scanning will be delayed until this period expires, thus preventing the transmission of status information to other stations in the network.

Send Power Up Status: Normally when a module is configured as a SLAVE, it will only transmit a response when polled by the master, or whenever some input value changes state or exceeds a setting. The Send Power Up Status check box allows a SLAVE module to report its power up status to the master after the Start Up Delay has expired. Click to enable this feature.



Transmission Path: This tool selects the primary path the module will use to communicate with other stations in the network. This is the transmission path that the module will use when sending event messages. The Site Monitor & Controller system also has a packet transponder or routing function, which provides a mechanism for accepting a packet on a primary channel and routing it to and from remote station(s).

A transmission path can be one of the following:

SERIAL PORT 1: This is Port1 on the main module. This is an RS232 channel capable of baud rates up to 230,400 bps and may be used for local configuration.

SERIAL PORT 2: This is Port2 on the main module. This is an RS232 channel capable of baud rates up to 230,400 bps and may be used for connection to a modem.

FFSK-MODEM: This option selects the optional FFSK modem plug-in module for use with an analog radio link (VHF or UHF), or a 4-wire wire-line or leased line.

The factory default transmission medium is FFSK MODEM.

3.3.1 Power Save Features

The Site Monitor & Controller module features a power-saving mode, which is targeted toward reducing power consumption in solar-powered applications.

Power-save mode is configured in the lower panel of the system window.

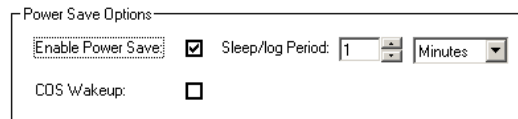


Figure 12 -- Power Save Option Configuration Window

3.3.2 Enable Power Save

When the Enable Power Save option is checked, the Site Monitor & Controller will shut down areas of the module that are not in use, thereby reducing the power consumption. When in power save mode, the clock rate of the processor is reduced and the processor is put to sleep for extended periods as defined by the user in the Sleep/Log period.

3.3.3 Sleep/Log Period

In power save mode, the processor sleeps for the period set by the Sleep/Log Period control. The period can be set to between 1 second and 60 hours.

Naturally the greater the sleep period, the greater the power saving. When this time expires, the processor is 'woken up' and tests for any event conditions that may exist (e.g. user has enabled a channel to report events). If none are found and the data logger functions are turned off (discussed in the data logger section of this document) the microprocessor resumes the sleep mode and the process repeats.

As a rule of thumb, a Sleep/Log Period of about ten seconds or more will significantly reduce Site Monitor & Controller's overall power consumption.

If there are event conditions present (e.g. user has enabled a channel to report events such as an input that has turned on/off, or an analog or temperature input is outside a programmed range), the 4-wire/RF modem module is brought out of low power mode and the events are transmitted to the host Site Monitor & Controller or siteVIEW equipped host station. When the 'acknowledge' is received from the host, the processor re-enters sleep mode for the next period.

3.3.4 COS Wakeup

When the Site Monitor & Controller is used with the 4-wire/RF modem, the externally supplied radio carrier detect (COS) can also be an additional wake up source independent of the Sleep/Log Period. If carrier (COS) is detected, the processor wakes up and brings the 4-wire/RF modem out of low power mode. If there is no recognized FFSK signal present and the carrier is lost, the module will return to sleep mode. If an FFSK data signal is detected from the radio then this is processed in the normal manner. When Carrier Detect is lost the processor tests for any trigger conditions and if any are found these are transmitted to the host Site Monitor & Controller or siteVIEW equipped station. When the 'acknowledge' is received from the host the processor resumes sleep mode.

The Power Save Mode is subject to the following conditions:

- Since the processor is effectively regulated by the Sleep/Log Period, the Sleep/Log period determines how often the module will scan the digital input channels, and read each of the analog and temperature channels, thus determining the resolution of signal inputs and the sample period for the data logger function.
- Applications that cannot tolerate scanning periods slower than one second should not use Power Save Mode.
- The local ALARM output function cannot be used.
- If using the set/reset local output function, the signal level to set or reset a local output must be present for a time greater than the sleep time period in order to be recognized.

When power save mode is active, the green LED (activity heartbeat indicator), no longer flashes at one-second intervals. Instead the red and amber LEDs will flash together at a low intensity. The red and amber LEDs will also flash at the interval programmed in the Sleep/Log period and not at one-second intervals.



If COS Wakeup is to be used, the FFSK module must be configured for an externally-supplied carrier detect signal from the radio.

COS Wakeup cannot occur using the FFSK module's internally generated signal.



If an external carrier detect signal is not available and long sleep periods are programmed (i.e. minutes or hours) then an incoming signal from the radio subsystem will be missed and remote communication with the remote Site Monitor & Controller will not take place. Refer to the section in this document on how to set up the FFSK module for external carrier detection.

The RS232 interface is power-saved continuously during power save mode. During this time it will not be possible to communicate with the Site Monitor & Controller module via either of the RS232 channels using the SCCU utility, though FFSK transmission will still be possible.

To bring the module out of power save mode take the following steps to activate the RS232 interface*:

1. Connect a data cable between Serial Port 1 of the Site Monitor & Controller and the serial port on the PC.
2. With power still on the module, move switch 1 (SW1-1) on the main module to the ON position. After the Sleep/Log period the module will return to full power mode and the green LED will flash at normal intensity at one-second intervals. Note: If the Sleep/Log period is programmed for a lengthy period then you may need to wait until this period has elapsed.
3. Start the SCCU utility and Connect to the module using SCCU.
4. When reconfiguration is complete, remove the data cable.
5. With power still applied, move ALL switches to the OFF position. If programmed, the module will return to the power save mode automatically after three seconds and the green, red and amber LED indicators will flash at a dim level at the interval specified in the Sleep/Log period.

*To awaken a rack-mounted Site Monitor & Controller, see the section titled "Rack Mount Option & Power Save Mode."

3.3.5 OK / Cancel

Click OK to keep the configuration changes.

To discard any changes, click the Cancel button.



Note: Variables are not written into the Site Monitor & Controller's configuration memory until the Write button (located on the Tool Bar) is clicked.

3.4 Configuring the Communication Ports

The Site Monitor & Controller has three main communication ports: two RS232 asynchronous serial ports and, when fitted, a synchronous FFSK modem plug-in module for use with a VHF/UHF radio or wireline circuit.

The ports configuration menu is accessed through Select Configuration | Ports.

Select the port you want to configure.

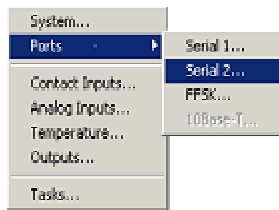


Figure 13 -- Port Selection



Note that the actual port that will be used as the PRIMARY transmission medium is set via Transmission Path in the System form – not here.

A typical setup form for Serial Port 1 is shown below. The setup for Port 2 is identical.

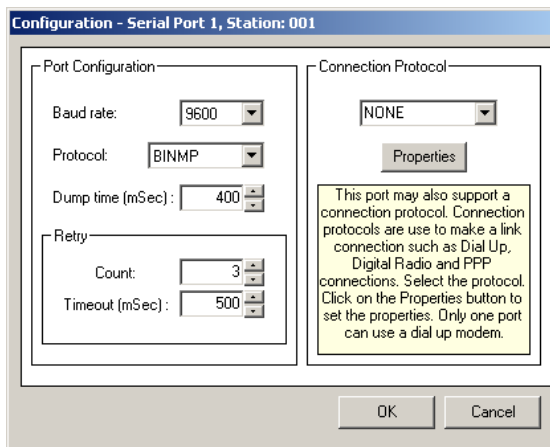


Figure 14 -- Serial Port 1 Configuration

Baud rate: This is the asynchronous speed that the port will operate at. This should match that of the connected equipment.



Figure 15 -- Baud Rate Selection

A serial port may operate at baud rates between 2400 and 230,400 baud.

Protocol: The Site Monitor & Controller serial port may be configured to operate with one of a number of ‘base’ protocols. The SCCU utility and siteVIEW software products require that the protocol be set to BINMP (Binary Mode Protocol). All stations within a network must operate the same protocol. *PPP is currently unsupported and is only there for future reference.*



Figure 16 -- BINMP Protocol Selection

Dump time: This specifies the inter-byte timer delay for Binary Mode Protocol and is used to flush a stalled packet. The user should accept the default value.

Retry timeout and Count: The retry timeout sets the amount of time the Site Monitor & Controller module will wait before re-sending the status information in the event that no station acknowledges receipt of it. The number of times it will retry is set by the Retry count control. More information on the use of this control may be found in the section on Tips for Setting up your network.

3.4.1 FFSK Properties

The FFSK module configuration is set up through the FFSK properties window as shown below. From the main menu select Configuration | Ports | FFSK.

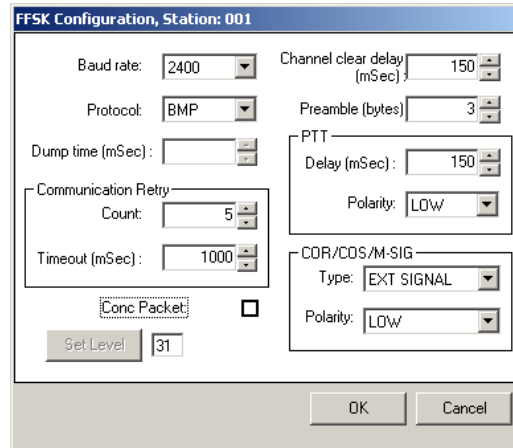


Figure 17 -- FFSK Module Configuration

Baud rate: This is the transmission rate that will be used over the air or via the wire line. There are two options, 1200 and 2400 baud. Normally 2400 baud is selected. 1200 baud should be selected when operating in a noisy or difficult bandwidth limited RF environment. All stations must use the same baud rate.

Protocol: The Site Monitor & Controller module may be configured to operate with one of a number of protocols. Normally with TASC supplied software products the protocol will be BINMP (Binary Mode Protocol). All stations within a network must operate the same protocol.



Figure 18 -- BINMP Protocol Selection

Dump time: This parameter is currently unassigned and has no effect on system operation.

Retry timeout and Count: The retry timeout sets the amount of time the Site Monitor & Controller module will wait before re-sending the status information in the event that no station acknowledges receipt of it. The number of times it will retry is set by the Retry count control. More information on the use of this control may be found in the section on Tips for Setting up your network.

COR/COS/M-SIG Delay: This is the amount of time that the channel must remain clear (un-occupied) and without Carrier Detect or MIN (M-Signal) before a module will attempt a transmission.

Preamble: This is the number of bit sync bytes that are initially sent by the transmitting module. Normally this is set to 3.

PTT Delay: Many transmitters take many tens of milliseconds to reach their full operating power after they are keyed up. This control sets the delay that will occur before the FFSK modem will begin transmitting data. When setting this value you must also take into consideration the COR/COS/Squelch opening time (delay) of the distant receiver.

PTT Polarity: This control sets the PTT signal (push to talk) as a low active or high active signal and should match that of the transmitter.

COR/COS/M-SIG TYPE: This selects between two types of Carrier Detection. When set to INT SIGNAL, the modem will detect energy in the voice band and provide Carrier detect. When set to EXT SIGNAL, the module uses the externally supplied COS/M-Signal input via the module's opto isolator.

EXT SIGNAL mode is the preferred method and must be used if the power save mode will be used and Carrier detect is to be used to wake up the module.

The polarity of the external M-Signal (COR/COS) can be set via the COR/COS/M-SIG Polarity.

COR/COS/M-SIG Polarity: This selects the polarity of the externally supplied Carrier detect (COS/COR) signal. If the radio supplies an active high signal when carrier is present, select HIGH, otherwise select LOW. If the COR/COS/M-SIG Type is set to internal then this option will be disabled as it is not relevant for this mode.

Further information on interfacing to an analog radio or wire-line is provided in the Analog RF/4W Modem Setup section in this document.

3.4.2 Setting The TX Output Level.

The FFSK transmission level may be set electronically. To set up the transmitter deviation or level to the wire-line you must be connected directly via cable to the module.

You cannot perform this test if connected to a station via the network or transmission medium other than cable connection.

3.4.3 Set Level

Click on the Set Level button in the FFSK setup window.



Note: This button will be disabled (grayed out) in the Off-Line edit mode or if connected to a station via the network transmission medium.

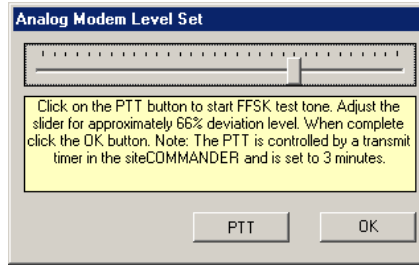


Figure 19 -- Analog Modem Level Setting

Whenever the PTT button is accessed (clicked), the module's input channel scanner is stopped. If the module is configured as MASTER and the station poller task is active, the poller task is suspended. A message window will appear as the poller is shut down. If the task is active and polling is currently active, it may take 2 or three seconds before the PTT button becomes active.

The PTT button will turn green and the button will change to PTT ON. Adjust for the desired level using the slider control. When adjusted click on the PTT button again to turn off the test.

The module's input scanner is restarted 3 seconds after the PTT tests are concluded. If the station poller was running and suspended, the station poller task is resumed after one additional interval period.

All tests activate a test timer. The test timer prevents the situation where the SCCU utility is aborted abnormally and the tests are not shut down in an orderly fashion. In this case the timer expires and releases the scanner and restarts any suspended poller task.

Further details on setting the transmitter or wire-line level are described in the Analog RF/4W Modem setup section later in this document.

3.4.4 OK / Cancel

Click OK to keep the configuration changes.



Note: Variables are not written into the Site Monitor & Controller's configuration memory until the Write button is clicked.

To discard any changes, click the Cancel button.

3.5 Configuring Contact Input Channels

There are two types of inputs on the Site Monitor & Controller module. There are 8 “digital” inputs suitable for monitoring switches or contact closures. These are referred to as ‘contact’ input channels in that they may be ON or OFF. The module also has a group of 8 analog input channels suitable for monitoring various voltages. These are referred to as Analog channels in this document.

From the main menu select Configuration | Contact Inputs. This menu option is only available when Off-Line Edit mode is activated or after configuration has been down loaded from the module(s).

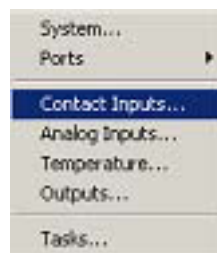


Figure 20 – Selecting Contact Inputs

It is recommended that all channel parameters be set before finally enabling the channel.

The input channel configuration menu (shown below) allows each of the inputs to be configured.

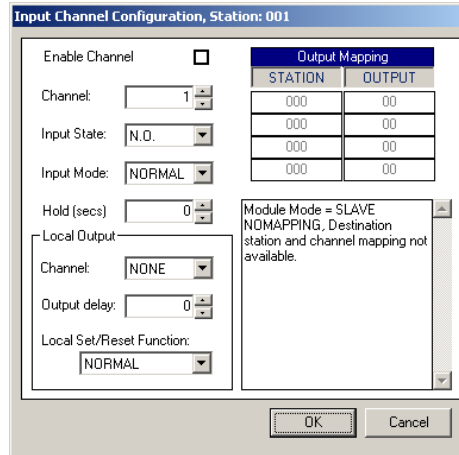


Figure 21 -- Input Channel Configuration

The desired input channel is selected via the Channel ‘spin wheel’ up/down arrows.

The maximum number of channels for the target configuration is automatically determined by the SCCU utility when it interrogates the Site Monitor & Controller module.

Once a channel is configured for the application, it is enabled by clicking the Enable Channel box. An enabled channel will report a status change immediately. If a channel is not enabled, the status of the channel will still be updated if polled by siteVIEW.

3.5.1 Input Signal Configuration

Input State: This is the OFF or normal state of the input signal. The input signal can be either N.C. (normally closed or low level input) or N.O. (normally open or high level input).

Input Mode: There are two types of input modes, normal and toggle. In the normal mode the module expects the inputs to be held by contact or switches closures such as relays or toggle switches or open collector drivers, i.e. these will be on or off – the transition through both states (off to on and on to off) will be recognized. Select NORMAL if this is the mode the channel will operate in.

In Toggle mode, the input may be driven by a momentary push button or external pulse. In this mode the first press of the button (or pulse, or level) registers as an ON condition and primes the channel to generate an ON status message (if enabled). No OFF event is sent when the button or signal is released. The second push of the button (or pulse, or level) registers as an OFF condition and primes the channel to generate an OFF status message (if enabled). Once again, no OFF event is sent when the button or signal is released. Select TOGGLE if this is the mode the channel will operate in.



Note that when TOGGLE mode is selected it is not possible to use a local output delay. This control will be forced to zero and disabled when in TOGGLE mode. This control can also be overridden by the Set/Reset control.

Hold Time: If desired, each input channel can be associated with a hold timer. A change in input event status will not be sent on the network until the input event has been present for the time specified in the Hold Time control. If the event is to be instantaneous, set this control to zero (0). The hold time is specified in seconds. The hold timer can be used to ignore short signal impulses by specifying a hold time of greater than the duration of the signal.

3.5.2 Local Output Control

An input event can be set to change the state of a local output independently of whether the channel is enabled to generate network event status messages or not. An input signal can be configured to turn on a local output in the presence of an input signal or turn off in the absence of an input signal. An independent output delay may also be programmed. Furthermore any input signal can be configured to set (turn on) or reset (turn off) a local output channel. Any number of input channels can be configured to turn on or set/reset a common output channel – there is no restriction.

Channel: The input event may also be configured to drive a local output (turn it on or off). The Local Output drop down box shows the total number of outputs that can be controlled in this configuration. To use this feature, scroll and select the desired output channel. As the module makes no checks for double assignments, you must make your own determination if you want multiple inputs to affect a common output. The maximum number of channels available for the target configuration is automatically determined by SCCU when it interrogates the Site Monitor & Controller system. If NONE is selected then the Output Delay control is disabled.

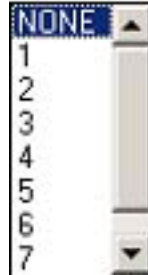


Figure 22 -- Output Channel Selection

Output Delay: A local output delay may be introduced before the local output is changed. The delay is from the time that the event is initially recognized and operates independently to any input Hold Time. The output delay functions in much the same way as the input hold timer, that is, the signal must be present for the time specified in the output delay control before affecting the local output channel. This allows a completely independent delay to be applied to the local output function. If the event is to be instantaneous, set this control to zero (0). The hold time is specified in seconds. Local output control can be used independently of network event transmission. If a channel is enabled (Enable channel box checked) and the channel map fields are left at zero, then no event transmission will take place as there is no destination channel to send to. This type of configuration can be used in conjunction with local output control to delay a local input to local output signal, or to use the set/reset function without generating a network transmission event.



Note that when TOGGLE mode is selected it is not possible to use a local output delay. This control will be forced to zero and disabled when in TOGGLE mode.

Local Set/Reset Function: Multiple inputs may directly set and reset local outputs via this function. An input channel may be configured to set (turn on) or reset (turnoff) a 'common' local output channel. Thus one input channel may be configured to set and another channel configured to reset a common output. If the specified output is to be set (turn on) by this channels signal then select SET OUTPUT. If the specified output is to be reset (turn off) by this channels signal then select RESET OUTPUT. There is no restriction on the number of input signals that can set or reset a local output channel. For example two input channel signals may set a common output and one may reset the common output. Any combination may be used.



Note that the Set/Reset function overrides the NORMAL/TOGGLE setting. When either RESET OUTPUT or SET OUTPUT is selected the Input Mode control is disabled.

The input channel signal must be present for at least 200milliseconds to activate the set/reset function. If Power Save mode is active then the signal must be present for at least 1.5 times the sleep period or else the signal will be lost.

For normal channel operation without set/reset, set this control to NORMAL.

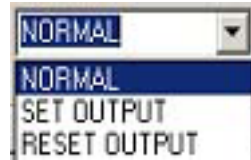


Figure 23 -- Set/Reset Output Selection

3.5.3 Input to Output Mapping

One of the many powerful features of the Site Monitor & Controller system is the ability to map an input signal change at one site to a remote output at another site (SLAVE INPUT MAPPING mode or MASTER mode). In MASTER mode, each input signal change may be sent to four other stations output channel(s) in the network.

Mapping an input channel requires the remote station address (zero in a module configured as slave) and the output channel that will be turned on or off when the input signal event is present. Each input may be assigned to affect up to four different outputs in a network. Outputs may be at one or more remote stations. For example if you wanted an input to close a relay at station address 003 on output channel 4 you would specify 003 in the 'DEST' column and 004 in the 'CHAN' column, thus creating an address of 003.004.

Ensure that a channel is mapped to a real station in the system and to a real output. Mapping to a non-existent output will have no serious effect on the system - your output will just never appear. Mapping to a non-existent station however can slow the network down, as all events in the network must receive acknowledgement from the remote station.

3.5.4 Local Control With No Network Message

If a channel is enabled (Enable channel box checked) and the channel map fields are left at zero, then no event transmission will take place, as there is no destination channel to send to. This type of configuration can be used in conjunction with local output control to delay a local input to local output signal, or to use the set/reset function without generating a network transmission event.

In summary, In SLAVE-INPUT MAPPING and MASTER modes, a network message is only generated when the OUTPUT fields are non-zero.

OK / Cancel

Click OK to keep the configuration changes.



Note: Variables are not written into the Site Monitor & Controller's configuration memory until the Write button is clicked.

To discard any changes, click the Cancel button.

3.6 Configuring Analog Channels

Each of the Site Monitor & Controller module's 8 analog input channels can be configured to transmit a channel status event when the channel voltage exceeds a high threshold set point and when a channel voltage falls below a low threshold set point. Each high and low threshold, or set point, is also associated with a hold timer which specifies how long the signal must be present before the condition is true. Logging options can also be specified.

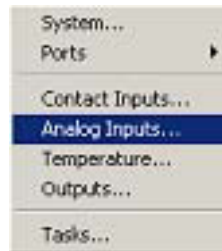


Figure 24 -- Analog Input Selection

From the main menu select Configuration | Analog Inputs. This menu option is only available when Off-Line Edit mode is activated or after configuration has been down loaded from the module(s).

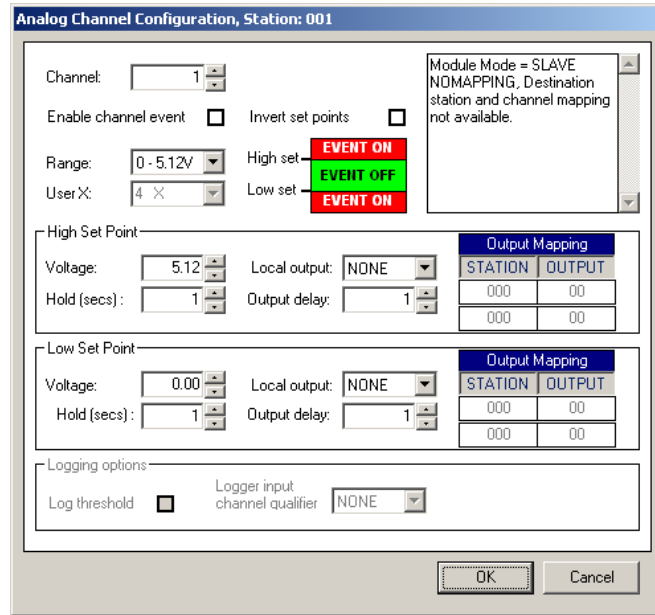


Figure 25 -- Analog Channel Selection

The desired analog channel is selected via the Channel 'spin wheel' up/down arrows.

3.6.1 Range

Revision R03 Site Monitor & Controller modules have four fixed ranges in conjunction with module jumpers and four user-selected ranges when user supplied external resistors are used.

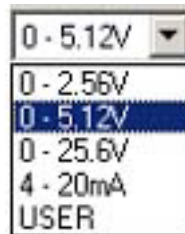


Figure 26 -- User-selected Ranges for External Resistors

When a new range is selected, the high set point voltage automatically adjusts to reflect the selected range.

3.6.2 User X

User X allows a user specified multiplier to be set. When the Analog range is set to USER, the Multiplier range can be selected. The multiplier range is based on an internal 5.12V reference. An external voltage divider resistor network must be supplied by the user. Refer to the section on interfacing for further information.



Note: The ranges selected are not activated until the new configuration is written back to the Site Monitor & Controller module.

3.6.3 High & Low Set Points and Hold Timers

Like an input channel 'event', an analog channel can transmit an event (send on/off system messages) to a specified station output using the mapping facility - this may be to turn on or turn off an indicator (output) or a relay at some distant station. Each channel can be programmed to generate two event types and each event can generate an ON or OFF event. This allows a single analog channel that has been programmed with a high and low set point to affect the logical state of up to two output channels in the network.

The high set and low set voltage values are directly entered in the format VV.vv, or selected via the up/down arrow control. If the value entered is outside the currently selected input range, SCCU will prompt to re-enter the correct value.

For voltage channels, the use of 'hold off' timers prevents setting off multiple trigger events when the measured voltage hovers around the set points. For this reason the 'set point' hold timer controls do not accept zero as a value.

When selecting a hold timer consider the following: If the low voltage hold timer is set to 6 seconds, then the voltage must be below and stay below the set point for 6 seconds before the event is triggered (ON). When the voltage returns to a value equal to or higher than the set point, the voltage must remain above that point for the time specified in the hold timer before the event will return to normal (OFF).

The high set point is identical but in reverse. For example, if the user sets a high voltage hold timer to 5 seconds, then the voltage must be above and stay above the set point for 5 seconds before the event is triggered (ON event). When the voltage returns to a value equal to or below the set point, the voltage must remain below that point for the time specified in the hold timer before the event will return to normal (OFF event).

If the requirement is for a single set point on a channel, carry out the following:

To disable the low set point function, set it to 0V. To disable the high set point function, set it to the highest value the channel will allow. The voltages can never be below 0V and never above the maximum.

3.6.4 Invert Set Points

When the Invert Set Points box is checked the above 'logic' is reversed. The 'set point' graphic will reverse.

3.6.5 Mapping an Analog Channel

If the system is to be set up in the more traditional manner, i.e. with a single Master to many out-stations (ISLAVES), then the 'DEST' station 'address' part of the mapping feature is not used in the slave modules and will be grayed out. This is when SLAVE NO MAPPING is selected as the module mode. The output *channel* map is still available as this directs the status event to a particular output channel at the master station.

In summary, depending on the module mode, each analog set point may be mapped to two remote stations and both the address of the station and the output channel must be specified. When mapping an analog input ensure you map it to a real station in the system and to a real output. Mapping to a non-existent output will have no serious effect on the system - your output will just never appear. Mapping to a non-existent station however can slow your network as the originating station may retry the transmission several times before giving up.

3.6.6 Local Channel Control

Each of the set points may be configured to switch a local output independent of the system event message function. The Local Output drop down box shows the total number of outputs that can be controlled in this configuration. If you wish to use this feature, scroll and select the desired output channel. The maximum number of channels available for the target configuration is automatically determined by SCCU when it interrogates the Site Monitor & Controller.

3.6.7 Output Delay

The local channel control also incorporates a local delay or hold timer independent of set point hold time. The delay is from the time that the event is initially recognized and excludes any input (set point) Hold Time. This allows a completely independent delay to be applied to this function.

The graphic below illustrates the possible timer/functions for each channel.

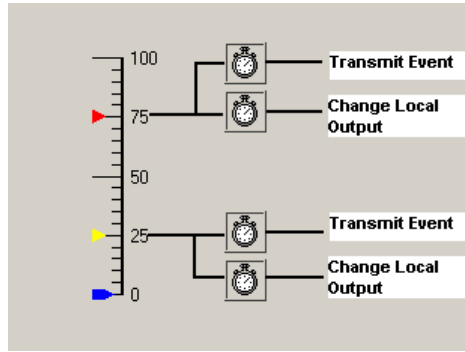


Figure 27 -- Timer/Function Options

3.6.8 Logging Options

The logging options are associated with the data logger that is detailed later in this document.

3.6.9 OK / Cancel

Click OK to keep the configuration changes.



Note: Variables are not written into the Site Monitor & Controller's configuration memory until the Write button is clicked.

To discard any changes, click the Cancel button.

3.7 Configuring Temperature Channels

The Site Monitor & Controller has a built-in eight-channel temperature bus supporting the National Semiconductor LM75 sensor. Each of the temperature channels can be configured to transmit a status event when the channel temperature exceeds a high threshold set point and when a channel temperature falls below a low threshold set point. Each high and low threshold is also associated with a hold timer.

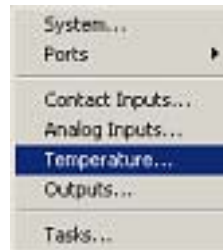


Figure 28 -- Temperature Channel Configuration

From the main menu select Configuration | Temperature Inputs. This menu option is only available when Off-Line Edit mode is activated or after configuration has been down loaded from the Site Monitor & Controller.

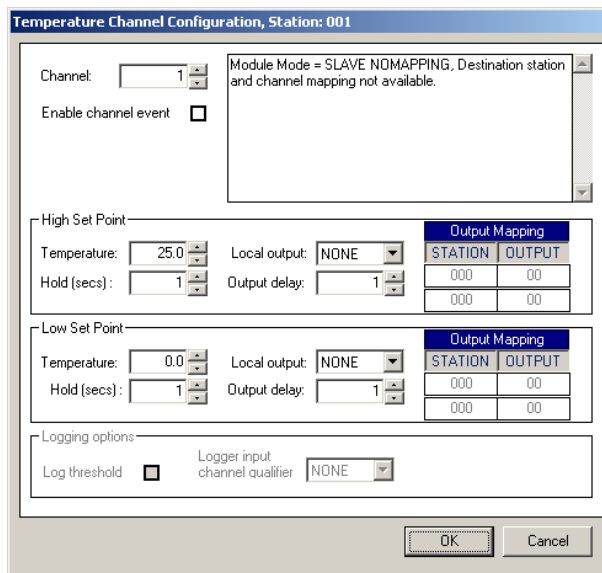


Figure 29 -- Temperature Sensor Channel Selection

The desired temperature channel is selected via the Channel 'spin wheel'.

3.7.1 High & Low Set Points And Hold Timers

Like an input channel 'event', a temperature channel can transmit an event (send on/off system messages) to a specified station output using the mapping facility - this may be to turn on, or turn off an indicator (output), a relay, a pump at some distant station. Each channel can be programmed to generate two event types and each event can generate an ON or OFF event. This allows a single temperature channel that has been programmed with a high and low set point to affect the logical state of up to two output channels in the network.

The high set and low set temperature values can be directly entered in the format CCC.C or selected via the spin wheel control. If the value entered is outside the currently selected input range, SCCU will prompt to re-enter the correct value. The optional temperature sensors have a range of -55°C to $+125^{\circ}\text{C}$.

For temperature channels, the use of 'hold off' timers prevents setting off multiple trigger events when the measured temperature hovers around the set points. For this reason the set point hold controls do not accept zero as a value.

When selecting a hold timer consider the following: If the low temperature hold timer is set to 6 seconds, then the temperature must be below and stay below the set point for 6 seconds before the event is triggered (ON). When the temperature returns to a value equal to or higher than the set point, the temperature must remain above that point for the time specified in the hold timer before the event will return to normal (OFF).

The high set point is identical but in reverse. For example, if the user sets a high temperature hold timer to 5 seconds, then the temperature must be above and stay above the set point for 5 seconds before the event is triggered (ON event). When the temperature returns to a value equal to or below the set point, the temperature must remain below that point for the time specified in the hold timer before the event will return to normal (OFF event).

If the requirement is for a single set point on a channel, carry out the following:

To disable the low set point function, set it to the lowest value (-55°C). To disable the high set point function, set it to the highest value the channel will allow ($+125^{\circ}\text{C}$). The temperature can never be below -55 and never above $+125$.

3.7.2 Mapping a Temperature Channel

If the system is to be set up in the more traditional manner, i.e. with a single Master to many out-stations, then the station 'address' part of the mapping feature is not used in the slave modules and will be grayed out. This is when one of the SLAVE modes is selected as the module mode. In SLAVE INPUT MAPPING, the output *channel* map is still available as this directs the status event to a particular output channel at the master station.

In summary, depending on the module mode, each temperature set point may be mapped to two remote stations. The address of both the station and the output channel must be specified. Mapping a temperature input to a non-existent output will have no serious effect on the system - your output will just never appear. Mapping to a non-existent station however, can slow your network as the generating station may retry the transmission several times before giving up.

3.7.3 Local Channel Control

Each of the temperature set points may be configured to switch a local output independent of the system event message function. The Local Output drop down box shows the total number of outputs that can be controlled in this configuration. If you wish to use this feature, scroll and select the desired output channel. The maximum number of channels available for the target configuration is automatically determined by SCCU when it interrogates the Site Monitor & Controller.

3.7.4 Output Delay

The local channel control also incorporates a local delay or hold timer independent of set point hold time. The delay is from the time that the event is initially recognized and excludes any input (set point) hold time. This allows a delay to independently be applied to this function.

3.7.5 Logging Options

The logging options are associated with the data logger that is detailed later in this document.

3.7.6 OK / Cancel

Click OK to keep the configuration changes.



Note: Settings are not written into the Site Monitor & Controller's configuration memory until the Write button is clicked.

To discard any changes, click the Cancel button.

3.8 Configuring Outputs

From the main menu select Configuration | Outputs. This menu option is only available when Off-Line Edit mode is activated or after configuration has been downloaded from the module(s). This allows the output channel to be set up.

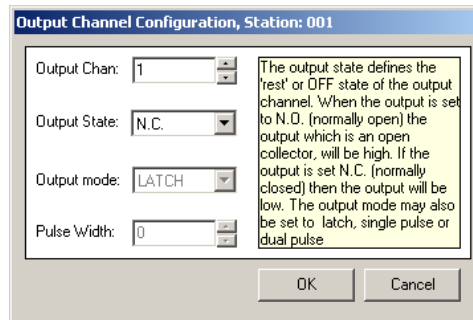


Figure 30 -- Output Channel Selection

Select the desired output channel via the Output Channel spin wheel.

Output State: This is the physical ‘rest’ or OFF state for the channel. Each output channel may be configured to be N.C. (normally closed – output level is low), or N.O. (normally open – output level is open circuit). Note that the output is an “open-collector” style driver and is designed to pull down some external circuit such as a relay, load resistor or other device.

The ‘rest’ or OFF state will also be adopted when the module powers up. The logical state of an output is determined after the configuration memory is read during power up. Irrespective of the output state setting, the internal logical state of the output is set to the OFF state after power up. This may be highly desirable in applications that are reliant on a default state after power on.

The Output State is completely independent to that configured for an input channel. Combined with channel mapping, output state configuration allows for signal inversion and greater flexibility.

Output Mode: Additionally the output may be defined as a latching output or one of two pulse modes.

In Pulse-1 mode, the output will pulse once only when the channel is turned ‘ON’.

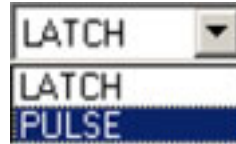


Figure 31 -- Pulse 1 Output Mode Selection

If either Pulse Mode is selected, the width of the output pulse may be adjusted via the Width control. Each value greater than zero equals a 10-millisecond increment to a maximum of 2.55 seconds.

3.8.1 OK / Cancel

Click OK to keep the configuration changes.



Note: Settings are not written into the Site Monitor & Controller's configuration memory until the Write button is clicked.

To discard any changes, click the Cancel button.

3.9 Saving A Configuration To Disk

A Site Monitor & Controller configuration can be saved to disk for later recall.



To save a configuration to disk, click on the File Save icon (shown above). Enter the filename and path where you want to save your configuration file to.

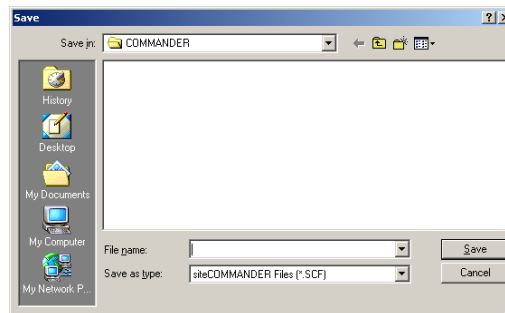


Figure 32 -- File Name and Path Selection

Site Monitor & Controller configuration files have the CCF file type.

Note: The File Save window will also be enabled when in the Off Line edit mode

3.10 Loading A Configuration From Disk

To load a configuration from disk, click on the File Open icon. Enter the filename and path where the configuration file is stored.



Figure 33 -- File Open Icon for loading a configuration

Site Monitor & Controller configuration files have the CCF file type.

The configuration tab strip is shown once the file has been loaded. The toolbar items File Save, Print and Upload buttons are also enabled after an initial File Open. At this time the configuration may be edited and saved back with the same or as a different filename, or be uploaded into a module, by clicking on the Upload button. Do not edit or modify CCF files that are saved/stored.

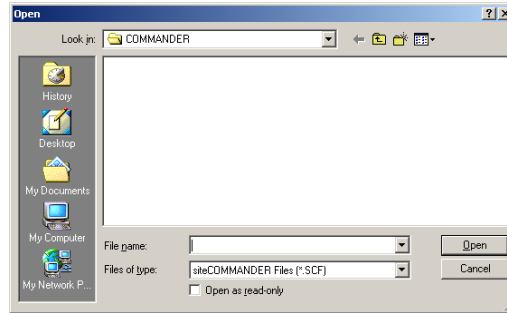


Figure 34 -- Site Monitor & Controller CCF Configuration File Type

3.11 Setting The System Date And Time

Site Monitor & Controller modules are fitted with a Real Time Clock (RTC). The RTC date and time are set by accessing the main menu System / Date and Time. The RTC is used in conjunction with the built-in data logger.

The date and time window is shown below. The form shows the current date and time as retrieved from the Site Monitor & Controller.

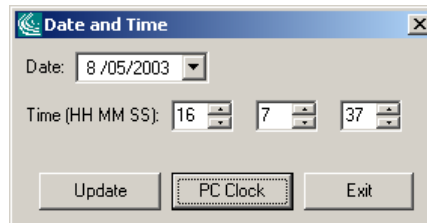


Figure 35 -- Date & Time Control Window

3.11.1 PC Clock

The PC Clock control takes the current PC time and writes it to the Site Monitor & Controller.

3.11.2 Update

The PC Clock control takes the current PC time and writes it to the Site Monitor & Controller.

The date can be set using the 'date selection control'. Click on the 'down' arrow in date box. This reveals the 'calendar' control as shown below.

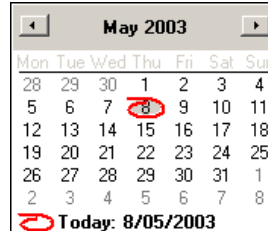


Figure 36 -- Calendar Date Selection Window

Use the left and right arrows to select previous/next months. Click on the date required.

To access another year, click on Month-Year at top of calendar. Use the up and down arrows to select next/previous years. Click on the date required. Click on update to write this date and time to the Site Monitor & Controller.

3.11.3 Cancel

Exit clock setup.

3.12 View Status Window

The Site Monitor & Controller SCCU provides a simple status monitor for checking the current contact input, analog, temperature and output channel conditions as an aid when configuring the module. To access the monitor, click the Status item in the menu bar.

3.12.1 Input Channel Status

The Status window shows the logical input status of groups of eight channels at any one time. When the window opens the Input channel status is shown. A typical input channel status window is shown below.



Note that this is the logical state of the inputs – these may not represent the physical state of the inputs, which will be dependent on the N.O. – N.C. setting configured by the user.

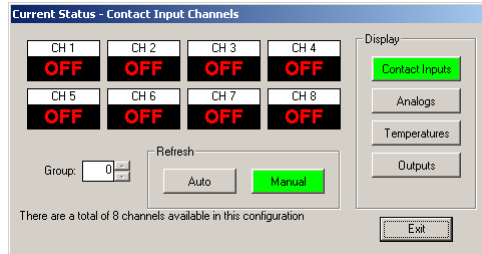


Figure 37 –Current Status Contact Input Channels Window

3.12.2 Analog Channel Status

To show the current analog input channel voltage values, click on the Analogs button.

The button will change to green when activated, providing instant feedback as to what function is being displayed. A typical analog channel status window is shown below.

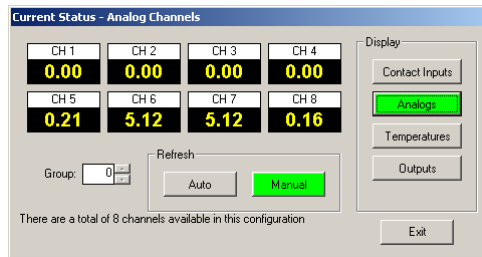


Figure 38 – Current Status Analog Channels Window



Note: SCCU automatically adjusts the analog reading for the particular channel based on the analog range that has been configured for the channel and stored in the Site Monitor & Controller memory.

If you have changed the range control in the analog setup window and not yet written the new configuration back to the Site Monitor & Controller the new setup will not yet be shown in this Analog channel status.



Note: The ranges selected are not activated until the new configuration is written back to the Site Monitor & Controller module.

Refer to the previous section – Setting up analog channel, for information on available analog ranges.

3.12.3 Temperature Channel Status

To show the current temperature channel values, click on the Temperatures button.

The button will change to green when activated, providing instant feedback as to what function is being displayed. The Site Monitor & Controller supports up to eight temperature sensors on the temperature bus. Sensor channels that aren't present are represented by dashes (---) in the display. A typical temperature channel status window is shown below.

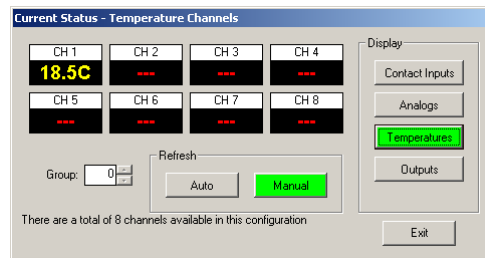


Figure 39 -- Current Status Temperature Channels Window

3.12.4 Output Channel Status

To show the current logical state of the output channels, click on the Outputs button.

The button will change to green when activated, providing instant feedback as to what function is being displayed. A typical output channel status window is shown below.

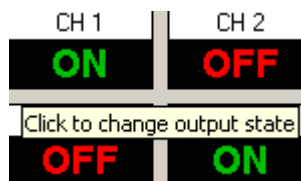


Figure 40 -- Typical Output Channel Status Window

To change the state of an output channel, click once in the Status window as shown below.

To manually refresh the window, click on the Manual refresh button.

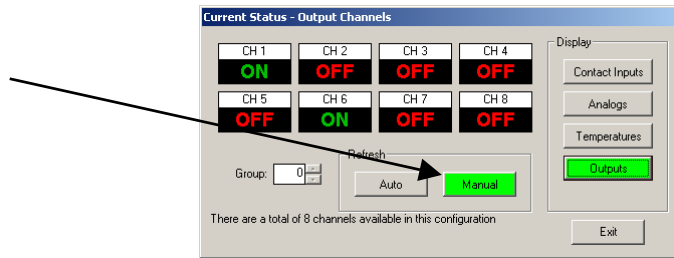


Figure 41 -- Output Channel Status Window & Refresh

The auto refresh button provides continuous updates at approximately one-second intervals.

3.13 Preparing An OFF-LINE Configuration



An 'off-line' configuration may also be prepared without being physically connected to the Site Monitor & Controller module. To do this, click on the 'off-line' edit icon in the tool bar.

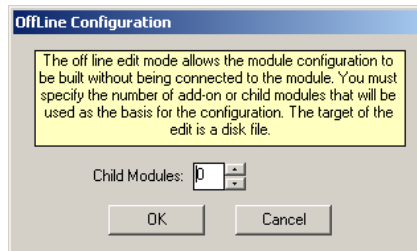


Figure 42 -- Off-Line Configuration Window

Using the child module spin wheel, select the number of modules that will be used in the configuration. If the configuration contains no child modules set the "Child Module" setting to zero and click the OK button. Refer to the Glossary Of Terms in this document for the definition of a child module.

The Off-Line configuration mode is useful for getting familiar with the many unique features of the Site Monitor & Controller system.

When the Off-Line Edit mode is selected, the menu item Configuration is no longer grayed out. Clicking on the Configuration menu item allows access to the following:

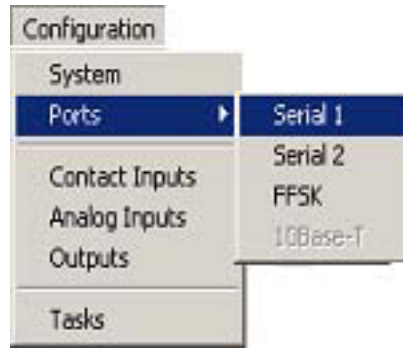


Figure 43 -- Configuration Ports Serial 1 Selection

System: Access to module wide configuration.

Ports: Communication configuration information for two serial ports and the FFSK port

Contact Inputs: Configuration information for the 'contact' input channels.

Analog Inputs: Configuration information for the analog channels.

Outputs: Configuration information for each of the output channels.

3.14 Analog RF/4-W Modem Setup

3.14.1 The 4-Wire Interface

If the module will be interfaced to a 4-wire transmission system, including leased circuits, microwave order wire or similar, jumpers J1 to J4 must be set to their rear positions (toward the RJ45 connector) as shown below.

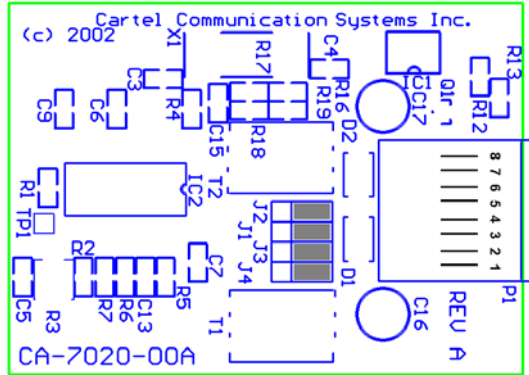


Figure 44 -- 4-Wire Wireline Plug-in Module

In the 4-Wire mode the module provides a 600Ω transformer-isolated interface with separate E+M signaling leads.

P1 – RJ45 Connections – 4-W mode (600Ω)

Pin	Signal
1	M-Signal Opto-isolated input A
2	M-Signal Opto-isolated input B
3	Transmit signal out – leg A
4	Transmit signal out – leg B
5	Receive signal in – leg A
6	Receive signal in – leg B
7	E-Signal Out FET Drain
8	E-Signal Out FET Source

Pin 1 is on the left when viewed looking into the connector.

The M-Signal input is via a bi-directional optically isolated input. The opto-isolator is bipolar in that a signal of either polarity may be applied to the input. Both inputs to the opto-isolator are accessible via the RJ45 connector. The opto-circuit has a series 470 resistors in one leg and a 2K7 resistor across the isolator to prevent false triggering due to static.

The user must supply an external current source for the circuit. The switching polarity of the M-Signal input is set in the FFSK setup window when using the SCCU utility.

The E-Signal output uses a FET device capable of switching voltages up to 50V at 150mA. The Drain of the FET is available on pin 7 of the RJ45 and when switching a positive load to ground would be connected to ground. The source of the FET device is available on pin 8 of the RJ45 connector and would normally be connected to the load. The switching polarity is set in the FFSK setup window when using the SCCU utility.

3.14.2 Setting The FFSK Properties For 4-Wire Line Use

The FFSK module configuration is set up through the FFSK properties window as shown below. The FFSK setup was discussed earlier in this document and this section deals with particular settings that are important to 4-wire line applications.

COR/COS/M-SIG TYPE: For 4-wire use this must be set to MODEM. In this mode the modem will detect energy in the voice band and automatically provide Carrier detect.

COR/COS/M-SIG Polarity: This will be disabled (grayed out) when the COR/COS/M-SIG TYPE is set to MODEM.

The module may operate with 4-wire circuits independent of signaling. If the 4-wire circuit has no signaling wires, then the PTT polarity in the following section is irrelevant, but the PTT delay should be set to zero to minimize packet delays.

COR/COS/M-SIG Delay: This is the amount of time that the channel must remain clear (un-occupied) and without Carrier Detect before a module will attempt a transmission.

If the 4-wire circuit requires signaling to operate, then the PTT polarity and delay (if needed) must be set. The PTT signal is delivered as E-Signal in the 4-wire mode.

3.14.3 Transmit And Receive Levels.

The transmit level is set electronically via the Set Level button in the FFSK setup window. This control is also helpful for setting the receive level at the other station. The receive level is adjusted via potentiometer R3 on the module.

Attach a voltmeter or oscilloscope to the TP1 test point on the module. In the presence of test tone, adjust potentiometer R3 so TP1 reads approximately 100mV-500mV RMS.

3.15 Analog RF

If the FFSK plug-in module will be interfaced to a VHF or UHF analog radio, jumpers J1 to J4 must be set in the forward (away from RJ45 connector) position as shown below.

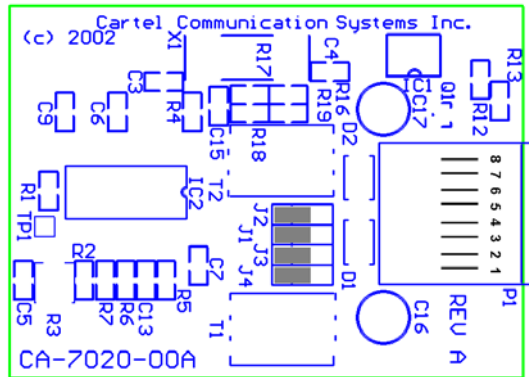


Figure 45 -- VHF/UHF Radio Plug-In Module Connection

P1 – RJ45 Connections – Analog Radio (high impedance)

Pin	Signal
1	M-Signal Opto-isolated input A
2	M-Signal Opto-isolated input B
3	Do not connect
4	Transmit signal out (to transmitter)
5	Receive signal in – (from discriminator or flat audio point)
6	Ground – must connect to ground
7	PTT output
8	Ground - must connect to ground

Pin 1 is on the left when viewed looking into connector.

3.15.1 Carrier Detection

Carrier detection is required for busy channel detection – without it the module may transmit when other stations are transmitting, resulting in data collisions and missed transmissions. The module may be set up for two detection methods to accommodate differing applications:

No COR/COS/Squelch

If the radio or wire-line provides no indication of other signals on the transmission medium, then the CD (Carrier Detection) method must be set to 'Modem' in the FFSK configuration window in SCCU. In this mode the modem will detect energy in the audio spectrum and signal the presence of CD. While this mode is provided for interfacing to microwave 4-Wire and order wire channels it may also be used with analog radios that have external signal mute, but have an internal COR/COS. Do not connect the module to a radio's discriminator audio in this mode; connect ahead of the COR/COS circuit.

COR/COS/Squelch Supplied

If the radio or wire-line provides an indication of other signals on the transmission medium via a COR/COS output, then the CD (Carrier Detection) method should be set to 'Line' in the FFSK configuration window in SCCU.

In this method, the signal is supplied via pins 1 and 2 on the module's RJ45 connector. The module incorporates a bipolar opto-isolator. If the COR/COS/Squelch signal is an open collector output then connect this output to either the A input or the B input. The other input must be connected to a voltage source of at least 5 volts.

If the COR/COS/Squelch signal has an internal 'pull-up' resistor as in some radios, then connect one input to the COR/COS/Squelch and connect the other input to the ground of the radio.

If the module is being interfaced to a wire-line system that supplies E+M signaling then the opto-isolator input should be wired according to the E+M system. If the M signal from the wire-line supplies voltage, then one input should be connected to this and the other to ground. The voltage may be either negative or positive.

If the M signal from the wire-line is a set of relay contacts, then the opto-isolator should be wired as for the open collector method above.

Whatever method is used, the module needs to know what signal level will indicate that there is a signal present on the medium. If the radio or wire line supplies a voltage in the presence of a signal (high) then CD signal polarity should be set to high in SCCU. If the radio or wire line supplies no voltage in the presence of a signal (low) then CD signal polarity should be set to low in SCCU.

3.15.2 Setting the TX output level

The FFSK transmission level is set electronically. To set the transmission level to the radio transmitter or wire-line, click on the Set Level button in the FFSK Configuration window. Note: If in the Off-Line edit mode, this button will be disabled (grayed out).

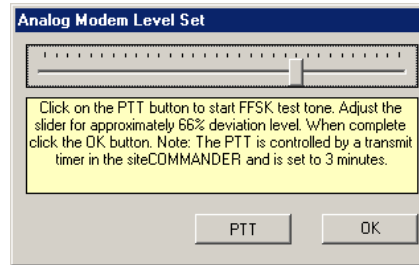


Figure 46 -- Analog Modem Level Set

To set up the transmitter deviation or level into the wire-line, you must be connected directly to the module using a serial data cable. This adjustment cannot be performed properly if connected to a station remotely via wire-line or analog radio.

Whenever the PTT button is operated (clicked), the module's channel scanner is stopped. If the module is configured as MASTER and the station poller task is active, the poller task is suspended. A message window will appear as the poller is shut down. If the task is active and polling it may take 2 or three seconds before the PTT becomes active.

To set the transmit level you will need:

- SCCU running on a computer
- Radio test set or deviation monitor
- Or suitable dummy load for the radio

Prior to setting the TX level ensure that following is carried out:

- connect the radio transmitter to a suitable load, and or,
- connect suitable deviation test equipment (Radio test set etc) to radio
- Click the PTT button to cycle the transmitter on and off manually.

With the aid of the deviation monitor or radio test set, adjust the digital output level control until the deviation monitor or radio test set reads approximately 66%. When this is done, click the OK button to accept the level and return to the FFSK Configuration display. If you have not done so, return to setting up your inputs, outputs and any analog channels that will configure on this module.



Note: This control may also be used to set the transmission level if the transmission medium is set to 'wire-line'.

The next step involves setting the modem receive level. You will need:

- Voltmeter or oscilloscope
- Trimmer tool
- PC running SCCU and the module that you just set the transmit level on
- Another Site Monitor & Controller module for the receive adjustment
- Dummy load/radio test set

3.15.3 Setting The RX Input Level

The input level of the FFSK module must be matched to that of the analog radio or wire-line. The input level adjustment is located on the FFSK module.

Attach a voltmeter or oscilloscope to the TP1 test point on the FFSK module. Using a previously configured Site Monitor & Controller module and radio, generate an FFSK test tone. Using a suitable trimmer tool, adjust potentiometer R3 on the FFSK module so that TP1 reads approximately 100mV-500mV RMS.

The block diagram below shows the method.

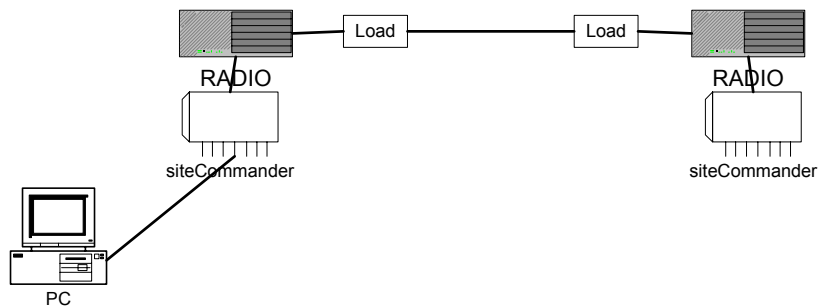


Figure 47 -- RX Input Level Diagram

Once the receive level is set, connect the computer to the Site Monitor & Controller module then use SCCU to configure it.

4.0 SETTING UP AND TESTING A NETWORK

Once all Site Monitor & Controller module(s) or station(s) are configured it is advisable to test out the initial 'network' in the workshop before field deployment. This may be done with or without the aid of the SCCU utility. If the application is a simple one with inputs mapped to outputs, i.e. switches and output control, then the SCCU utility is not required.

If the application is more sophisticated and involves the TASC siteVIEW monitoring software package, then the SCCU utility will help 'tune' and test the system first.

Do not attempt to configure or test a station using the primary transmission path without first configuring all modules via local serial cable connection. If you have not pre-configured all the modules in the network then stop now and do so!

Ensure that each of the modules has a unique address. If using analog radio, equip each of the radios with a suitable dummy load or antenna. Also ensure there is an adequate level of good RF signal at each of the radios.

If the system will be deployed in a 4-wire application such as one that will be used with a 4-wire party line 'order wire' system, then an artificial network may need to be constructed using wire-line bridges. In the absence of wire-line bridges an artificial 'bridge' may be constructed with resistors.

4.1 Using SCCU to Test a Master or Gateway Module

A module configured as MASTER or GATEWAY can be used to test out or fine-tune each slave station that will be used in the network.

Connect a serial cable between the computer's serial port and the Serial Port #1 connector on the Site Monitor & Controller. Launch the SCCU Utility. Ensure that the Primary Transmission Path is set to FFSK-RF or FFSK-WL and the module is configured as a MASTER or GATEWAY. Click on the Connect button and enter the slave or remote station address in the "Connection" window as shown below.

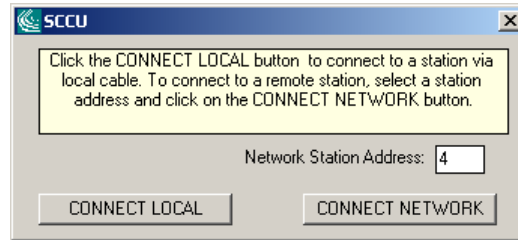


Figure 48 -- Test Connect Window

In the example we have entered station address 4. Click on the CONNECT NETWORK button. The red LED on the Master module will illuminate when this module is transmitting. You should note that a slave module's red LED illuminates when it is transmitting. The bar in the download progress window will indicate the connection's progress.

4.2 Making Changes in a Live Network

When changing configurations, due consideration must be given to avoid erratic operation when changing parameters. Whether the re-configuration is being carried out "over the air" or via cable connection at the site, changes in configuration will invoke a system shutdown and auto restart. This may make the site unavailable for a few seconds.

4.3 Resetting the Non-Volatile RAM (NVR)

If required, a module's configuration may be reset to that when shipped. The menu option in SCCU, System/Reset NVR may be used to reset the module's NVR. The user is prompted to confirm this action.

The action can only be carried out when physically connected to the local serial port. This function is ignored if attempted over the air, as it would be possible to reconfigure the module address during operation and possibly result in the module or station being unreachable.

The NVR may also be reset via switch SW1-4.

If the Reset NVR switch (SW1-4) is in the 'reset' position (ON) during power up, all NVR variables will reset to that of the factory settings. All LED indicators (green, amber & red) will flash together indicating that the variables have been reset.

The switch must be placed into the 'OFF' position to continue and restore normal operation. Do not remove power at this time.



Note: All indicators will continue to flash until the switch (SW1-4) is placed back into the 'OFF' position. No communication with Site Monitor & Controller will be possible until this is done. This is to prevent the technician from inadvertently leaving the switch in the 'ON' position.

4.4 Connecting the Optional Temperature Sensors

The Site Monitor & Controller incorporates a built-in eight-channel temperature bus supporting the National Semiconductor LM75. The sensor can directly measure temperatures between -55°C and $+125^{\circ}\text{C}$ to an accuracy of $\pm 3\text{C}^{\circ}$.

The temperature sensor is provided as an "air sensor" with dual RJ45 modular jacks for daisy chain connection. Temperature readings are taken at 1-second intervals.

The sensor module is powered from the Site Monitor & Controller module bus and therefore the sensor requires no external power supply.

Prior to plugging in the sensor, ensure that power is removed to the Site Monitor & Controller module. Set the temperature sensor's address by cutting the appropriate traces (0, 1, 2) on the temperature sensor circuit board. Each temperature sensor requires a unique address.

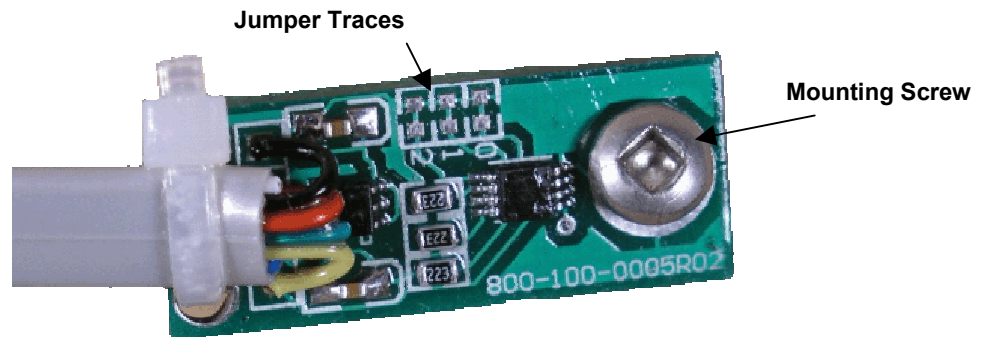


Figure 49 -- Temperature Sensor

Jumper Traces

Bus Address	2	1	0
1	0	0	0
2	0	0	x
3	0	x	0
4	0	x	x
5	x	0	0
6	x	0	x
7	x	x	0
8	x	x	x

4.5 Tasks

4.5.1 Introduction to Tasks

A module configured as a MASTER may be configured to perform tasks in the absence of any other controlling hardware.

For applications where there is irregular activity on the network, it may be desired to have advance notice say, of station radio or system failure. A single task may be configured to poll a list of stations on a regular basis and alert the user when there is no response from a station. The Station Poller Task when configured is run immediately after power up and after the startup delay has expired. The Station Poller task can be configured to turn on a local output at the MASTER when the station responds to a poll. The output is turned off if the station does not respond.

The poller task runs at start up time and at a user-defined interval. Each station may be assigned an individual output as the target of the poll ('station available'). When the station responds the output is driven low (ON) to indicate that the station is available. If a station does not respond the output is left open or high (OFF).

The poller task window is accessed from the main menu, Configuration | Tasks. An example poller task window is shown below.

4.5.2 Task Interval

The user may enter the interval between poller tasks in the Task Schedule panel. When the interval is set to zero the task is turned off.

The screenshot shows a 'Task Setup' window with several sections:

- Station Poller:** A tabbed interface with 'Station Poller', 'Analog Monitor', 'R1', 'R2', and 'R3' tabs. 'Station Poller' is selected.
- Information Box:** A yellow box containing text: "The poller is a task that runs on a MASTER module only. A maximum of 32 stations may be specified in the station list. The poller task runs at start up time and at a user defined interval. Each station may be assigned an output as the target of the poll. When the station responds the output is driven low to indicate that the station is available. If a station does not respond the output is left open or high."
- Task Schedule:** A section with a numeric input field set to '45' and the label 'Minutes'.
- Task Action:** A section containing:
 - A table with 'Station' and 'Channel' columns:

Station	Channel
001	01
002	04
003	07
004	10
005	13
006	16
 - 'Station List' dropdown menu with '1' selected.
 - 'Output Chan' dropdown menu with 'NONE' selected.
- Buttons:** 'Load Task', 'Save Task', 'Stop Tasks', 'Start Task', and 'Exit'.

Figure 50 -- Task Set-Up Form



Note: Due to the poller’s timer resolution and low task priority, scheduling the poller to run at intervals below 5 minutes will lead to interval inaccuracies and the poller may run faster than intended.

Once the interval timer has expired, the first station in the list (lowest slave address) is polled. If the poll is successful the ‘station available’ bit is turned on. If the station fails to respond it is retried the number of times that the user has set the FFSK retry count to in the system configuration window for the FFSK module. Once the retry count has been exhausted and the station still has not responded then the station available bit is turned off. A non-configurable ‘hog’ interval of one second elapses between each poll in the list. This is to allow any other stations including the MASTER airtime to send information.

Once all stations in the list have been polled the task is scheduled to run again after the defined interval.

4.5.3 Task Action

To configure a station to be included in the poll, click on and select the station in the drop down list box “Station List”. Next select the Output Channel (station available bit) in the drop down list box “Output Chan”.

Each time a station has been associated with an output channel it will appear in the Station and Channel panel. To edit or remove a station in the list, double click on the station in the list and its data will appear in the Station List and Output Chan drop down list boxes. To remove a station simply set its output to NONE. It is automatically removed from the list.

To save the task list into the module, click on Save Task. To load a task previously saved to a module, click on Load Task.

4.6 Data Logger Functions

4.6.1 Introduction to Data Logger Functions

The Site Monitor & Controller data logging facility uses the real time clock for time stamping and saving data into the module's memory.

The Data logging facility has the following features:

- Accumulated 'repeater' airtime – maximum accumulation time = 16,777,215 seconds (194 days)
- Sample interval of between 1 and 216,000 seconds (60 hours) – sample buffer of 7,000 samples
- Accumulating time for min/max logging of between 1 minute and 60 days – min/max buffer of 2,544 time stamped entries
- Accumulated contact times for all 8 contact input channels – maximum accumulation time = 16,777,215 seconds (194 days)
- Exceeded threshold logging for all analog and temperature channels
- Exceeded threshold logging for all analog and temperature channels with input channel qualification
- User selectable mix of sampling and min/max logging
- One shot sampling with log hold
- CSV file save for both sample and Min/Max time stamped logs

The data logger can be set up when in "Off-Line" edit mode or when connected to a Site Monitor & Controller module. The data logger setup is accessed from the main menu by selecting Configuration/Data Logger Setup.

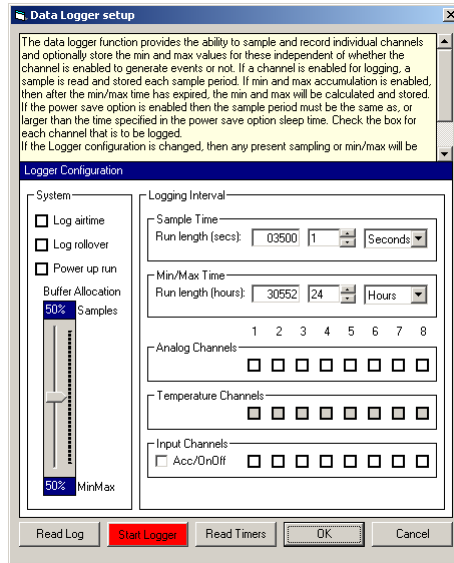


Figure 51 -- Data Logger Set-up Window

When in “Off-Line” mode, the Read Log, the Logger Run status button and the Read Timers button are disabled.

The data logger setup is accessed from the main menu by selecting Configuration/Data Logger Setup.

To maintain flexibility, the logger can be formatted to the user’s requirements. The log is capable of storing straight samples of any analog or temperature channel. The log can also store time stamped events such as calculated minimum and maximum channel information. As the min/max log provides absolute time stamps it also stores events such as the time when a channel threshold is exceeded or when a qualified threshold has been exceeded. Qualified thresholds are channels that are associated with a contact input channel. A qualified threshold is one that is only recorded if the associated contact input channel is active (ON).

4.6.2 System Panel

The system panel controls three aspects of the data logger.

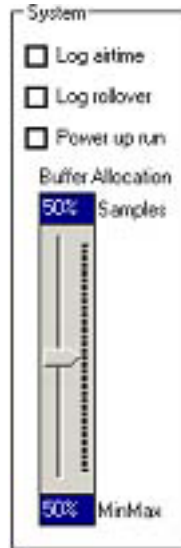


Figure 52 -- System Panel

Log Airtime

Airtime logging activates on receipt of the externally supplied Carrier detect signal via the optional FFSK module. The time that carrier is present (the signal is active), is added to the airtime accumulator. The accumulator accuracy is in seconds. The total amount of accumulated time is 16,777,215 seconds before rollover. The Log airtime box should be checked to enable Carrier detect logging.



Note that if the Carrier Detect signal is present for less than one second, the Airtime log will not be incremented. The airtime accumulator is non-volatile.

Log Rollover

Normally the log runs until either stopped by the user or the log is filled to capacity. The logger may be set to automatically “roll over” when full. This means that the oldest entry is dropped from the log when a new entry is placed into the log. With the box unchecked, the log will fill to its maximum and further logging will stop until the log is read or cleared.

Power Up Run

The logger may be setup to start logging automatically after the power up delay has expired. Check the Power up run box.

Buffer Allocation

The buffer allocation control allows the user to ‘format’ the logger according to the needs of the application for sample buffering or Min/Max buffering. Since the logger stores data in two different formats, rather than divide the logger memory into fixed partitions, the user can allocate more or less memory to each of the two formats depending on the application. The allocation control is simply dragged up or down to allocate the required amount to each section. If more sample buffering is needed the control is dragged upward. If less is required and the user wishes to allocate more buffering for minimum and maximum (and time stamped events) then the control is dragged downwards. Each time the control is dragged, the amount of sample run time is updated dynamically in the Logging interval Sample Time and Min/Max Time panels (discussed below).

4.6.3 Sample Time Panel

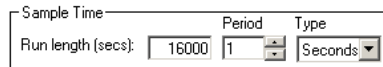


Figure 53 -- Sample Time Panel

Sample time applies to the analog and temperature channels. It is the time between successive sampling of an analog or temperature channel. The sample time unit value is set via the Period control. The Type control allows the period to be specified as seconds, minutes or hours. Depending on the buffer allocation control setting and the period time set, the Run length is dynamically updated to show the actual running time of the sample logger.

If sample buffering is allocated by the Buffer allocation control and the sample period has expired, the channels that are checked in the Analog or Temperature Channel panels are sampled and recorded. While the sample logger does not absolute time stamp an entry, a ‘time from start’ counter is written to the log. This reduces the amount of storage required for the sample log. If no allocation for sample recording is made then the sample time controls set the sample rate at which the minimum and maximum calculation is updated statically. The sample log file save facility creates absolute times based on the offset time and the log start time.



When Power Save is active, the logger sample time cannot be less than the power save Sleep/Log Time.

4.6.4 Min/Max Time Panel

Min/Max Time		
Run length (hours):	24	Hours

Figure 54 -- Minimum/Maximum Time Panel

Min/Max time is the accumulated time period when the Site Monitor & Controller will write the accumulated minimum and maximum values to the log. When the min/max time has expired, the current 'static' min/max values are time stamped and written into the log. The min/max time period is set via the Period control. The Type control to the right allows the period to be specified as minutes, hours or days. Depending on the setting of the buffer allocation control and the sample time set, the Run length is updated dynamically, showing the actual running time of the min/max logger.

If the user allocates 100% of the buffer for minimum and maximum calculation, then no sample recording is done. In this mode the logger works in the following manner:

At the time period set by the sample period control, a reading of the analog voltage (or temperature) is taken and the static minimum and maximum value is updated but not written into the log. Only when the period set by the min/max control expires is this value time stamped and recorded into the log. This allows a greater log run length to be obtained when many channels are being recorded.

4.6.5 Enabling Logging

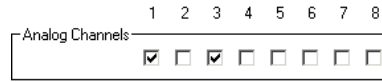


Figure 55 -- Analog Channel Log Enabler

To enable an analog or temperature channel to be logged, check the desired channel box in the Analog or Temperature Channel panel. In the graphic above, Analog channels 1 and 3 are enabled for logging. This control works independently of the channel event enable control in the corresponding analog or temperature setup window previously discussed in the Configuring Analog and Temperature channels section of this document. Only when one of the channel check boxes above is checked, will the logger record information about this channel. Temperature channels with no sensor present will be disabled and will show as a grayed out box. Only temperature channels with temperature sensors present can be activated.

As can be seen in the next section, there is an association between these controls and the analog and temperature channel setup windows.

Using The Logger To Record Analog Threshold Crossing

In addition to sampling and recording minimum and maximum analog voltages, the logger may be used to record the time and duration when an analog threshold point (low or high) is exceeded. This is done in conjunction with the analog channel setup window. To set this up, first enable the channel by checking the applicable channel box in the analog logger panel. Do this for all channels you are enabling. Close this window (Click on OK) and access the Analog Channel setup window. For each channel that was enabled in the logger window, the logger options ‘controls’ are enabled as shown below.

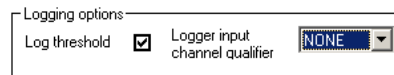


Figure 56 -- Logger Threshold Crossing Option

When the Log threshold box is checked, the logger will timestamp and record the crossing point and times that are set up in this window.

Check the Enable threshold log box and set the thresholds required. Note if only one threshold is required then set the other control to its maximum or minimum.

For example, if a channel is to log each time the voltage is below 1 Volt, then set the Low Set Point control to 1.0V and the High Set Point to the maximum for the channel range. Since the voltage can never be above the maximum, the high threshold is effectively turned off. The same can be said in reverse. If channel is to log when a voltage is above a certain value, then set that value in the high set point control. Set the low set point control to zero. Since the voltage can never be below zero it is turned off.

In summary, the logging of thresholds will be done for each channel that has its box checked in the logger analog channels panel and the Enable threshold log box checked in the analog setup window. When the channel voltage goes above or below the thresholds programmed, the value is read, time stamped and written into the log. When the voltage returns back inside the threshold, the value is read, time stamped and recorded.

If the Log threshold box is unchecked then the logger will not log thresholds but simply sample and/or record minimum/maximum values for the channel.

Using An Input Channel To Validate An Analog Channel

Quite often in an application an external signal is used to validate or 'qualify' the voltage that is being read.

An example of one such application, is measuring the received signal strength indicator (RSSI) on a radio receiver. When signal is present it is indicated by a COS or carrier detect signal. The COS or carrier detect is an on/off signal. When the COS or carrier detect signal is ON, the strength of the signal being received is shown by the radio's RSSI voltage output and varies according to the strength of the signal. When the COS or carrier detect signal is OFF the voltage on the receivers RSSI output is not valid. The Site Monitor & Controller can be used to record RSSI values on radio links and can be used to analyze link performance via this method.

An example setup for RSSI measurement is shown below. The analog channel concerned has been enabled for logging, the Log threshold box is checked and the CARDET carrier detect signal (from the FFSK module) has been chosen as the input qualifier. For multiple receivers, other input signal channels and analog channels can also be used in parallel.

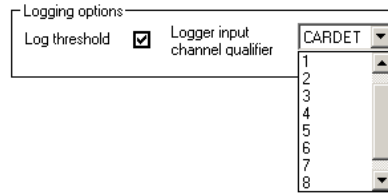


Figure 57 -- Logging Option Signal Selection

The input channel qualification feature can also be used to validate forward and reverse power readings in conjunction with a user supplied power-measuring device such as a reflected power meter. Power readings are only true when the transmitters push to talk (PTT) line is active (ON). The signals read by the meter are not valid when the PTT signal is OFF.

To use this feature, the PTT signal should be wired to a selected contact input channel, the contact input channel setup according to the PTT signal and the channel selected in the Logger input qualifier control. The analog hold timer will provide sufficient time for the transmitter to ramp up power before the level is qualified.

In both illustrated cases, whenever the signal exceeds the threshold set (either high or low) then the input channels signal is tested and if active (ON), the entry is written into the min/max log and time stamped.

Using The Logger to Record Temperature Threshold Crossings

The logger may also be used to record the time and duration when a temperature threshold point (low or high) is exceeded. To do this, follow the same procedure as outlined for the analog channels above.

If the Enable threshold log box is unchecked then the logger will not log thresholds but simply sample and/or record the minimum/maximum for the channel.

4.6.6 Contact Input Channel Logging

The logger may log two different types of contact input channel activity – ON time accumulation, or the logging of ON and OFF times. When a contact input channel is enabled for logging, the logging option panel is enabled in the corresponding input channel setup window. When the Log ON/OFF time option is enabled, the logger records logical ON and logical OFF transition times using the Real Time Clock.

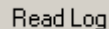
Two settings affect the sampling time of this facility. When not using the power save facilities, the logger will record absolute times at the normal fixed sampling (scanner) time of 100ms. When using the power save facilities the sample time will be affected by the setting that the user has chosen for the sleep/log time, since the logger can only run when the microprocessor is awake. When the Accumulate time is enabled the logger accumulates the total logical ON times for input channels, much like the air timer, and stores these in non-volatile memory.

4.6.7 Run Status

 Start Logger

The logger's run status is updated each time the logger setup is accessed. When the logger is stopped, the Start Logger button appears red. When the logger configuration has been set, click this button to start logging. The button will turn green and the legend on it will change to "Stop Logger."

4.6.8 Reading The Log

 Read Log

The Read log button will download the data log. This may take some time depending on whether the log is being retrieved locally (via direct serial cable connection) or over the air from a remote station and also depends on the number of samples recorded in the log.

4.6.9 Log Files

Reading the log also saves the sample log and the min/max log in a time stamped file in comma separated variable (CSV) file format.

Sample logs are stored with the file extension slf. Min/Max logs are stored with the file extension mlf.

Sample logs contain the following file format:

Channel, sample value in binary, hours, minutes, seconds, date, month, year.

Where channel:

0 – 7 = analog channels 1 – 8 respectively

8 – 15 = temperature channels 1 – 8 respectively

Min/Max logs contain the following file format:

Channel, minimum, maximum, hours, minutes, seconds, date, month, year

Where channel:

- 00 – 07 = analog channels
- 08 – 15 = temperature channels
- 16 – 23 = analog channel threshold exceeded (Note 1)
- 24 – 31 = temperature channel threshold exceeded (Note 1)
- 32 – 39 = contact input channel event (Note 2)



1. Analog and temperature channel threshold exceeded values are logged as follows: If the minimum value contains 65,535 then the maximum threshold was exceeded and the maximum value contains the threshold value. If the maximum value contains 65,535 then the minimum threshold was exceeded and the minimum value contains the threshold value.

2. Contact input channel change events log the event type in the “minimum value” field. The minimum value contains zero if the event (contact channel) turned off. The value is non-zero when the event turned on. The maximum value has no relevance.

4.6.10 Reading Airtime And Contact Accumulators

Read Timers

The air-timer and contact channel accumulators can be read quickly via the Read Timers button. The logger configuration panel is replaced with a timer panel similar to the figure below.

Air time:

Contact Input Channels

Contact ch 1:	<input type="text" value="0"/>	<input type="button" value="Clear"/>
Contact ch 2:	<input type="text" value="0"/>	<input type="button" value="Clear"/>
Contact ch 3:	<input type="text" value="0"/>	<input type="button" value="Clear"/>
Contact ch 4:	<input type="text" value="0"/>	<input type="button" value="Clear"/>
Contact ch 5:	<input type="text" value="0"/>	<input type="button" value="Clear"/>
Contact ch 6:	<input type="text" value="0"/>	<input type="button" value="Clear"/>
Contact ch 7:	<input type="text" value="0"/>	<input type="button" value="Clear"/>
Contact ch 8:	<input type="text" value="0"/>	<input type="button" value="Clear"/>

Figure 58 -- Air-timer & Contact Input Channels

Each of the 'elapsed' or accumulated timers is shown in seconds. Any of the 'timers' may be reset via the corresponding Clear button. All airtime and contact channel timers are non-volatile.

The Read Times button will now show the Show Config legend. Click to return to the configuration panel.

4.7 Tips For Setting Up A Network

This section provides a number of important and useful tips for setting up a network of Site Monitor & Controller modules.

4.7.1 Terminating Analog Inputs

Never apply in voltages outside of the select range directly to any analog input. Excessive voltages will damage the module.

Unused analog inputs should be grounded where possible or at the very least disabled via the configuration software utility SCCU.

If the module will be used in an environment with high levels of RF power present, take adequate care when routing sensing cables near coaxial cables that carry RF power.

Evaluate the voltage that will be measured and apply the appropriate delay timer value to the channel concerned. If the voltage being measured is subject to large variations, then consider carefully the effect that undue reporting of these variations may have on the overall system when selecting a set point and timer.

4.7.2 Using Analog Inputs To Supplement Contact Inputs

Any analog channel may be used to supplement a contact input or contact channel by the following process. Each analog channel has two set points. Only one set point needs to be used to signal an event that the input has changed status. For example if the substitute input that is to be measured is an input from a relay or open collector signal, a voltage source will be required. A good voltage source may be the station power supply ...for example a 12V DC supply. Arrange the relay so that the desired relay activity switches the voltage on and off. In the case of an open collector driver, arrange a 'pull up' to the 12V supply with for example, a 2K7 resistor. Be sure and set the appropriate range jumpers as well as the proper range settings in SCCU.

If the event is to activate (turn on) when the voltage is high use the high set point facility on the analog channel. Set the high set point to a value of half the supplied voltage. In case of a 12V station supply, 6-8V is a good value to use. The low set point must also be 'disabled' by setting it to 0V. As the voltage can never be below 0V, the low set point will never trigger an event.

If the event is to activate (turn on) when the voltage is low, then use the low set point. Once again set the low set point to a value of half the supplied voltage. The high set point must also be 'disabled' by setting it to its maximum value (10.2V on the 10.2V range or 20.4V on the 20.4V range).

4.7.3 Using A Channel As A Local Delay Timer

If an input channel is enabled and no mapping data was entered, i.e. the channel output map fields were left at zero, then no event transmission over the network will take place. This configuration can be used in conjunction with the local output control to delay a local input to local output signal without generating a transmission event. If the need arises this feature may be used to add a simple delay to a local input signal. This feature can also be used to invert the polarity of the input signal by changing the local output channels rest polarity to the inverse of the input signal.

4.7.4 Sharing A Radio Channel With The Site Monitor & Controller

In some situations and where light use of radio channel is expected, the Site Monitor & Controller system equipped with the RF modem option may share a channel with voice traffic. The number of Site Monitor & Controller stations, the frequency of status updates and the amount of voice traffic will ultimately determine the occupancy.

Do note that voice transmissions may cause unacceptable delays in the transmission of vital data between stations and could result in the complete loss of signaling at a vital moment.

The Site Monitor & Controller analog radio and 4-W wire-line module, uses FFSK signaling for communication between modules. The Site Monitor & Controller may share an analog radio channel with voice traffic under the following conditions:

4.7.5 Without Sub-Audio (CTCSS/DCS) Signaling

In this situation no sub-audio signaling is used by any radio in the network. FFSK packets will be heard on the shared channel and may be a source of annoyance to other operators.

4.7.6 With Sub-Audio (CTCSS/DCS) Signaling

In this situation it is possible to have two scenarios.

No Sub-Audio Signaling on radios interfaced to the Site Monitor & Controller.

In this situation Site Monitor & Controller FFSK packets will not be heard by voice radios if they use sub-audio signaling. However, it is possible for a mobile operator to commence transmission when the Site Monitor & Controller is transmitting FFSK since the radios interfaced to the Site Monitor & Controller do not generate sub-audio signaling and therefore do not generate a 'busy channel' indication at the mobile radio.

Sub-Audio Signaling used on all radios sharing the channel

In this situation FFSK packets will not be heard by other voice radios and there is little chance for packet collisions as all radios on the channel use signaling. All radios that are interfaced to the Site Monitor & Controller will use one common sub-audio signaling method and code. It should be noted that sub-audio signaling is not required by the Site Monitor & Controller. Sub-audio signaling is only introduced to prevent voice mobiles transmitting when FFSK transmissions are present on the channel by using the radios 'busy channel lockout' feature.

4.7.7 Upgrading The Application Firmware

The Site Monitor & Controller operating firmware (application) may be upgraded in the field. From time to time new features and amendments may be issued. This section describes the process of performing an application upgrade to the Site Monitor & Controller operating firmware. Operating firmware cannot be upgraded over the air (VHF/UHF radio) and must be carried out via direct cable connection between the PC and the module.



Note: During flash memory loading, data is output on some of the microprocessor pins that control the PTT signal when an analog FFSK modem is fitted. If the system that is being flash loaded is connected to an analog radio transceiver, the transceiver may key up for the duration of the upload. As an added precaution the radio should be turned off to prevent loading on the radio channel and or overheating of the transceiver.

Site Monitor & Controller firmware files have the following file naming convention:

Site Monitor & Controller _YYY_verX.XX.rom

where YYY indicates the application type. The application type is normally "standard". X.XX denotes the software version number.

Be sure that all switches in the Configuration 'DIP' type switch pack SW1, are in the OFF position before starting the upgrade. It is also a good idea to first save the module's configuration memory using the SCCU utility File Save option.

Connect a serial cable between the PC serial port and Serial Port #1 on the Site Monitor & Controller module. Launch SCCU. Click on System | Flash Upload.



Figure 59 -- System Flash Upload Menu

The SCCU Utility will prompt to confirm that you wish to carry out this action.

Select Yes to continue. The file open window is shown. Select the required firmware flash file. In the example window below we have access to one file as shown.

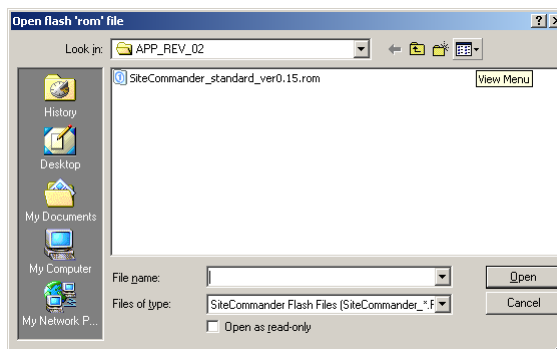


Figure 60 -- Open Flash ROM File Window

The flash load may be also aborted at this point by clicking on CANCEL.

The file is read and during flash loading a progress window shows the current block count of flash ‘pages’ loaded. During the flash upload both the red and green module LED indicators will flash.

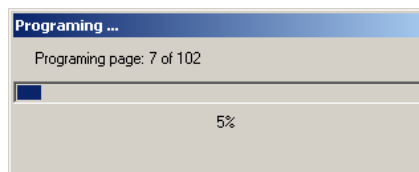


Figure 61 -- Flash Loading Progress Bar Window

After the final ‘page’ is loaded the application updates an internal database and displays the date and time of the last flash load for this module as shown below.



Figure 62 -- Flash Loader Update Status Display

Clicking on OK finalizes the process. The green LED on the module will then flash at one-second intervals. The process is complete.

4.7.8 Errors during Flash Loading

Errors during uploading are normally due to the incorrect file being used or the file contains errors.

Incorrect file header

If the following message shows after selecting the file, then the file is not a Site Monitor & Controller flash file. Locate and choose the correct file for the Site Monitor & Controller product.

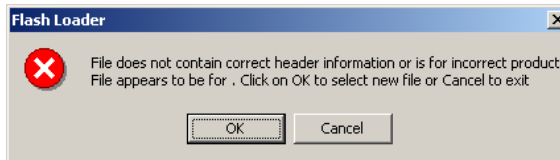


Figure 63 -- Sample of Incorrect Flash File

Bad Checksum

The file may be damaged. If you do not have a back up file, contact Daniels Electronics for a replacement file.

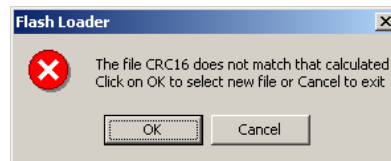


Figure 64 -- Sample of Damaged File Message

5.0 SITEVIEW MONITORING SOFTWARE

The siteVIEW application software is an optional Windows-based program for controlling and monitoring a network of Site Monitor & Controllers. siteVIEW can operate over data transmission media consisting of VHF & UHF analog radios or analog wire-line. siteVIEW is designed to run on an average personal computer with medium resolution graphics and a 19" monitor. It also requires a serial port.

To use siteVIEW with Site Monitor & Controller, a basic Site Monitor & Controller module is required at the central station to act as a Gateway. The purpose of the Gateway is to interface the siteVIEW computer with the network of Site Monitor & Controllers. A Gateway can be provided in a 19" rack module or wall mount enclosure.

Using a friendly user interface, siteVIEW provides a number of visual tools for station and site maintenance, including the site database manager and visual site template tools.

In summary the siteVIEW system consists of:

- Network monitor
- Visual design (station) template manager
- Station database manager
- Event log manager

More detail on how to use siteVIEW can be found in the siteVIEW manual.

6.0 SPECIFICATIONS

Motherboard													
Power	+11.0 to +25.0 VDC												
Current Consumption	Maximum 80 mA @ +13.5 VDC (FFSK option fitted); <15 mA current draw in lower power mode. (1 second wake-up interval with FFSK option fitted.)												
Module Size	175 mm x 75 mm x 22 mm high [7.0" L x 3.0" W x 0.9" H]												
Weight	Less than 500 g												
Operating Temperature	-40 to +65°C												
Digital Inputs	8 contact closures, switches, open collector or Voltage inputs (0 to 60 VDC input) with individual hold timers and high/low trigger set point per input												
Digital Outputs	8 'open drain' FET outputs, switching up to 50 VDC @ 150 mA current sink each. Programmable pulse or latching output												
Analog Inputs	8 x 10-bit A/D with 0 to 2.56 V, 0 to 5.0 V, 0 to 25.0 V and 4 to 20 mA range with individual hold timers and high/low trigger set point per input												
Temperature Monitoring	Up to 8 temperature sensors (option)												
Serial Ports	Two RS-232 asynchronous ports												
Data Rate	9600 bps												
Analog RF & 4-W Modem													
Data Rate	1200 & 2400 bps synchronous												
Signaling Type	FFSK												
CRC	16-bit CRC												
Radio Interface	50 K ohm level adjustable												
PTT	Programmable active high or low, up to 50 VDC with a sinking capacity of 150 mA												
PTT Delay	Programmable in 10 ms increments – maximum 1 second												
4-Wire Interface													
Type	600 ohm transformer isolated												
Protection	DC blocking to 60 VDC, secondary impulse protection												
Signaling	E&M optically isolated												
Site Monitor & Controller Configuration Utility (SCCU)	The SCCU is included with the Site Monitor & Controller. The utility allows the user to configure the modules' operating parameters from a personal computer running Windows™ 98 or higher.												
siteVIEW Site Monitoring and Control Software	TASC siteVIEW is a fully configurable Windows™ (2000 or higher) site monitoring and control software package for use with Site Monitor & Controller hardware. This optional software package allows the user to graphically view detailed information about each site using an intuitive instrument panel interface. siteVIEW features simple drag-and-drop configuration, event logging, audible alarm notification, and automatic polling.												
Temperature Sensors	<p>The Site Monitor & Controller can support up to a maximum of 8 temperature sensors per module.</p> <table border="0"> <tr> <td>Span:</td> <td>-55 to +125°C</td> <td>Connector:</td> <td>RJ-45 Modular plug</td> </tr> <tr> <td>Accuracy:</td> <td>-25 to +100°C +/- 2 C° max</td> <td>Bus derived power:</td> <td>2 mA per sensor</td> </tr> <tr> <td></td> <td>-55 to +125°C +/- 3 C°</td> <td></td> <td></td> </tr> </table>	Span:	-55 to +125°C	Connector:	RJ-45 Modular plug	Accuracy:	-25 to +100°C +/- 2 C° max	Bus derived power:	2 mA per sensor		-55 to +125°C +/- 3 C°		
Span:	-55 to +125°C	Connector:	RJ-45 Modular plug										
Accuracy:	-25 to +100°C +/- 2 C° max	Bus derived power:	2 mA per sensor										
	-55 to +125°C +/- 3 C°												

7.0 GLOSSARY OF TERMS

Site Monitor & Controller Module – The basic Site Monitor & Controller module is depicted below.

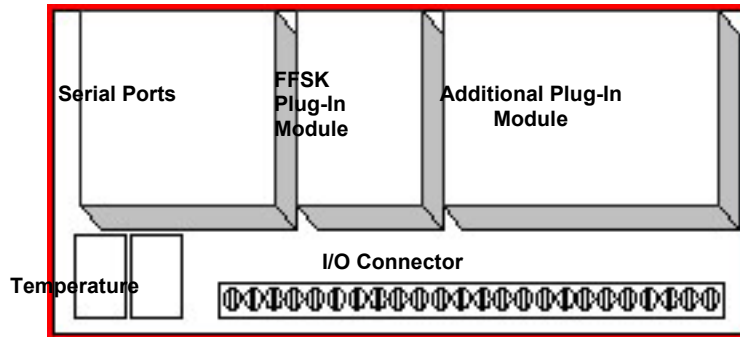


Figure 65 -- Basic Site Monitor & Controller Module

DIM –Data Interface Module -- A module that plugs into the main Site Monitor & Controller circuit board to provide data communication in a network of Site Monitor & Controllers. Only one module at a station may have DIMs.

Connectionless based Protocol – This is where the connection between two stations is direct and full time data exchange is possible without prior connection. An example of this would be a direct RS232 cable connection.

Master – A MASTER station is the central station that receives status/event information from remote SLAVE stations and routes these to the appropriate outputs as programmed by the Site Monitor & Controller Configuration Utility (SCCU) software.

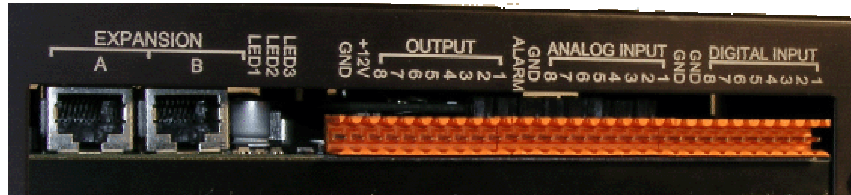
Gateway – A gateway station is the central Site Monitor & Controller station configured to provide an air interface to a network over analog radio or wire-line facilities. The gateway formats communication packets to and from a personal computer running siteVIEW software.

siteVIEW Software – siteVIEW is an optional software package designed to provide complete graphical site monitoring and control for networks of Site Monitor & Controllers. siteVIEW software runs on a personal computer connected to a Site Monitor & Controller module that has been configured as a Gateway.

SCCU – Site Monitor & Controller Configuration Utility Is the visual configuration software utility used to configure the Site Monitor & Controller module or station. The SCCU Utility is supplied with the Site Monitor & Controller programming kit.

8.0 APPENDIX 1 – CONNECTOR ASSIGNMENTS

Input/Output Connector



Connector P1 – I2C Expansion port

Pin	Signal Name
1	+12Vdc
2	N/C
3	Daisyin
4	Ground
5	SDA
6	Ground
7	SCL
8	N/C

Connector P2 – Module Expansion port

Pin	Signal Name
1	+12 VDC
2	N/C
3	Daisyout
4	Ground
5	SDA
6	Ground
7	SCL
8	N/C

Connector CN8 – LED Indicator Expansion connector (if fitted)

Pin	Signal Name
1	+5 VDC
2	Amber LED
3	Green LED
4	Red LED

Connector CN11 – LCD Expansion connector (if fitted)

Pin	Signal Name
1	Ground
2	+5V DC
3	Contrast
4	A14
5	/WR
6	ENABLE
7	AD0
8	AD1
9	AD2
10	AD3
11	AD4
12	AD5
13	AD6
14	AD7
15	Ground
16	+5V DC

Connector CN12 – Relay Expansion connector (option)

Pin	Signal Name
1	Output 1
2	Output 2
3	Output 3
4	Output 4
5	Output 5
6	Output 6
7	Output 7
8	Output 8
9	Do not connect
10	Ground
11	Ground
12	Polarity protect DC In
13	Polarity protect DC In
14	Polarity protect DC In