

**Geotechnical Systems Australia P/L**

**EXTENSOMETER DATA LOGGER  
COMMUNICATION SOFTWARE**

**VERSION 8.6G**

**OPERATING MANUAL**

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# Operating Manual

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## EXTENSOMETER DATA LOGGER COMMUNICATION SOFTWARE

### Version 8.6G

The Extensometer Data Logger Communication software is a graphical user interface that enables remote access to functions of the Extensometer Data Logger system. In addition it recovers stored data to text files that can be readily imported into a spreadsheet software application for further analysis.

The software can be configured to operate with either a local hardware communication link to the logger or via a modem link with connection through the GSM Data network system.

The application is a stand-alone executable created with the National Instruments Corporation LabVIEW<sup>®</sup> program development system. The installation of this software on any computer will confirm your acceptance of the Software Licence Agreement contained in the **ReadMe.pdf** file accompanying this release kit.

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# System Requirements

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The Extensometer Data Logger Communication software utilises the Windows® operating system. The interface screen has been designed for a 1024 x 768 resolution screen using 256 colours and different settings may result in loss of screen detail.

## MINIMUM SYSTEM

80486-based PC  
 1024 x 768 Monitor using 256 colours  
 Minimum 8MB of RAM (16MB or more recommended)  
 CD ROM Drive for software installation  
 A mouse or other pointing device  
 A modem capable of operating at 9600 baud

## Installing the Software

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### INSTALLATION

1. The Extensometer Data Logger Communication software is distributed on an installation CD. Insert the CD and double-click on the <setup.exe> file to begin
2. Change the path, if necessary, to point to the directory where you require the software to be installed. Click **Finish** to start the installation.
3. The software installer will automatically recognize that an earlier version of the application is installed. Run the <setup.exe> file to upgrade or re-install the application and support files.

### INSTALLED FILES

The installer will create the following files in the directory specified by the user:-

<b>EXL860.exe</b>	The software application
<b>EXL860.ini</b>	LabVIEW initialisation file
<b>Configuration Manager.exe</b>	Utility to configure the logger operating mode
<b>Modem Manager.exe</b>	Utility to manage access numbers for remote connections
<b>Operating Manual.pdf</b>	A copy of this document
<b>ReadMe.pdf</b>	Warranty, disclaimer and installation information

# Getting Started

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## OPERATING THE SOFTWARE

The Extensometer Data Logger Communication enables an operator to send and receive data from the microprocessor-based control system of the Extensometer Data Logger. The operator selects functions from a menu list and transmits them to the system via a [SEND] or [UPDATE] command button. The system will then respond to the selected function request appropriately. Some functions require the operator to enter data to be sent to the system and each command has accompanying on-screen instructions to assist the operator to communicate with the system. In-built transmission error features ensure that data integrity is maintained and the software has a dialogue response to all commands so the operator is assured that commands are received correctly.

Moving the screen pointer over the required screen function and activating the selection by clicking with the left mouse button carries out software operation. On-line HELP is available at all times by pressing [CTRL-H] and moving the pointer over the screen components. A brief description of the component function will appear in the HELP window.

## STRUCTURE

The software is configured to run automatically when loaded. Alternatively it can be started manually by clicking with the left mouse button on the [RUN] Arrow [⇒] in the toolbar. Once the application is running, it can only be shut down through the [CLOSE] button to ensure that the application completes saving all default values prior to shutting down.

## Windows® OPERATING SYSTEM SETTINGS

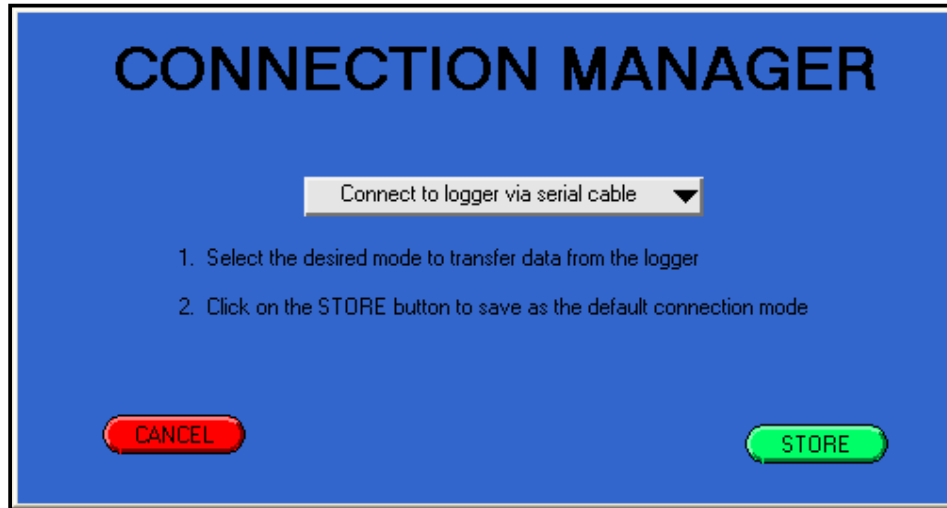
The Extensometer Data Logger Communication software can download the current date and time settings of the host computer directly to the logger. The format of the date and time must comply with that shown below and the existing settings can be readily altered via the Windows® Control Panel, Regional Settings dialogue feature. If the configurations listed are not shown as alternatives in the dialogue box, they may be typed directly into the settings format entry box and applied as the default format.

These should be set to:-	TIME:	HH:mm:ss
	DATE:	dd/MM/yy
	LONGDATE:	dddd, d MMMM yyyy

For the correct front panel display, the default icon font must be set to MS San Serif, Size 8. This can be selected via the [Control Panel/Display/Appearance/Item: Icon] dialogue box

# Serial Communication Links

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## SERIAL CONNECTION

When installing the software for the first time, a dialogue box will appear to select the mode of connection to the logger. This will normally only be necessary once however the selection screen can be forced to appear again by editing the **EXL860.ini** file entry to read [Installed=0]. The selection mode can then be altered if required.

## DIRECT SERIAL LINK

The Extensometer Data Logger may be connected to the computer serial port by the custom RS232 cable supplied with the software package. This cable must be connected to a 9 pin serial communication port usually located at the rear of the computer. The plug retaining screws should be fastened.

The connection to the logger is via the 7 pin male connector located on the logger module. The solar panel connector must be removed and the RS232 cable socket correctly aligned before pushing the cable plug onto the connector pins and securing with the screw-lock collar. The plug can be removed by unscrewing the collar and withdrawing the cable socket from the chassis plug. It is vital to replace the solar panel connector or the connector cap to ensure the system remains waterproof.

**NB. To conserve battery power, the communication cable must be removed from the system module to allow the system to return to sleep mode.**

When the operator runs the communication interface, an option box appears on the front panel to allow the operator to re-assign the serial port to be used to connect to the Extensometer Data Logger system. Connection is confirmed by a message line and the uploading of the current system configuration parameters to the host computer.

## GSM, PSTN and RADIO MODEM SERIAL LINKS

The Extensometer Logger may be supplied with a modem connection option utilising either the GSM900 Digital data network, the PSTN Network or a proprietary radio network that was installed during manufacture. All software features are available through the remote link although allowable times for responses from the logger have been increased to account for network delays. The software uses the **EXL860.ini** configuration file to determine if access via a modem is required.

The GSM Modem is located within the logger case and is powered from the logger battery. The power demand of the modem requires recharging via a solar panel and a communication access window wakes the modem for remote access. The Extensometer Data Logger software has the necessary functions to allow the operator to establish this window that will enable the modem to answer for a period of two hours from the access start time. The modem window access is set to a default time of 12:00 prior to delivery.

The **Modem Manager** utility file has been included in the installation directory to customise the list of site ID tags and access telephone numbers. These details are stored in the **EXL860.ini** file and this file may be edited directly if required. Note that the configuration file format must be followed exactly for the default details to be correctly read.

Direct serial communication is still available through the logger RS232 connection port by cancelling the modem splash screen, however the modem link will be disabled while the logger port is in use. Unplugging the custom serial cable will re-establish modem access to the logger system.

For installations utilising a GSM Modem with an extended capacity external battery, the external RS232 port is used to connect battery power and removing this plug will also remove power to the logger. This configuration is fitted with an internal lithium battery to maintain power to the logger and allow data recovery via a direct serial link.

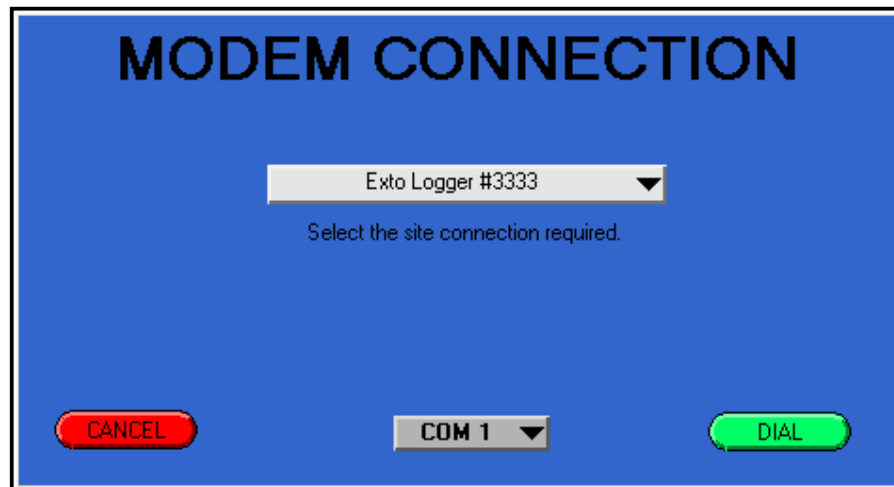
## USB-SERIAL ADAPTER

The Extensometer Logger is supplied with USB-Serial adapter to allow it to connect to laptop computers without a conventional 9-pin serial port.

The adapter is supplied with its own installation CD however the adapter should install itself automatically on computers running Windows2000®, WindowsXP® or Windows VISTA® operating systems.

# Communication Interface Functions

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## [Site Connection] MENU

Click on the arrow with the left mouse button and select from the list of available logger sites. This list of Site ID tags may be customised with the **Modem Manager** editor installed with the Extensometer Data Logger software.

## [COM PORT] MENU

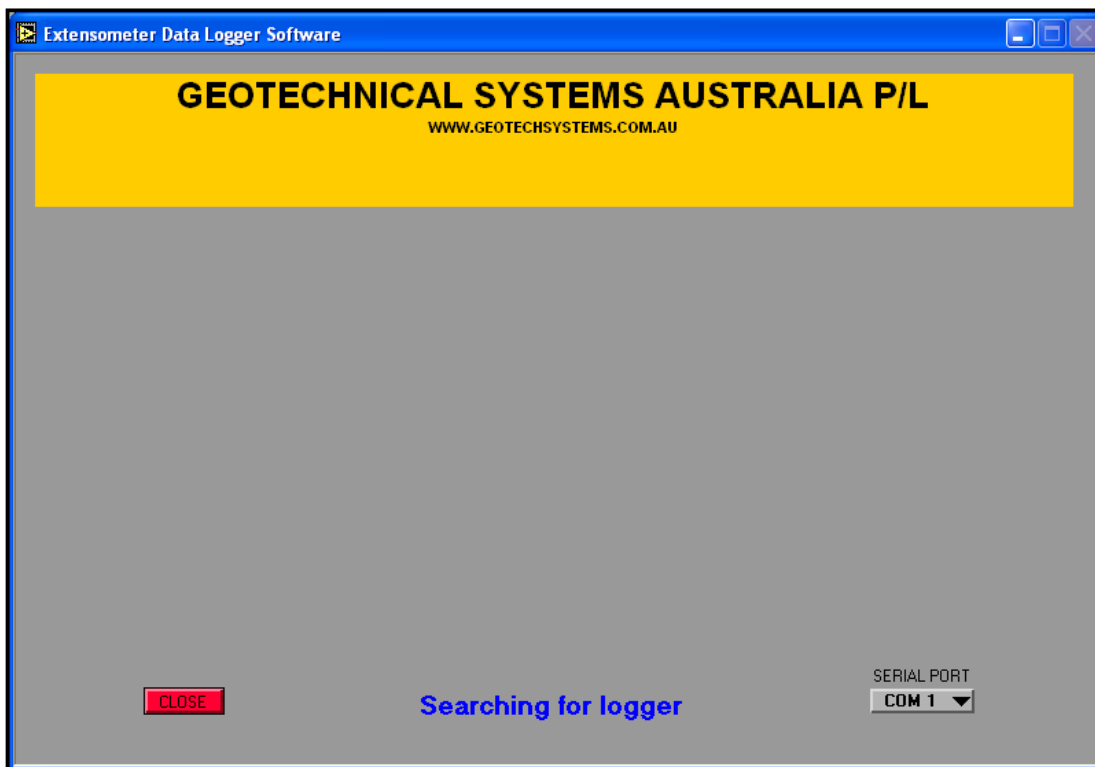
The range of this menu is 1-4 in line with conventional serial protocol and a new port may be selected by clicking on the arrow with the left mouse button and selecting an alternative.

## [DIAL] BUTTON

The modem will dial the selected site when the operator clicks on this control with the left mouse button. The software will carry out all of the procedures to establish a dialogue between the computer modem and the remote logger module. Once this link is established the connection display disappears and the modem link becomes transparent to the software operation.

## [CANCEL] BUTTON

Select this option by clicking with the left mouse button to cancel the modem connection process and return to the serial cable connection display.



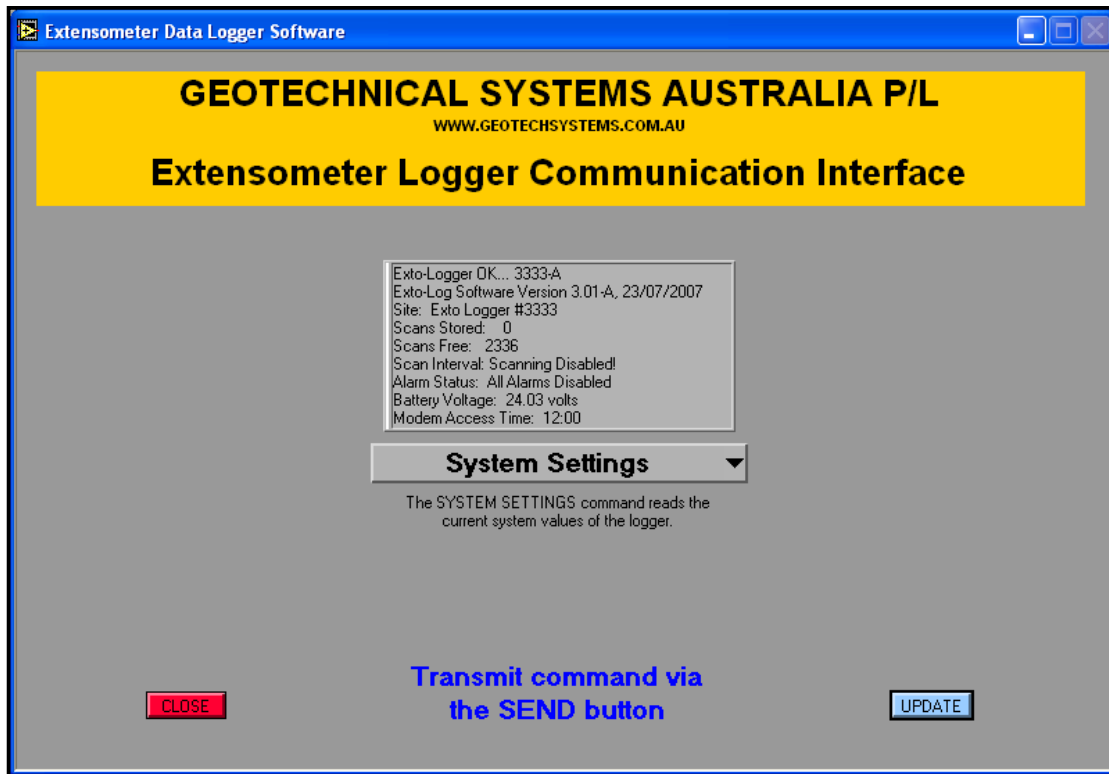
## [SERIAL PORT] CONTROL

This data box will appear while the application is searching for the serial connection to a Extensometer Data Logger system and disappear once a connection is established. During this time the operator may change the serial communication port used by the software to reflect the connection used by a particular computer. The range of this port is 1-4 in line with conventional serial protocol and alternatives may be viewed for selection by clicking on the arrow with the left mouse button.

The serial port selection box will not be shown when using a modem link, as the communication port will be pre-selected during the modem connection phase. If the logger search phase continues past three repetitions the connection between the logger and its modem should be checked.

## [CLOSE] BUTTON

Select this option by clicking with the left mouse button to cancel the search for an Extensometer Data Logger system and return to the Communication Interface.



### [System Settings] MENU OPTION

This menu selection displays the current status of the Extensometer Data Logger. Alterations to these settings must be made from other appropriate menu commands and the display will automatically update and return to the above screen.

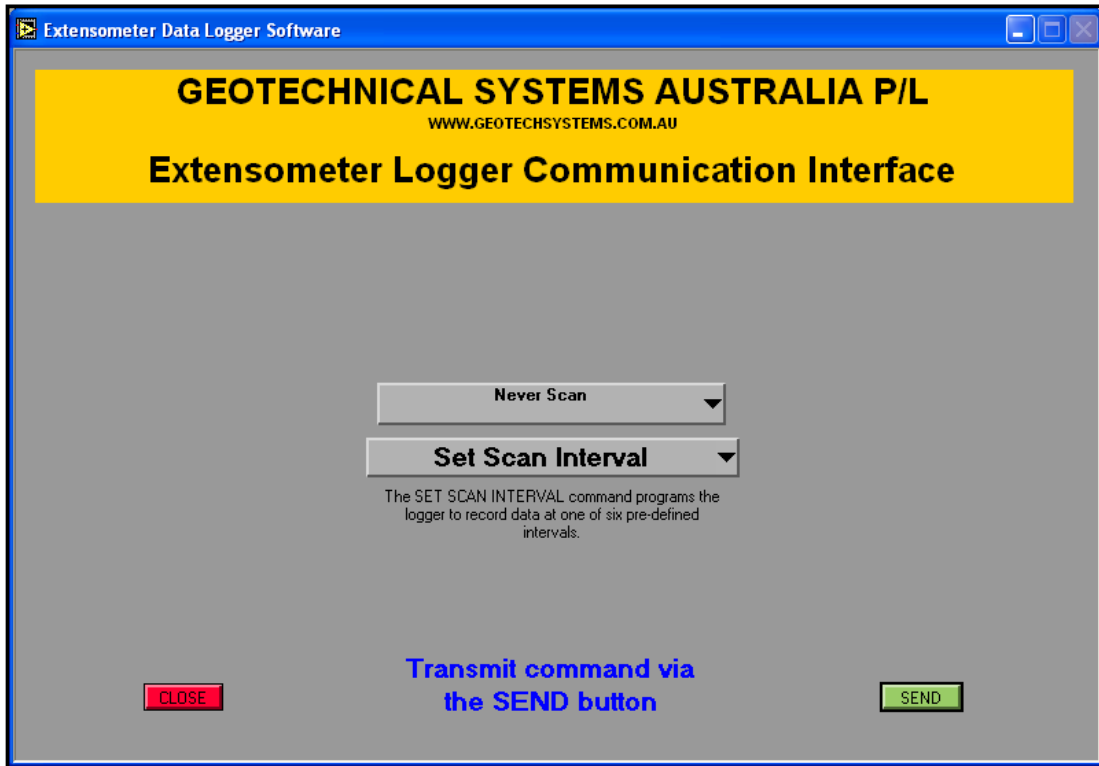
If the connection to the logger is lost at any time, the available menu options will be inhibited until the connection is re-established. This feature ensures the application data remains current and prevents the operator from making decisions based on incorrect data displays.

### [UPDATE] BUTTON

The System Settings display can be manually updated at any time by clicking on this button. The [UPDATE] button can also be activated by pressing [ENTER] on the computer keyboard.

### [CLOSE] BUTTON

Select this option to exit from the Extensometer Data Logger Communication Interface.



### [Set Scan Interval] MENU OPTION

This option displays a second menu to allow the operator to select one of seven available scan intervals for the Extensometer Data Logger system. The selected Scan Interval should be chosen after consideration of the amount of data required and the memory capacity of the system. The [Never Scan] option should be selected prior to carrying out any alterations to the system and care must be taken to reset the required interval at the completion of the task.

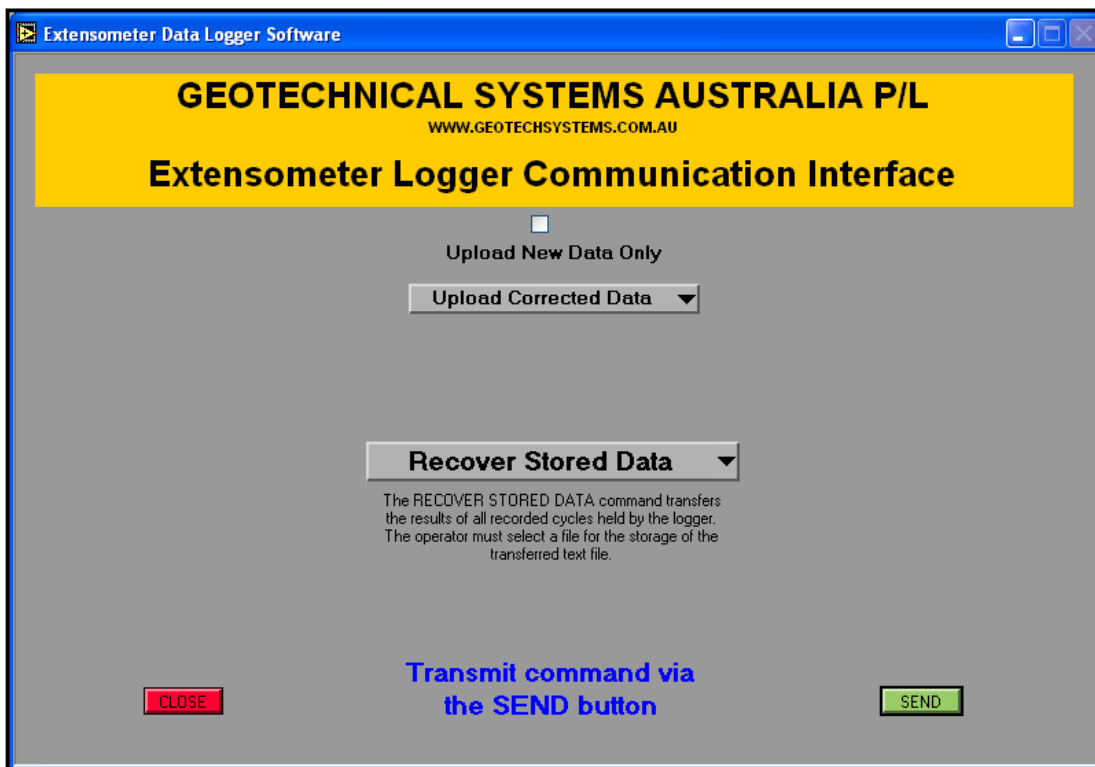
**APPLICATION NOTE:** All scanning is disabled while the logger is on-line to a host PC to reduce transmission errors and minimise data corruption.

### [SEND] BUTTON

Click on this button to transmit the selected scan interval to the logger system. The [SEND] button can also be activated by pressing [ENTER] on the computer keyboard.

### [CLOSE] BUTTON

Select this option to exit from the Extensometer Data Logger Communication Interface.



### [Recover Stored Data] MENU OPTION

Select this option to transfer stored measurement scans from the Extensometer Data Logger system to the host computer. The operator will be prompted to provide a filename and folder for the recovered data. A text file will be created on the computer for the data with an extension denoting that the data was recovered from the system. A full explanation of this data file is given in the relevant section of this manual.

The transmission will be checked for errors and the operator notified via a warning message if the upload is corrupted. Errors usually only affect a single data scan and the majority of data will still be valid.

Select the <Upload New Data Only> to recover data recorded since the last upload

### [Upload Raw Data] OPTION

In this mode, two reference channels are included with the data from Extensometer and Crackmeter instruments to allow manual correction for instrument lead wire losses.

### [Upload Corrected Data] OPTION

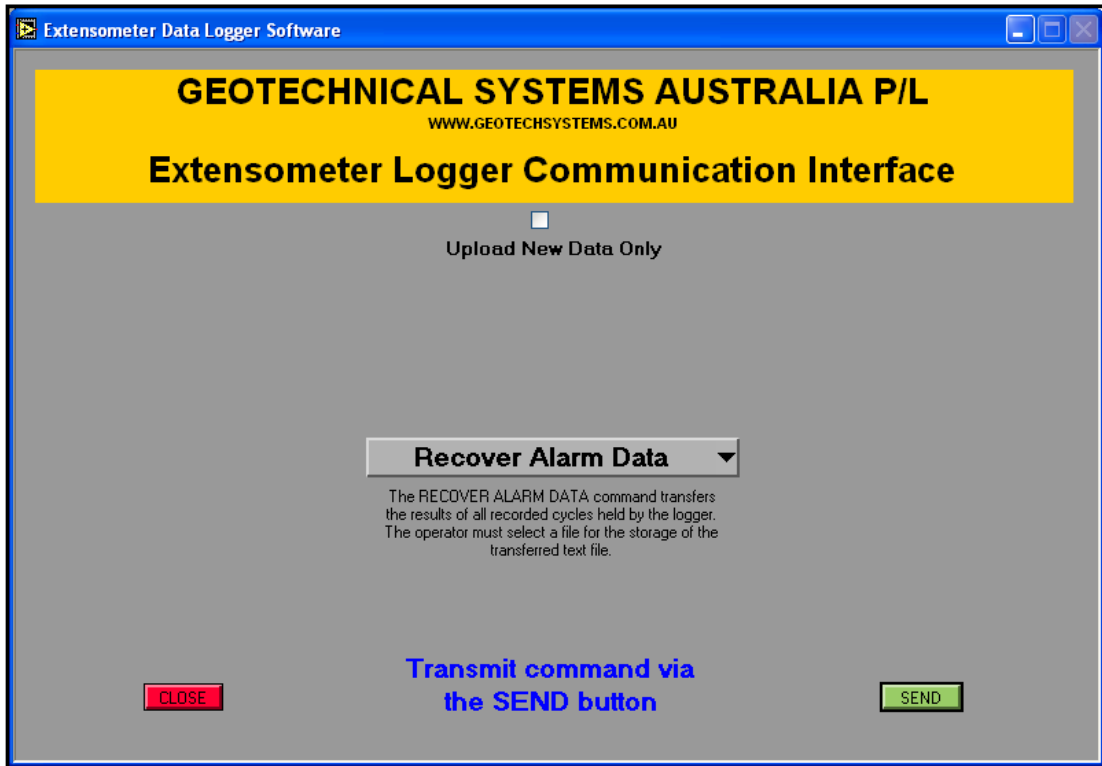
In this mode, the data from Extensometer and Crackmeter instruments is automatically compensated for instrument lead wire losses prior to upload.

## **[SEND] BUTTON**

Click on this button to recover data from the logger system. The [SEND] button can also be activated by pressing [ENTER] on the computer keyboard.

## **[CLOSE] BUTTON**

Select this option to exit from the Extensometer Data Logger Communication Interface.



### [Recover Alarm Data] MENU OPTION

Select this option to transfer stored measurement scans from the Extensometer Data Logger system to the host computer. The operator will be prompted to provide a filename and folder for the recovered data. A text file will be created on the computer for the data with header denoting that the data was recovered from the system. A full explanation of this data file is given in the relevant section of this manual.

The transmission will be checked for errors and the operator notified via a warning message if the upload is corrupted. Errors usually only affect a single data scan and the majority of data will still be valid.

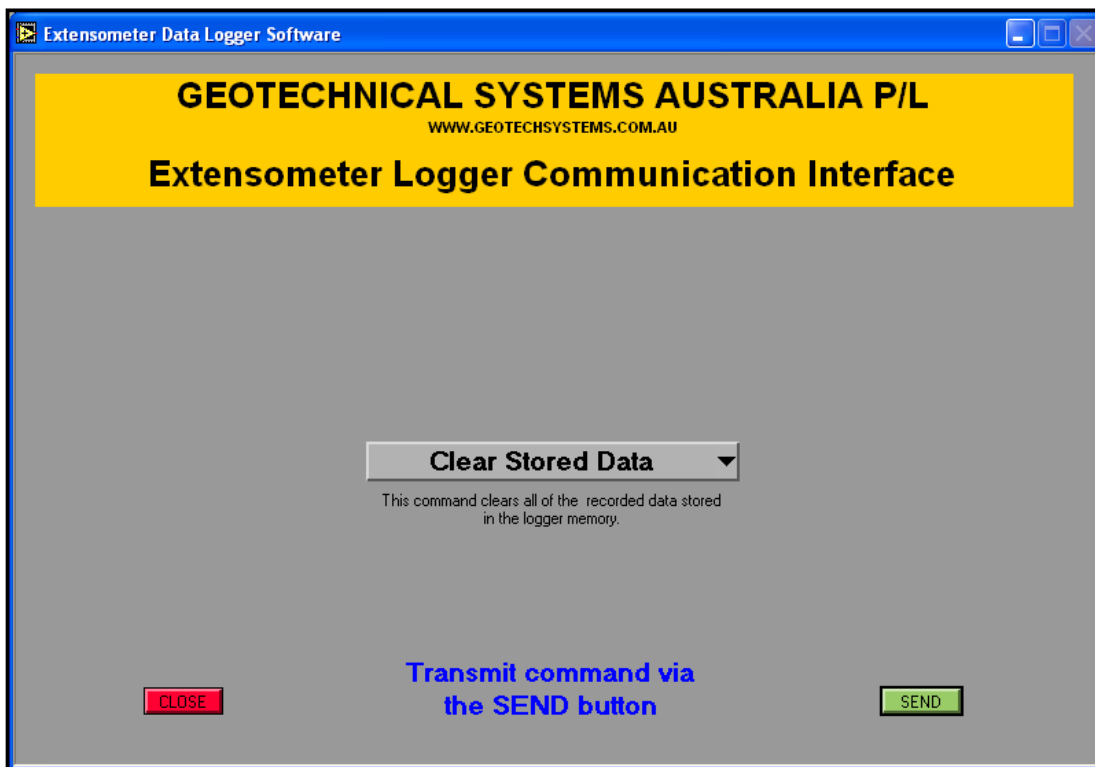
Select the <Upload New Data Only> to recover alarm data recorded since the last upload

### [SEND] BUTTON

Click on this button to recover data from the logger system. The [SEND] button can also be activated by pressing [ENTER] on the computer keyboard.

### [CLOSE] BUTTON

Select this option to exit from the Extensometer Data Logger Communication Interface.



### **[Clear Stored Data] MENU OPTION**

Select this option to clear stored scans from the Extensometer Data Logger system. The operator will be prompted to confirm the menu selection.

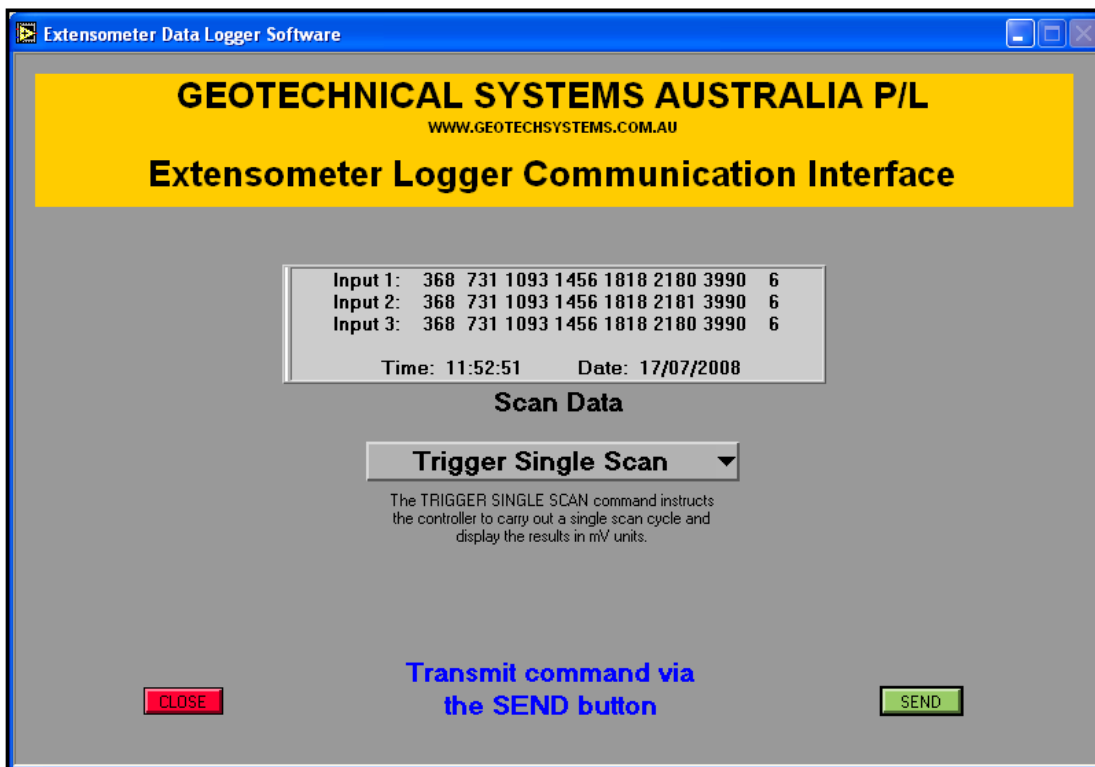
This command will not function if there is unrecovered data in the system. The system will respond with a visual warning to the operator and return to the System Settings display.

### **[SEND] BUTTON**

Click on this button to clear stored data from the logger system. The [SEND] button can also be activated by pressing [ENTER] on the computer keyboard.

### **[CLOSE] BUTTON**

Select this option to exit from the Extensometer Data Logger Communication Interface.



### [Trigger Scan] MENU OPTION

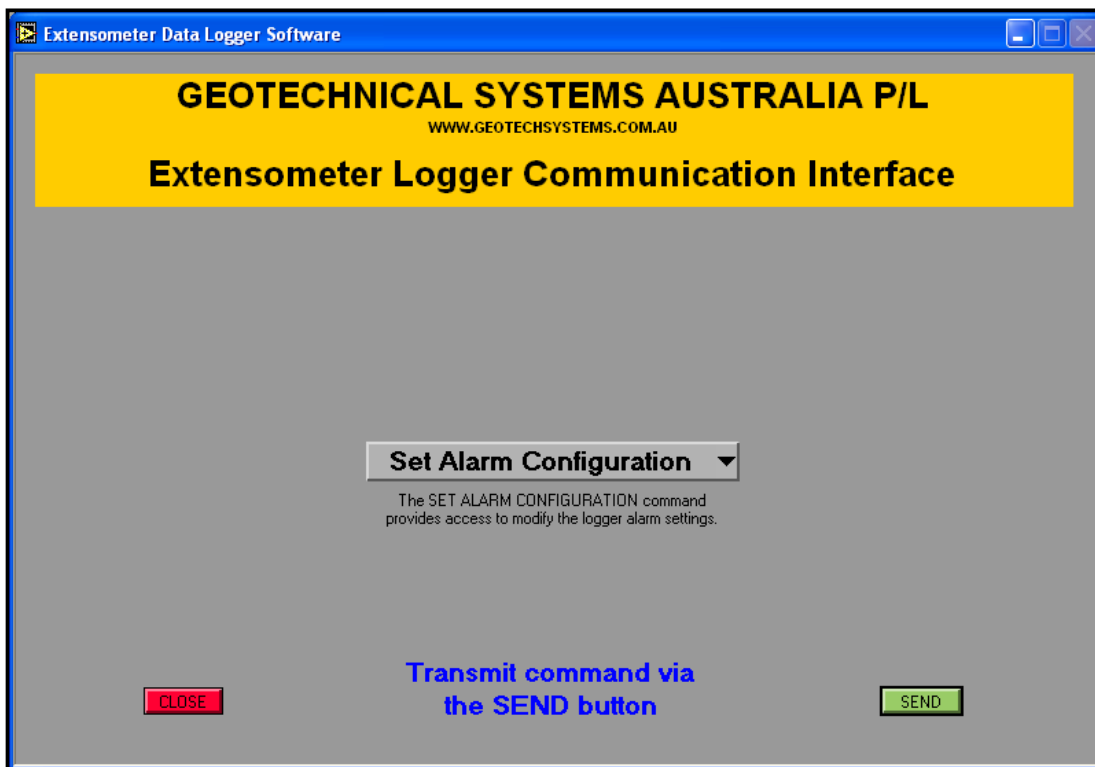
This option will instruct the Extensometer Data Logger system to carry out a single scan according to its configuration. The display of the returned data will vary with different configurations however the data will always be displayed in raw millivolt format. This command should be used to confirm that the system is operating correctly prior to leaving it for unattended operation.

### [SEND] BUTTON

Click on this button to carry out a single data scan. The data from this scan will be recorded in logger memory and returned in the indicator box. The [SEND] button can also be activated by pressing [ENTER] on the computer keyboard.

### [CLOSE] BUTTON

Select this option to exit from the Extensometer Data Logger Communication Interface.



### **[Set Alarm Configuration] MENU OPTION**

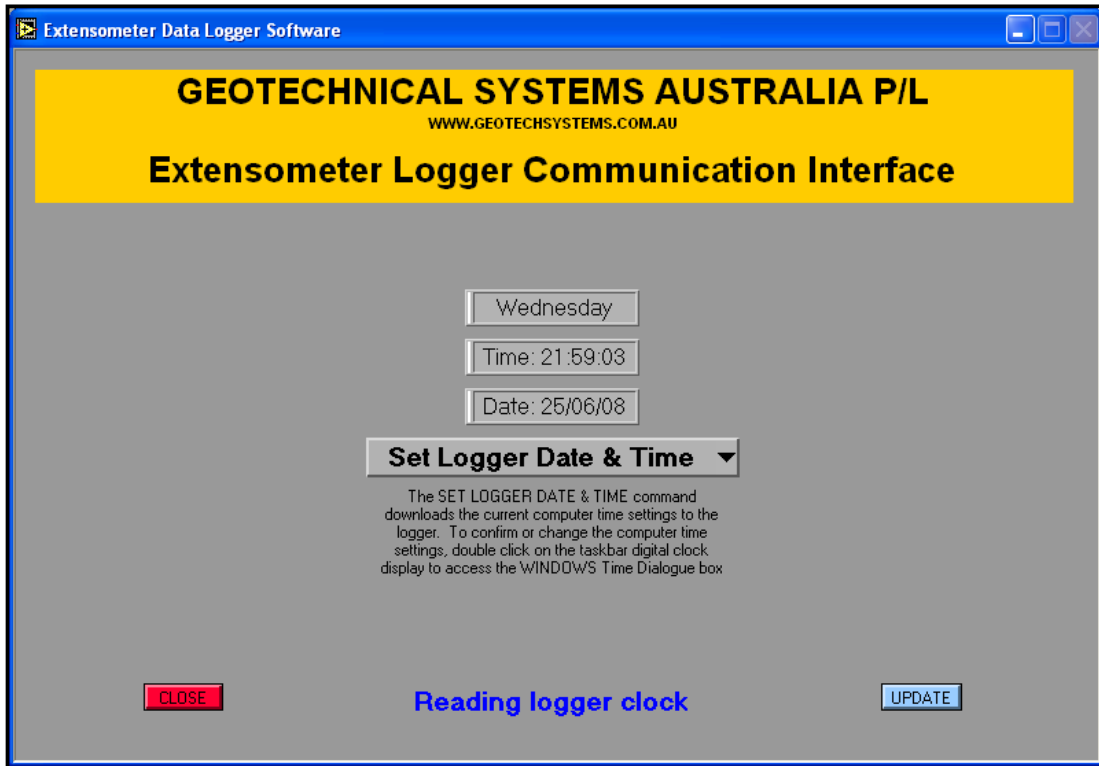
This option will load the Alarm Configuration Interface to allow access to the set-up options for the logger alarm features.

### **[SEND] BUTTON**

Click on this button to load the interface. The [SEND] button can also be activated by pressing [ENTER] on the computer keyboard.

### **[CLOSE] BUTTON**

Select this option to exit from the Extensometer Data Logger Communication Interface.



### **[Set Logger Date & Time] MENU OPTION**

Select this option to view the current TIME and DATE settings of the Extensometer Data Logger system. The displayed values are recovered from the system on-line as an indication that a communication link has been established.

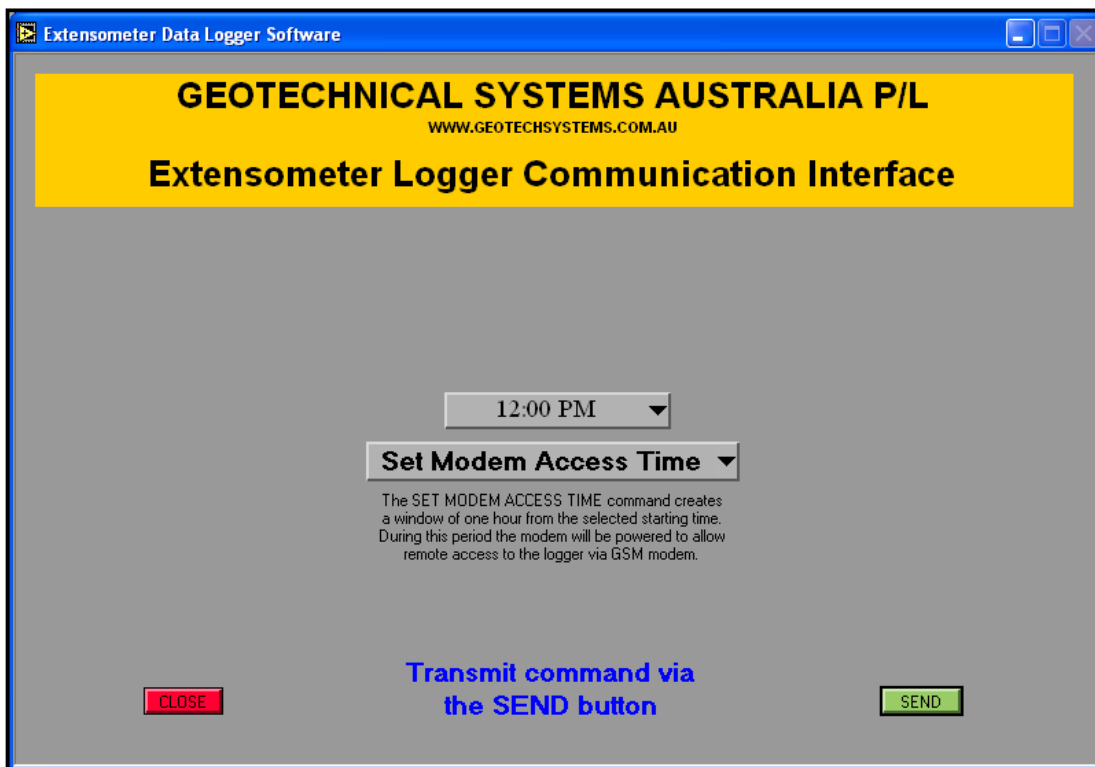
### **[UPDATE] BUTTON**

Select this option to load the current TIME and DATE settings of the host computer to the logger system. The [UPDATE] button can also be activated by pressing [ENTER] on the computer keyboard.

The Real Time Clock used in the logger will continue to operate even when the logger is switched off.

### **[CLOSE] BUTTON**

Select this option to exit from the Extensometer Data Logger Communication Interface.



### **[Set Modem Access Time] MENU OPTION**

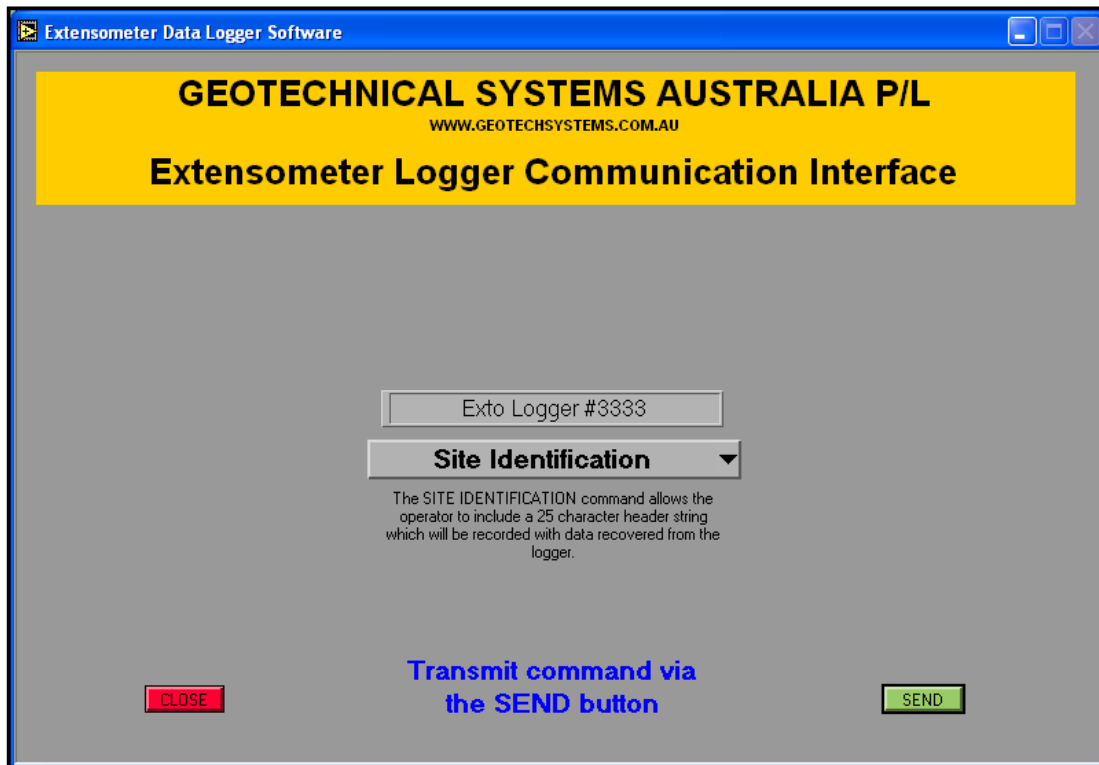
Select this option to view a list of start times for remote modem access to the logger. The logger modem will be powered for a 2-hour interval from the selected start time to enable it to answer incoming calls. Once on-line, all available features of the logger are accessible to the remote user. The current start time value is displayed in both the time selection menu and the System Settings data box.

### **[SEND] BUTTON**

Click on this button to transmit the modem access start time to the logger system. The [SEND] button can also be activated by pressing [ENTER] on the computer keyboard.

### **[CLOSE] BUTTON**

Select this option to exit from the Extensometer Data Logger Communication Interface.



### **[Site Identification] MENU OPTION**

Select this option to load a Site Identification header to the Extensometer Data Logger system. This identification header will be included with data recovered from the system. New header information can be entered into the data box and sent to the system via the [SEND] button.

When typing data into the Site Identification data entry box, do not terminate the entry with the [ENTER] key, as this will be interpreted as starting a second line of information. Simply finish typing and transmit the line to the logger via the [SEND] button.

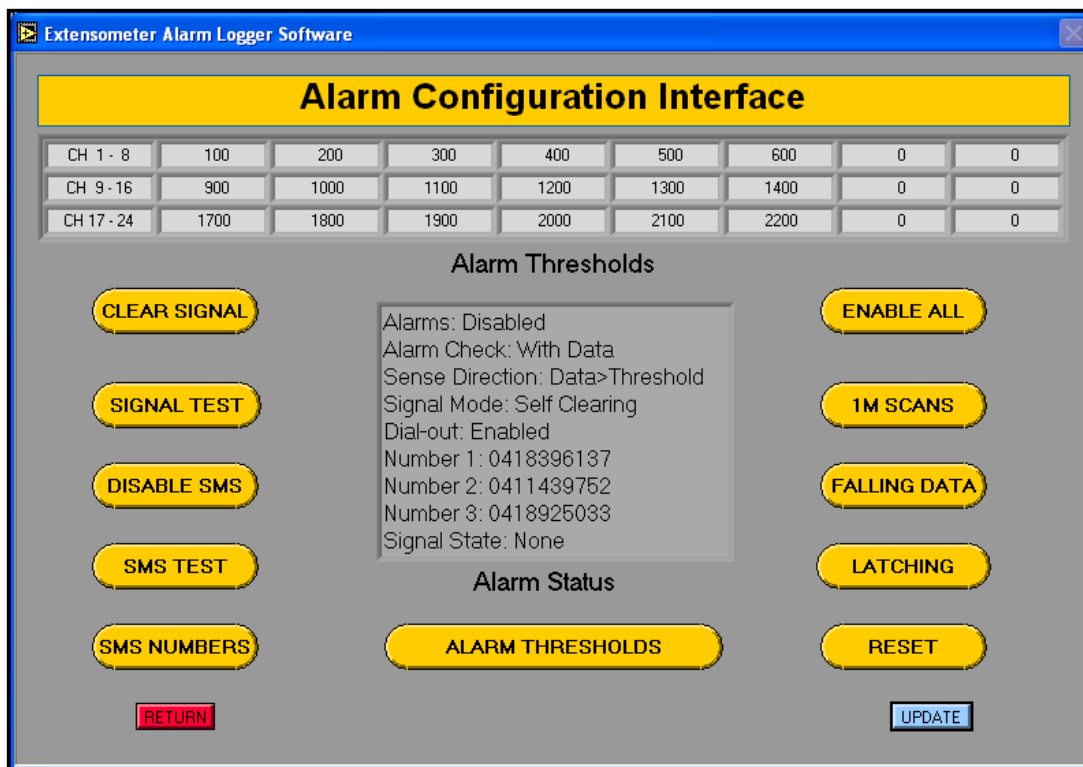
### **[SEND] BUTTON**

Click on this button to download the Site Identification header shown to the logger system.

### **[CLOSE] BUTTON**

Select this option to exit from the Extensometer Data Logger Communication Interface.

# Alarm Configuration Interface



## [Alarm Thresholds] DISPLAY

Shows the current trigger level settings of the logger alarm channels in (mV) units

## [CLEAR SIGNAL] BUTTON

Click to cancel any active external signal connected to the logger.

This function also cancels any active alarm channels. These channels will not generate any further alarms until the RESET button is used to re-arm all of the configured logger channels.

## [SIGNAL TEST] BUTTON

Click to test the operation of an external signal connected to the logger.

## **[DISABLE SMS] BUTTON**

Click to enable or disable automatic generation of an SMS message by the logger in response to an alarm condition. The logger will remain awake for up to 3 hours after successful transmission of the SMS test message to allow the operator to access the logger to check recorded data or alter alarm settings.

SMS Alerts will be automatically disabled until at least one contact number is programmed.

## **[SMS TEST] BUTTON**

Click to test the SMS message sent by the logger in response to an alarm condition. The logger will report an alarm condition on Channel 99 to confirm the SMS set-up parameters. Access to the logger will be inhibited for 30 seconds while the SMS test message is transmitted.

The SMS Test command request is stored in the logger until the current connection is terminated however the request will be cancelled if either the RESET or CLEAR SIGNAL buttons is operated.

**APPLICATION NOTE:** The logger cannot respond with a test message while either the serial communication cable is connected or access to the logger is via a GSM modem link.

Serial Cable Link: The test message will not be sent until the software breaks the current connection however the serial cable **MUST BE REMOVED FROM THE LOGGER WITHIN 20 SECONDS** to allow it access to the GSM modem.

GSM Modem Link: The logger automatically recognizes that it is on a call and the test message will not be sent until the software breaks the current connection.

## **[SMS NUMBER] BUTTON**

Click to edit up to three contact numbers to be used for SMS Alerts

## **[ALARM ENABLE] BUTTON**

Click to enable or disable alarm scanning. This function affects all configured alarms.

## **[ALARM CHECK] BUTTON**

Click to select alarm status testing at either 1-minute intervals or in conjunction with data scanning. This function affects all configured alarms.

**APPLICATION NOTE:** 1-minute alarm scanning is disabled while the logger is on-line to a host PC to reduce transmission errors and minimise data corruption. Alarm operations can be checked by using the <With Data> option and manually triggering a data scan.

## **[ALARM SENSE] BUTTON**

Click to select the direction in which data must cross the preset threshold to trigger an alarm condition. This function affects all configured alarms.

**RISING DATA:** The channel value must be greater than the preset threshold level to trigger an alarm.

**FALLING DATA:** The channel value must be less than the preset threshold level to trigger an alarm.

## **[ALARM MODE] BUTTON**

Click to select the mode of operation for triggered alarms.

**SELF-CLEARING:** In this mode, the data controls the operation of the external signal. Any configured alarm may generate a signal condition however all configured alarm channels must be clear for the logger to de-activate the signal.

When an input crosses back across its threshold value, only the external signal will be cleared. The logger will still note the initial alarm and register the channel as 'tripped'.

**LATCHED:** In this mode, a signal will be activated by any threshold crossing and remain active regardless of future data activity. The signal can only be cleared by the CLEAR SIGNAL or RESET buttons.

## **[RESET] BUTTON**

Click to clear any alarms currently registered and re-arm all configured alarm channels. This function will also cancel any active external signals and SMS Test requests.

## **[ALARM THRESHOLDS] BUTTON**

Click to access and adjust the alarm trigger point of individual configured data channels.

## **[UPDATE] BUTTON**

The current Alarm Status display can be manually updated at any time by clicking on this button. The [UPDATE] button can also be activated by pressing [ENTER] on the keyboard.

## **[CANCEL] BUTTON**

Select this option to exit from the Alarm Interface and return to the VW Logger Communication interface

Extensometer Alarm Logger Software

### Alarm Configuration Interface

CH 1 - 8	100	200	300	400	500	600	0	0
STATUS	Tripped	Tripped	Tripped	Tripped	Tripped	Tripped	Inhibited	Inhibited
DATA	368	731	1093	1456	1818	2181	3990	6
CH 9 - 16	900	1000	1100	1200	1300	1400	0	0
STATUS	Armed	Armed	Armed	Tripped	Tripped	Tripped	Inhibited	Inhibited
DATA	368	731	1093	1456	1818	2181	3990	6
CH 17 - 24	1700	1800	1900	2000	2100	2200	0	0
STATUS	Armed	Armed	Armed	Armed	Armed	Armed	Inhibited	Inhibited
DATA	368	731	1093	1456	1818	2181	3990	6

Channel 01 100 Tripped

Channels Threshold Level Channel Status

RETURN
UPDATE CHANNEL DATA VALUES
PRINT

## [Threshold Level] DATA ENTRY

Enter channel threshold value in (mV) units. New data may be directly entered into the dialogue box. The data may also be incremented and decremented by one (mV) unit at a time by clicking on the direction arrows with the left mouse button. Changes to individual channel thresholds are updated in the displayed array of all logger channels.

Engineering value thresholds are determined by reference to the individual instrument calibration data sheets.

## [Channels] MENU

Click on the arrow to view and select each available channel configured for alarm scanning.

## **[Channel Status] DISPLAY**

Configured logger channels may have four states:

Armed: The channel data has not crossed its threshold at any time.

Tripped: The channel data has crossed its threshold and has triggered an alarm. The channel is marked to prevent it causing multiple SMS alerts.

Cancelled: The channel data has crossed its threshold and triggered an alarm. This alarm has been cancelled by the CANCEL SIGNAL button. The channel is marked and will not generate any further alarms until it is re-armed with the RESET button.

Inhibited: The channel threshold value is set to zero and the alarm system will not scan this channel.

The status of all logger channels is shown in the displayed array of all logger channels.

## **[PRINT] BUTTON**

Click to print a summary of the current alarm set-up to the default printer.

## **[UPDATE CHANNEL DATA VALUES] BUTTON**

Click to trigger a full scan of configured inputs. The current value of individual channels is updated in the displayed array of all logger channels.

If alarms are enabled, the alarm and channel status will respond according to the current alarm parameter settings to assist the user to evaluate the alarm mode operation.

## **[RETURN] BUTTON**

Click to return to the alarm interface display.

# Configuration Manager Utility

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## OVERVIEW

The Configuration Manager is used to set the operating mode of logger prior to deployment in the field. In addition to the individual configuration screens shown on the following pages, this utility also allows access to the following logger functions for operator convenience.

System Settings

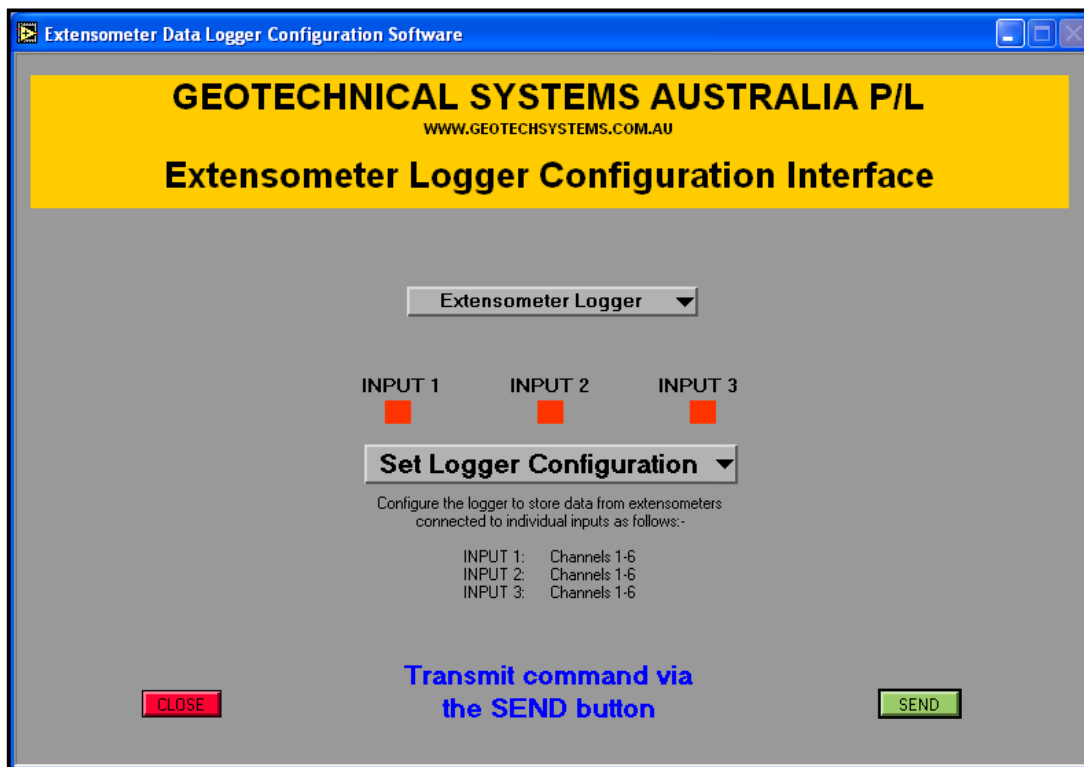
Set Logger Data & Time

Set Modem Access

Site Identification

## SERIAL CONNECTION

The Configuration Manager can only connect to the logger via the RS232 serial cable supplied. Loggers fitted with remote access hardware such as radio or telephone modems should be configured prior to deployment into the field. Alternatively, a laptop computer needs to be available on site should a logger need to be re-configured.



### [Extensometer Logger Configuration] MENU OPTION

Select the required input connection(s) for up to three 6-channel extensometers. The logger system will be optimised for data acquisition, memory usage and serial data transfer.

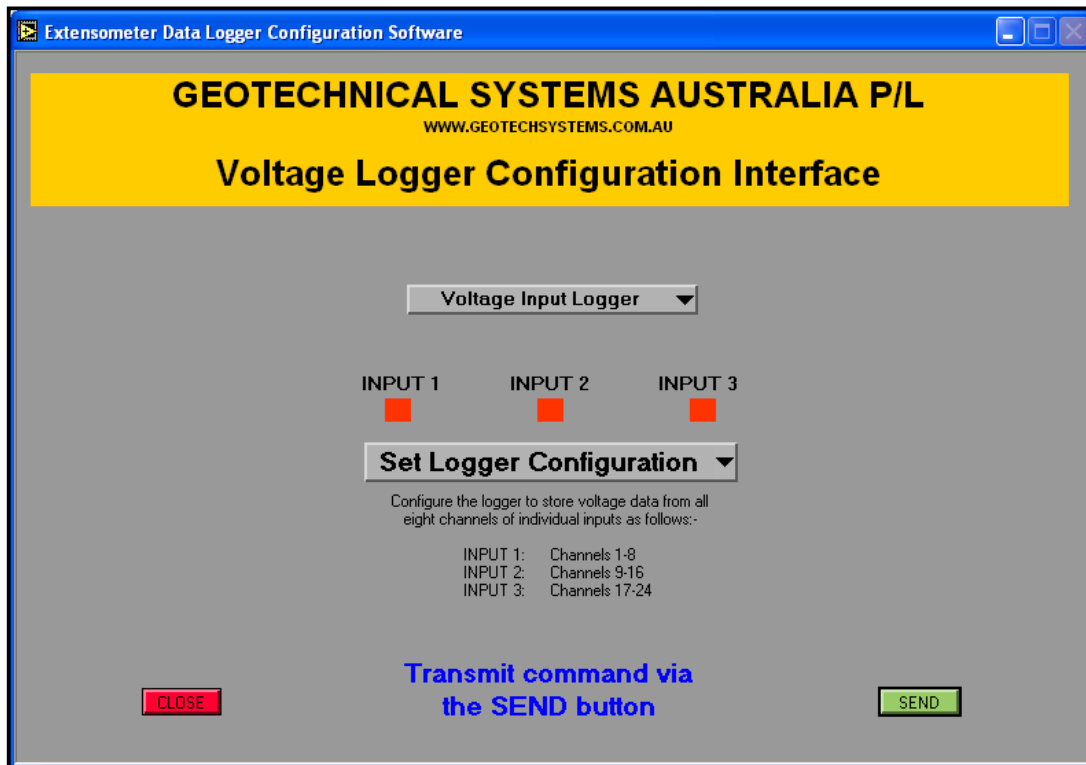
Refer to the Logger Input Connection section for input connector pin configurations.

### [SEND] BUTTON

Click on this button to transmit the selected configuration to the logger system. The [SEND] button can also be activated by pressing [ENTER] on the computer keyboard.

### [CLOSE] BUTTON

Select this option to exit from the Extensometer Data Logger Communication Interface.



## [Voltage Logger Configuration] MENU OPTION

Select the required input connection(s) for up to 24 voltage input channels. The inputs will be read in groups of 8 channels and unused input connection channels should be tied to ground as good practice. The logger system will be optimised for data acquisition, memory usage and serial data transfer.

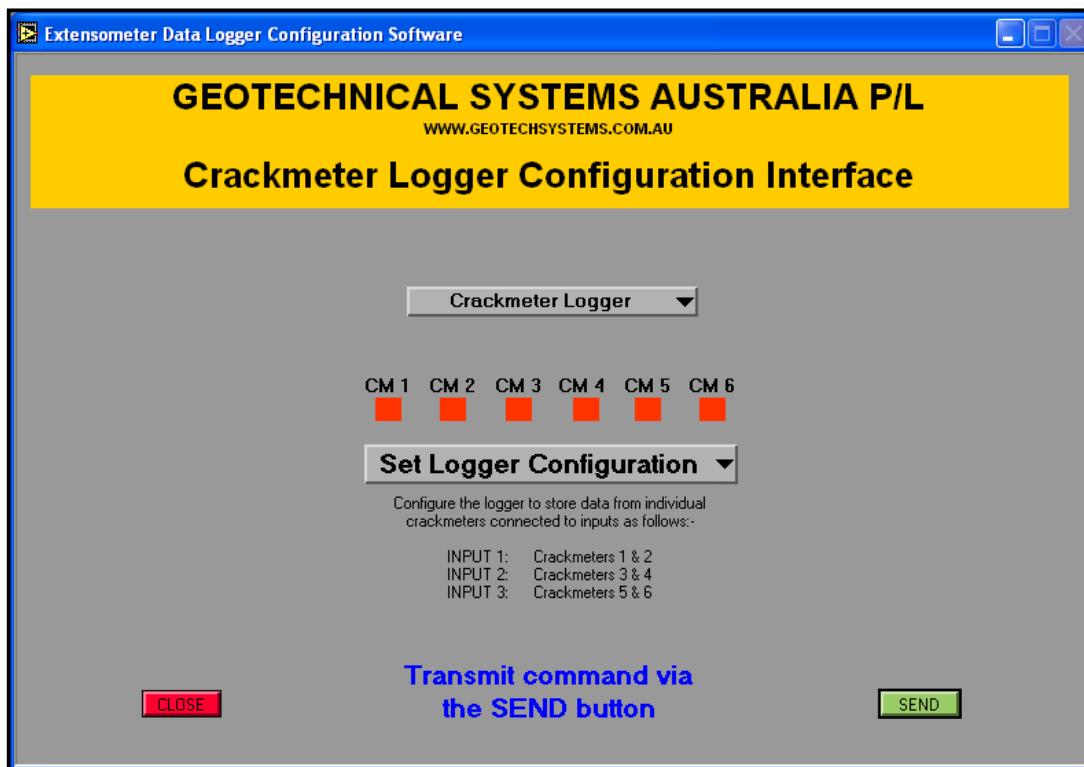
Refer to the Logger Input Connection section for input connector pin configurations.

## [SEND] BUTTON

Click on this button to transmit the selected configuration to the logger system. The [SEND] button can also be activated by pressing [ENTER] on the computer keyboard.

## [CLOSE] BUTTON

Select this option to exit from the Extensometer Data Logger Communication Interface.



### [Crackmeter Logger Configuration] MENU OPTION

Select the required input connection(s) for up to 6 single channel crackmeters. The logger system will be optimised for data acquisition, memory usage and serial data transfer. Selections will be automatically allocated to the first available input.

Refer to the Logger Input Connection section for input connector pin configurations.

### [SEND] BUTTON

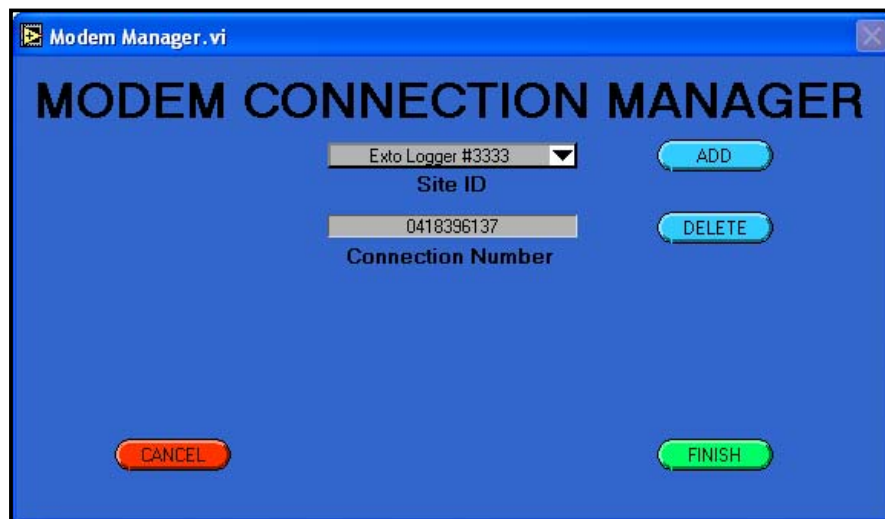
Click on this button to transmit the selected configuration to the logger system. The [SEND] button can also be activated by pressing [ENTER] on the computer keyboard.

### [CLOSE] BUTTON

Select this option to exit from the Extensometer Data Logger Communication Interface.

# Modem Manager Utility

---



## [Site ID] MENU

Click on the arrow with the left mouse button and select from the list of available logger sites. The currently assigned connection number will be also displayed. This site identification list may be edited with the **ADD** and **DELETE** buttons.

## [ADD] BUTTON

Clicking this button with the left mouse button will display two empty data entry boxes for the operator to type in a new Site ID and its assigned connection number. The new ID and access number (including any access codes) will be inserted into the existing Site ID list immediately before the site currently displayed.

## [DELETE] BUTTON

Clicking this button with the left mouse button will remove the site currently displayed.

## [FINISH] BUTTON

Select this option by clicking with the left mouse button to end the edit process and close the utility. The revised Site ID list will be used for future modem connection attempts.

## [CANCEL] BUTTON

Select this option by clicking with the left mouse button to cancel the edit process and close the utility without changing the original Site ID list.

# Extensometer Logger Data Files

```

Extensometer Logger Data File
Site: Exto Logger #3333
Date: 26/06/08
Time: 15:10:37
Battery Voltage: 14.04
Raw Data in mVolts
X1-1 X1-2 X1-3 X1-4 X1-5 X1-6 X1-V X1-Z Time Date
 624 1194 1765 2335 2906 3476 4046 53 14:00:00 25/06/2008
 624 1194 1765 2335 2906 3476 4046 53 15:00:00 25/06/2008
 624 1194 1765 2335 2906 3476 4046 53 16:00:00 25/06/2008
.
.
 624 1194 1765 2335 2906 3476 4046 53 14:00:00 26/06/2008
 624 1194 1765 2335 2906 3476 4046 53 15:00:00 26/06/2008
Data transfer complete.

```

The data file header contains the following information:-

- i) Logger identification information
- ii) The system site identification information
- iii) The data recovery date
- iv) The data recovery time
- v) The logger battery voltage after the data recovery
- vi) The recovered data format
- vii) A header line to assist with identification of measured data  
(X1-V is the extensometer excitation voltage, X1-Z is the extensometer reference voltage)

When the **UPLOAD RAW DATA** option is used, each scan is saved as follows:-

- i) Input data from each of the six measurement channels of connected extensometer(s)
- ii) Excitation voltage of each instrument measured at the individual extensometer head
- iii) The time and date that the scan occurred
- iv) All data scans use tab separation between columns

```

Data in mVolts corrected to 4.000 Volts Excitation
X1-1 X1-2 X1-3 X1-4 X1-5 X1-6 Time Date
 572 1143 1715 2286 2858 3429 14:00:00 25/06/2008
 572 1143 1715 2286 2858 3429 15:00:00 25/06/2008
 572 1143 1715 2286 2858 3429 16:00:00 25/06/2008
.
.
 572 1143 1715 2286 2858 3429 14:00:00 26/06/2008
 572 1143 1715 2286 2858 3429 15:00:00 26/06/2008
Data transfer complete.

```

When the **UPLOAD CORRECTED DATA** option is used, each scan is saved as follows:-

- i) Input data from each of the six measurement channels of connected extensometer(s)
- ii) The time and date that the scan occurred
- iii) All data scans use tab separation between columns

## Voltage Input Logger Data Files

```

Voltage Logger Data File
Site:  Exto Logger #3333
Date:  26/06/08
Time:  15:10:37
Battery Voltage: 14.04
Raw Data in mVolts
CH01  CH02  CH03  CH04  CH05  CH06  CH07  CH08  Time  Date
  452   910  1366  1822  2278  2735  3192  3648  14:00:00  25/06/2008
  452  1010  1366  1822  2278  2735  3192  3648  15:00:00  25/06/2008
  452  1010  1366  1822  2278  2735  3192  3648  16:00:00  25/06/2008
.
.
  452  1010  1366  1822  2278  2735  3192  3648  14:00:00  26/06/2008
  452  1010  1366  1822  2278  2735  3192  3648  15:00:00  26/06/2008
Data transfer complete.

```

The data file header contains the following information:-

- i) Logger identification information
- ii) The system site identification information
- iii) The data recovery date
- iv) The data recovery time
- v) The logger battery voltage after the data recovery
- vi) The recovered data format
- vii) A header line to assist with identification of measured data

Each scan is saved as follows:-

- i) Input data from each of the eight measurement channels of every selected input(s)
- ii) The time and date that the scan occurred
- iii) All data scans use tab separation between columns

# Crackmeter Logger Data Files

```

Crackmeter Logger Data File
Site: Exto Logger #3333
Date: 26/06/08
Time: 15:10:37
Battery Voltage: 14.04
Raw Data in mVolts
Crk1   C1-V   C1-Z   Crk2   C2-V   C2-Z   Crk3   C3-V   C3-Z   Time   Date
2050   4045   56    2055   4044   55    2053   4044   57    14:00:00   25/06/2008
2050   4045   56    2054   4045   56    2052   4045   55    15:00:00   25/06/2008
2050   4045   56    2054   4044   57    2052   4045   56    16:00:00   25/06/2008
.
.
2051   4045   56    2054   4045   56    2053   4044   56    14:00:00   26/06/2008
2051   4045   56    2055   4045   55    2053   4045   56    15:00:00   26/06/2008
Data transfer complete.

```

The data file header contains the following information:-

- i) Logger identification information
- ii) The system site identification information
- iii) The data recovery date
- iv) The data recovery time
- v) The logger battery voltage after the data recovery
- vi) The recovered data format
- vii) A header line to assist with identification of measured data  
(X1-V is the crackmeter excitation voltage, X1-Z is the crackmeter reference voltage)

When the **UPLOAD RAW DATA** option is used, each scan is saved as follows:-

- i) Input data from each connected crackmeter(s)
- ii) Excitation voltage of each instrument measured at the individual crackmeter head
- iii) The time and date that the scan occurred
- iv) All data scans use tab separation between columns

```

Data in mVolts corrected to 4.000 Volts Excitation
Crk1   Crk2   Crk3   Time   Date
2000   2006   2003   14:00:00   25/06/2008
2000   2004   2002   15:00:00   25/06/2008
2000   2004   2002   16:00:00   25/06/2008
.
.
2001   2004   2003   14:00:00   26/06/2008
2001   2005   2003   15:00:00   26/06/2008
Data transfer complete.

```

When the **UPLOAD CORRECTED DATA** option is used, each scan is saved as follows:-

- i) The millivolt data from each connected crackmeter(s)
- ii) The time and date that the scan occurred
- iii) All data scans use tab separation between columns

# Alarm Data File Format

```

Voltage Logger Alarm File
Site:  Exto Logger #3333
Date:  26/06/08
Time:  15:10:37
Battery Voltage: 14.04
CH1    CH2    CH3    CH4    CH5    CH6    CH7    CH8    Time    Date
    0      0      0      0      0      0      0      0      11:00:00    25/06/2008
    0      0      0      0      0      0      0      0      12:00:00    25/06/2008

(Alarms enabled by operator)

    0      0      0      0      0      0      0      0      13:00:00    25/06/2008
    0      0      0      0      0      0      0      0      14:00:00    25/06/2008

(Channel #2 crosses threshold value)

    0      2      0      0      0      0      0      0      15:00:00    25/06/2008
    0      2      0      0      0      0      0      0      16:00:00    25/06/2008

(Channel #2 alarm state cancelled by operator)

    0     -2      0      0      0      0      0      0      17:00:00    25/06/2008
    0     -2      0      0      0      0      0      0      18:00:00    25/06/2008
Data transfer complete.

```

The alarm data file header contains the following information:-

- i) A file-type identification
- ii) The system site identification information
- ii) The data recovery date
- iv) The data recovery time
- v) The logger battery voltage after the data recovery
- vi) A header line to assist with identification of measured data

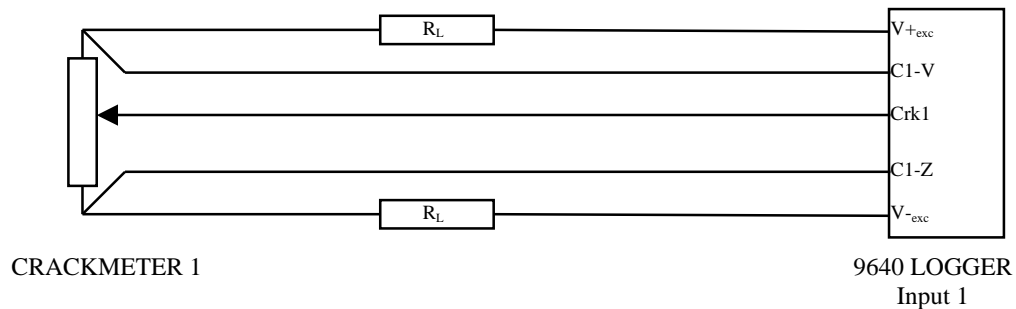
The data recorded for each scan is recorded as follows:-

- i) Scans logged with alarms disabled will record a [0] value on all channels
- ii) When alarm scanning is enabled, channels whose threshold value is crossed in the defined sense direction will record a positive data values equal to their Channel No. This allows convenient plotting in a spreadsheet application such as MS Excel or Lotus  
eg. Channel #2 generates an alarm, [2] is recorded.
- iii) When a channel is cancelled, a negative channel data value is recorded.  
eg. Channel #2 is cancelled, data record changes to [-2]
- iv) If a measured channel value crosses back over its threshold value, the recorded value will return to [0]. If the channel alarm was cancelled then a [-0] value will be recorded
- v) Alarm scanning does not take place for channels measured as zero
- vi) The time and date that the scan occurred.
- vii) All data scans use tab separation between columns

# Data Compensation Techniques

## LEAD-WIRE COMPENSATION

The logger has two input channels on each connector to measure the excitation voltage at the instrument head via the REFERENCE cables provided by the instrument manufacturer. This allows a correction to be made for voltage losses due to the internal resistance of the instrument cables supplying power to the instrument. When raw data is recovered from a logger configured for either extensometers or crackmeters, these offset voltages are included and may be applied as shown to reflect the true voltage of the active measurement channels.



## EXCITATION VOLTAGE STANDARDIZATION

Both extensometers and crackmeters output a voltage level that varies as a measure of physical movement. Individual instruments are calibrated by the manufacturer using their own reference voltage, however this invariably differs from the excitation voltage of individual installations. The Extensometer Data Logger automatically compensates for lead-wire losses and re-calculates the resultant value for a 4.000 volt excitation level. This allows the data to be easily converted to a physical change when the manufacturers calibration factor is applied.

## CALCULATIONS

```
Raw Data in mVolts
Crk1      C1-V  C1-Z  Time  Date
2050      4045   56  14:00:00  25/06/2008
Data transfer complete.
```

$$\Rightarrow \text{Corrected Crk1} = \left[ \frac{(\text{Crk1}) - (\text{C1-Z})}{(\text{C1-V}) - (\text{C1-Z})} \times 4000 \right] = \left[ \frac{(2050 - 56)}{(4045 - 56)} \times 4000 \right] = 2000 \text{ mvolts}$$

```
Data in mVolts corrected to 4.000 Volts Excitation
Crk1      Crk2  Crk3  Time  Date
2000      2006  2003  14:00:00  25/06/2008
Data transfer complete.
```

# Logger Operation

---

## INITIALISING THE LOGGER

The logger normally leaves the factory with both the primary power supply and the internal battery for the clock isolated. This is to ensure that the maximum battery life is available to the user.

The primary battery must be re-connected by unscrewing the retaining screws and removing the lid of the logger. Move the on-board slide switch S2 to the ON position and re-seal the logger taking care that the o-ring seal seats correctly to maintain the IP67 integrity of the logger.

Selecting the Set Date & Time menu option and updating the logger parameters from the computer automatically reconnects the clock battery. Ensure that the Time and Date formats used by the Windows<sup>®</sup> Operating system conform to those shown on Page 3 of this manual.

The case need not normally be re-opened except to replace the lithium power pack (if fitted) however the battery should be disconnected via the power switch if the logger is to be stored for an extended period.

## CONNECTING SENSORS

Individual vibrating wire sensors are connected may be connected to the logger in a variety of ways depending on the logger model supplied end-user requirements.

### IP67 Logger

Individual instruments are connected via the pre-wired IP67 connecting cables supplied with the logger. This method allows the user to readily make and break instrument connections without the problem of compromising the waterproof nature of the sensor input(s).

Sensors are allocated according to the input connection diagram on Pages 37 to 39 of this manual. The instrument cables should be soldered into place and the system operation confirmed by careful reference to both the logger connection list(s) and the monitoring instrument wiring instructions supplied by the manufacturer. Once the system is operating correctly, it is recommended that the solder terminations of the cable plug(s) be encapsulated in waterproof silastic compound to enhance their long-term reliability.

**NB** In the Voltage Logger configuration, input signals are read in groups of eight for any selected connector. Unused input channels within a connector group should be connected to the reference voltage input (Pin 12) to remove unwanted input signal drift.

## OEM Logger

This version of the logger is usually supplied as part of a larger logger system and housed in an external waterproof case. Connections are made either to an auxiliary terminal strip, pre-wired by the system manufacturer or via the cable access holes in the polycarbonate case, directly to the terminal block plugs located on the lower board of the logger.

Sensors are allocated according to the input connection table on Pages 40 - 42 of this manual.

**NB** In the Voltage Logger configuration, input signals are read in groups of eight for any selected connector. Unused input channels within a connector group should be connected to the reference voltage input (Pin 10) to remove unwanted input signal drift.

## RE-CHARGING LOGGER BATTERY

### IP67 Logger

The RS232 connection plug is used to re-charge the internal lead-acid batteries (if fitted) or connect a solar panel for operation of the logger with a modem interface.

Connections for this plug are as follows:-

Input Voltage	RS232 Input Connection
14 volt to 18 volt DC	Pin 5
0 volts	Pin 6

The supplied plug-pack module may also be connected to the serial port and charging for a minimum of 14 hrs will provide maximum battery life. The battery will not be over-charged even if left connected for longer periods

### OEM Logger

The POWER terminal is used to re-charge the external lead-acid battery connected to the B+ and B- terminals. The battery may be re-charged using either the supplied plug-pack module or an optional solar panel.

**APPLICATION NOTE:** The internal charging circuit is designed for a maximum charging capacity of 10 Watts. If a battery that requires a charging system larger than 10 Watts is installed to supply logger power, an external regulator must be fitted between the solar panel and the battery. In this case, the solar panel would not be connected to the circuit board terminals.

Connections for this terminal are shown in the input connection table as follows:-

Input Voltage	POWER Terminal Block
14 volt to 18 volt DC	SP+
0 volts	SP-

## SENSOR POWER

Normally instruments will be powered from the 4volt regulated supply available on Pin 9 of Inputs 1, 2 and 3.

A fused 12V, 150mA supply from the logger battery is available on the main processor board and the lower extension board via the **[Vo]** terminal for instruments with their own voltage regulation. This supply may be either activated when the logger wakes up or left permanently powered if a link is fitted to the **[O\ Ride]** terminal headers. The impact on battery life must be taken into consideration when sensors are left permanently powered.

# IP67 Logger Input Connections

---

## Extensometer Configuration Inputs 1, 2 or 3

<b>Extensometer Connection Signal</b>	<b>Logger Connection</b>	<b>Lead</b>
Anchor 1	Pin 1	White 1
Anchor 2	Pin 2	White 2
Anchor 3	Pin 3	White 3
Anchor 4	Pin 4	White 4
Anchor 5	Pin 5	White 5
Anchor 6	Pin 6	White 6
V+ Reference	Pin 7	Black 1
V- Reference	Pin 8	Black 2
Not Connected	Pin 9	Black 3
Not Connected	Pin 10	Black 4
Excitation +ve	Pin 11	Black 5
Excitation -ve	Pin 12	Black 6

**Voltage Logger Configuration Inputs 1-8**

<b>Voltage Input Signals</b>	<b>Logger Connection</b>	<b>Lead</b>
0-4V Single-end, Inputs 1	Input 1, Pin 1	White 1
0-4V Single-end, Inputs 2	Input 1, Pin 2	White 2
0-4V Single-end, Inputs 3	Input 1, Pin 3	White 3
0-4V Single-end, Inputs 4	Input 1, Pin 4	White 4
0-4V Single-end, Inputs 5	Input 1, Pin 5	White 5
0-4V Single-end, Inputs 6	Input 1, Pin 6	White 6
0-4V Single-end, Inputs 7	Input 1, Pin 7	Black 1
0-4V Single-end, Inputs 8	Input 1, Pin 8	Black 2
Fused 12V, 150mA supply from battery	Input 1, Pin 9	Black 3
Battery -ve return line	Input 1, Pin 10	Black 4
Regulated 4V supply	Input 1, Pin 11	Black 5
0V Reference, Inputs 1-8	Input 1, Pin 12	Black 6

**Voltage Logger Configuration Inputs 9-16**

<b>Voltage Input Signals</b>	<b>Logger Connection</b>	<b>Lead</b>
0-4V Single-end, Inputs 9	Input 2, Pin 1	White 1
0-4V Single-end, Inputs 10	Input 2, Pin 2	White 2
0-4V Single-end, Inputs 11	Input 2, Pin 3	White 3
0-4V Single-end, Inputs 12	Input 2, Pin 4	White 4
0-4V Single-end, Inputs 13	Input 2, Pin 5	White 5
0-4V Single-end, Inputs 14	Input 2, Pin 6	White 6
0-4V Single-end, Inputs 15	Input 2, Pin 7	Black 1
0-4V Single-end, Inputs 16	Input 2, Pin 8	Black 2
Fused 12V, 150mA supply from battery	Input 2, Pin 9	Black 3
Battery -ve return line	Input 2, Pin 10	Black 4
Regulated 4V supply	Input 2, Pin 11	Black 5
0V Reference, Inputs 9-16	Input 2, Pin 12	Black 6

**Voltage Logger Configuration Inputs 17-24**

<b>Voltage Input Signals</b>	<b>Logger Connection</b>	<b>Lead</b>
0-4V Single-end, Inputs 17	Input 3, Pin 1	White 1
0-4V Single-end, Inputs 18	Input 3, Pin 2	White 2
0-4V Single-end, Inputs 19	Input 3, Pin 3	White 3
0-4V Single-end, Inputs 20	Input 3, Pin 4	White 4
0-4V Single-end, Inputs 21	Input 3, Pin 5	White 5
0-4V Single-end, Inputs 22	Input 3, Pin 6	White 6
0-4V Single-end, Inputs 23	Input 3, Pin 7	Black 1
0-4V Single-end, Inputs 24	Input 3, Pin 8	Black 2
Fused 12V, 150mA supply from battery	Input 3, Pin 9	Black 3
Battery -ve return line	Input 3, Pin 10	Black 4
Regulated 4V supply	Input 3, Pin 11	Black 5
0V Reference, Inputs 17-24	Input 3, Pin 12	Black 6

## Crackmeter Configuration Inputs 1, 2 or 3

<b>Crackmeter Connection Signal</b>		<b>Logger Connection</b>	<b>Lead</b>
Crackmeter #1,	Active Channel	Input 1, Pin 1	White 1
	Reference +ve	Input 1, Pin 2	White 2
	Reference -ve	Input 1, Pin 3	White 3
	Excitation +ve	Input 1, Pin 11	Black 5
	Excitation -ve	Input 1, Pin 12	Black 6
Crackmeter #2,	Active Channel	Input 1, Pin 4	White 4
	Reference +ve	Input 1, Pin 5	White 5
	Reference -ve	Input 1, Pin 6	White 6
	Excitation +ve	Input 1, Pin 11	Black 5
	Excitation -ve	Input 1, Pin 12	Black 6
Crackmeter #3,	Active Channel	Input 2, Pin 1	White 1
	Reference +ve	Input 2, Pin 2	White 2
	Reference -ve	Input 2, Pin 3	White 3
	Excitation +ve	Input 2, Pin 11	Black 5
	Excitation -ve	Input 2, Pin 12	Black 6
Crackmeter #4,	Active Channel	Input 2, Pin 4	White 4
	Reference +ve	Input 2, Pin 5	White 5
	Reference -ve	Input 2, Pin 6	White 6
	Excitation +ve	Input 2, Pin 11	Black 5
	Excitation -ve	Input 2, Pin 12	Black 6
Crackmeter #5,	Active Channel	Input 3, Pin 1	White 1
	Reference +ve	Input 3, Pin 2	White 2
	Reference -ve	Input 3, Pin 3	White 3
	Excitation +ve	Input 3, Pin 11	Black 5
	Excitation -ve	Input 3, Pin 12	Black 6
Crackmeter #6,	Active Channel	Input 3, Pin 4	White 4
	Reference +ve	Input 3, Pin 5	White 5
	Reference -ve	Input 3, Pin 6	White 6
	Excitation +ve	Input 3, Pin 11	Black 5
	Excitation -ve	Input 3, Pin 12	Black 6

# OEM Logger Input Connections

---

## Extensometer Configuration Inputs 1, 2 or 3

<b>Extensometer Connection Signal</b>	<b>Logger Connection</b>
Anchor 1	Pin 1
Anchor 2	Pin 2
Anchor 3	Pin 3
Anchor 4	Pin 4
Anchor 5	Pin 5
Anchor 6	Pin 6
V+ Reference	Pin 7
V- Reference	Pin 8
Excitation +ve	Pin 9
Excitation -ve	Pin 10

### **Voltage Logger Configuration Inputs 1-8**

<b>Voltage Input Signals</b>	<b>Logger Connection</b>
0-4V Single-end, Input 1	Input 1, Pin 1
0-4V Single-end, Input 2	Input 1, Pin 2
0-4V Single-end, Input 3	Input 1, Pin 3
0-4V Single-end, Input 4	Input 1, Pin 4
0-4V Single-end, Input 5	Input 1, Pin 5
0-4V Single-end, Input 6	Input 1, Pin 6
0-4V Single-end, Input 7	Input 1, Pin 7
0-4V Single-end, Input 8	Input 1, Pin 8
Regulated 4V supply	Input 1, Pin 9
0V Reference, Inputs 1-8	Input 1, Pin 10

### **Voltage Logger Configuration Inputs 9-16**

<b>Voltage Input Signals</b>	<b>Logger Connection</b>
0-4V Single-end, Input 9	Input 2, Pin 1
0-4V Single-end, Input 10	Input 2, Pin 2
0-4V Single-end, Input 11	Input 2, Pin 3
0-4V Single-end, Input 12	Input 2, Pin 4
0-4V Single-end, Input 13	Input 2, Pin 5
0-4V Single-end, Input 14	Input 2, Pin 6
0-4V Single-end, Input 15	Input 2, Pin 7
0-4V Single-end, Input 16	Input 2, Pin 8
Regulated 4V supply	Input 2, Pin 9
0V Reference, Inputs 9-16	Input 2, Pin 10

### **Voltage Logger Configuration Inputs 17-24**

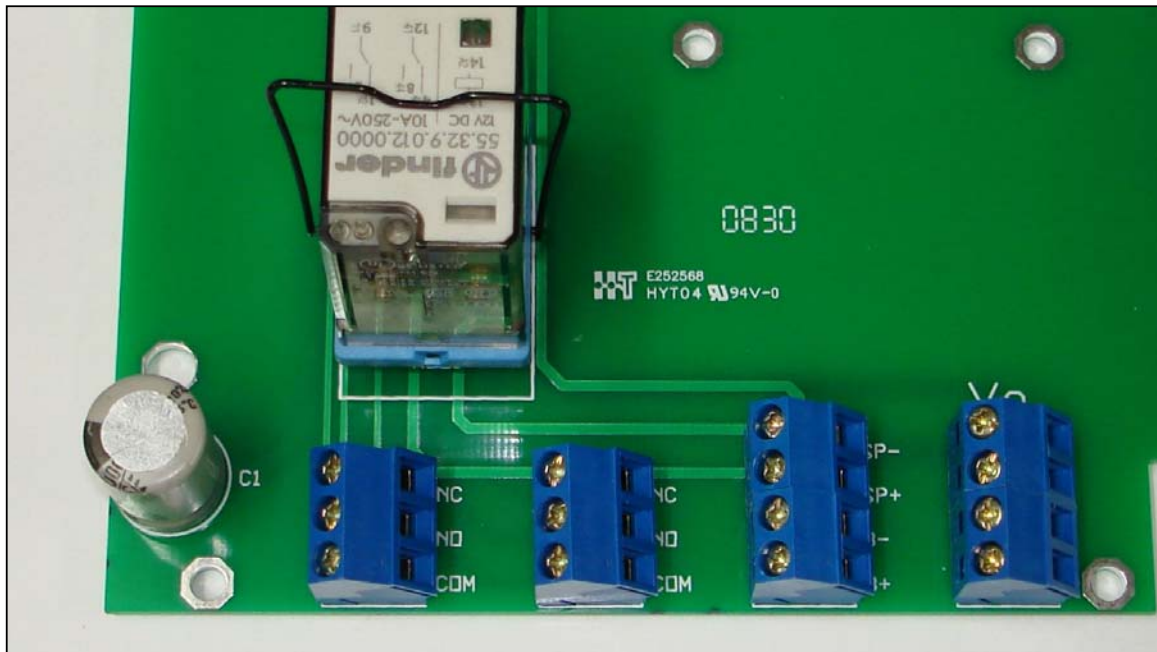
<b>Voltage Input Signals</b>	<b>Logger Connection</b>
0-4V Single-end, Input 17	Input 3, Pin 1
0-4V Single-end, Input 18	Input 3, Pin 2
0-4V Single-end, Input 19	Input 3, Pin 3
0-4V Single-end, Input 20	Input 3, Pin 4
0-4V Single-end, Input 21	Input 3, Pin 5
0-4V Single-end, Input 22	Input 3, Pin 6
0-4V Single-end, Input 23	Input 3, Pin 7
0-4V Single-end, Input 24	Input 3, Pin 8
Regulated 4V supply	Input 3, Pin 9
0V Reference, Inputs 17-24	Input 3, Pin 10

### **Switched power supply from battery**

Fused 12V, 150mA supply	Vo Terminal, Pin 1 (upper board)
	Vo Terminal, Pin 1,2 (lower board)
Battery -ve return line	Vo Terminal, Pin 2 (upper board)
	Vo Terminal, Pin 3,4 (lower board)

## Crackmeter Configuration Inputs 1, 2 or 3

<b>Crackmeter Connection Signal</b>	<b>Logger Connection</b>
Crackmeter #1, Active Channel Reference +ve Reference -ve Excitation +ve Excitation -ve	Input 1, Pin 1 Input 1, Pin 2 Input 1, Pin 3 Input 1, Pin 9 Input 1, Pin 10
Crackmeter #2, Active Channel Reference +ve Reference -ve Excitation +ve Excitation -ve	Input 1, Pin 4 Input 1, Pin 5 Input 1, Pin 6 Input 1, Pin 9 Input 1, Pin 10
Crackmeter #3, Active Channel Reference +ve Reference -ve Excitation +ve Excitation -ve	Input 2, Pin 1 Input 2, Pin 2 Input 2, Pin 3 Input 2, Pin 9 Input 2, Pin 10
Crackmeter #4, Active Channel Reference +ve Reference -ve Excitation +ve Excitation -ve	Input 2, Pin 4 Input 2, Pin 5 Input 2, Pin 6 Input 2, Pin 9 Input 2, Pin 10
Crackmeter #5, Active Channel Reference +ve Reference -ve Excitation +ve Excitation -ve	Input 3, Pin 1 Input 3, Pin 2 Input 3, Pin 3 Input 3, Pin 9 Input 3, Pin 10
Crackmeter #6, Active Channel Reference +ve Reference -ve Excitation +ve Excitation -ve	Input 3, Pin 4 Input 3, Pin 5 Input 3, Pin 6 Input 3, Pin 9 Input 3, Pin 10



**Alarm 1**

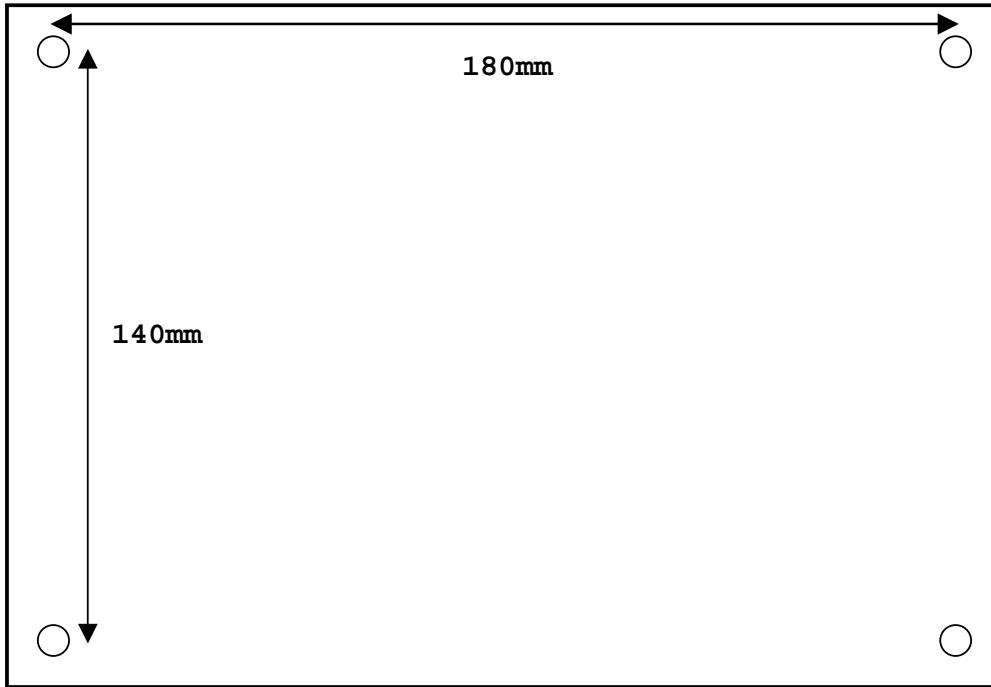
**Alarm 2**

**Battery & Solar  
Inputs**

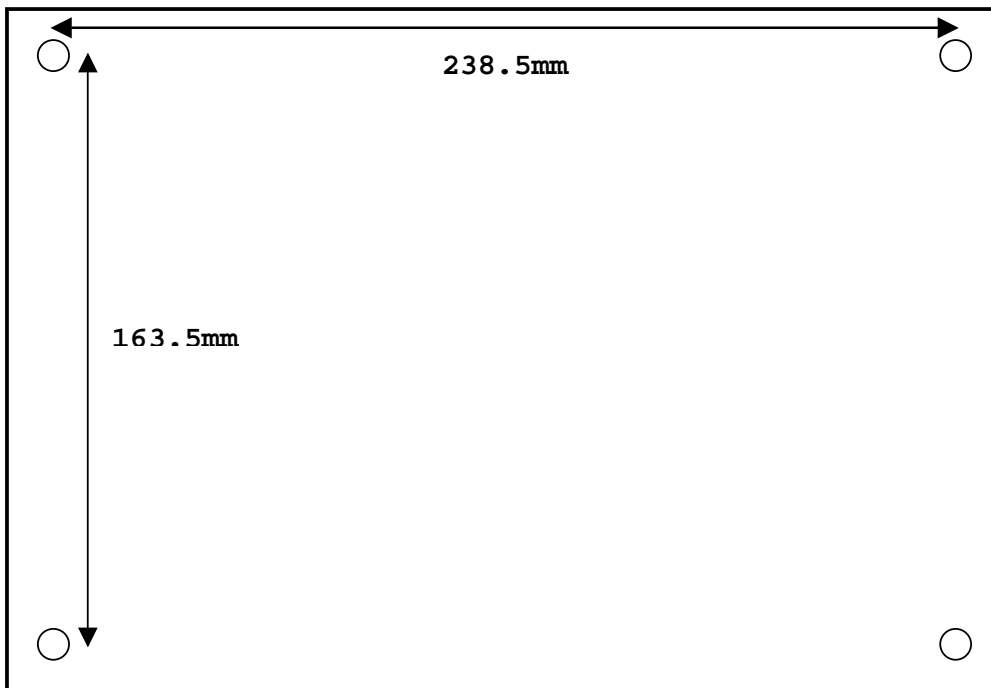
**Power Out**

# Logger Case Mounting Layout

---



**IP67 Case Mounting Dimensions**



**OEM Case Mounting Dimensions**

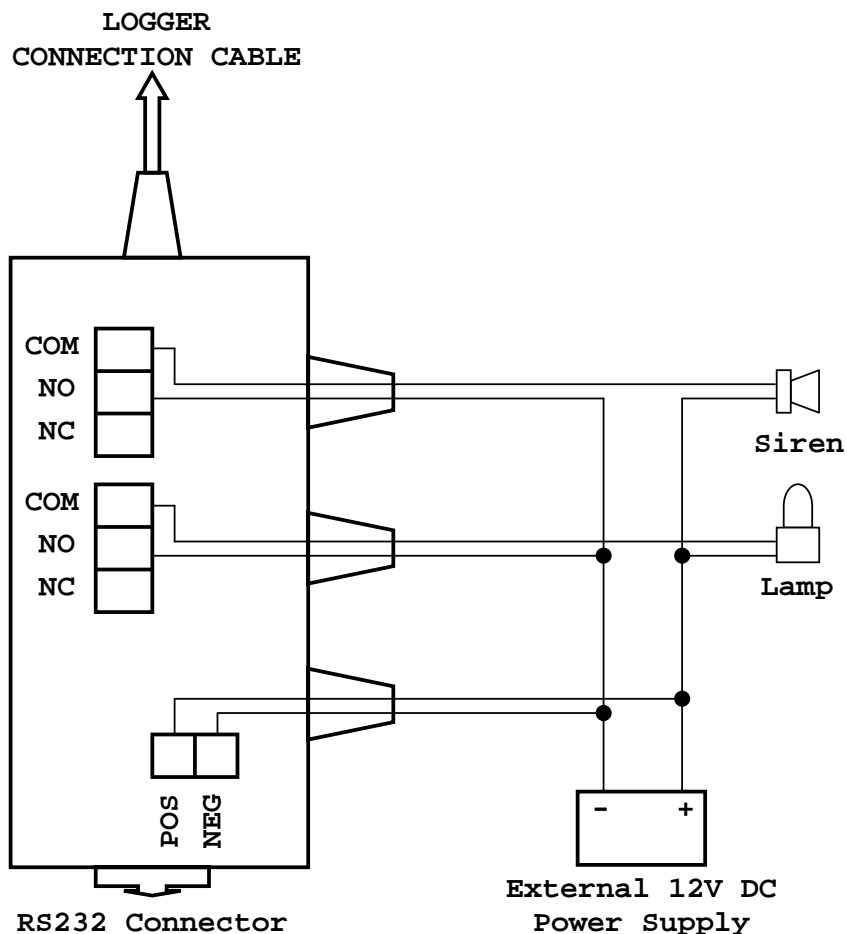
# IP67 Logger Alarm Module

## INTRODUCTION

The Logger Alarm Module is a custom interface for the connection of external signal devices requiring drive currents of up to 2A. It has provision for an external isolated power supply and uses a dual-pole power relay to provide two isolated switch contacts in either NO or NC configuration.

**APPLICATION NOTE:** The Logger Alarm module is only supplied with the IP67 case version of the logger. The OEM logger has an integrated alarm system with terminal connection for direct wiring of both NO and NC alarms.

## WIRING CONFIGURATION



# IP67 Logger System Specifications

---

## PHYSICAL SPECIFICATIONS:

<b>Size:</b>	160mm high x 200mm wide x 100mm deep	
<b>Weight:</b>	3kg	
<b>Material:</b>	Powder-coated die-cast aluminium	
<b>Sealing:</b>	IP67	
<b>Temperature:</b>	Operating	-20°C to +55°C
	Storage	-25°C to +70°C

## ELECTRICAL SPECIFICATIONS:

<b>Power:</b>	Internal Battery:	Sealed Lead Acid, 12V-1.3Ah 240V Plug-pack Charger Module
	Options:	10W Solar Charger Extended capacity external battery Primary Lithium Cell, 12V, 2Ah
<b>Configurations:</b>	Extensometer:	Up to 3 instruments, 6 anchors per extensometer Up to 5450 scans with a single extensometer connected
	Voltage Input:	Up to 24 single-end inputs, 4V max input level Up to 5450 scans with 8 inputs connected
	Crackmeter:	Up to 6 instruments Up to 5450 scans with a single crackmeter
<b>Data Logging:</b>	Input Channels:	Depends on logger configuration
	Excitation:	1 x 4v regulated plus 1 x fused 12v, 150mA per input
	Resolution:	1mV
	Digital Filtering:	64 sample integration
	Storage Capacity:	2336, 3270 or 5450 scans inc Time and Date data (depends on logger input configuration)
	Data Backup:	10 years without primary power
	Logger Timing:	Real-time clock, non-volatile operation 10 year count without primary power
<b>Scanning Intervals:</b>		1 min, 10 min, 1 hour, 6 hour, 12 hour, 24 hour Manual trigger mode via computer interface
<b>Alarm Logging:</b>	Logging Control:	Global enable/disable of all alarm functions
	Scan Rate:	Synchronous with data scan or 1 minute intervals
	Trigger Level:	Individual channel threshold value set by operator
	Trigger Sensing:	Threshold crossed in either [+ve] or [-ve] direction
	Signal Mode:	Set by operator to either Latched or Self-clear mode
Signal Outputs:	Single external control line for external alarm module SMS Alert option when a GSM Modem is fitted	

**Communications:** Baud Rate: 9600 baud, 8 data, 1 start, 1 stop, no parity  
Data Format: Data (mV units), Time, Date  
Data Separator: Tab separated columns, text format  
Data Recovery: Custom WINDOWS Interface software

**Modem Options:** Type: WAVECOM ASSSAM2W Quad-band GSM Modem  
Comms Rate: 9600 baud, Non-transparent mode  
SIM Card: Micro-SIM

Type: NETCOMM IG6000 DC Industrial Grade PSTN  
Comms Rate: ITU-T V.32 (9600bps)

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# OEM Logger System Specifications

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## PHYSICAL SPECIFICATIONS:

<b>Size:</b>	180mm high x 255mm wide x 100mm deep	
<b>Weight:</b>	1.5kg	
<b>Material:</b>	Glass-filled polycarbonate with smoke-tint lid	
<b>Sealing:</b>	Dependant on supplied external case	
<b>Temperature:</b>	Operating	-20°C to +55°C
	Storage	-25°C to +70°C

## ELECTRICAL SPECIFICATIONS:

<b>Power:</b>	External Battery:	Suggested minimum: Sealed Lead Acid, 12V-1.3Ah
	Options:	10W Solar Charger 240V Plug-pack Charger Module
<b>Configurations:</b>	Extensometer:	Up to 3 instruments, 6 anchors per extensometer Up to 5450 scans with a single extensometer connected
	Voltage Input:	Up to 24 single-end inputs, 4V max input level Up to 5450 scans with 8 inputs connected
	Crackmeter:	Up to 6 instruments Up to 5450 scans with a single crackmeter
<b>Data Logging:</b>	Input Channels:	Depends on logger configuration
	Excitation:	1 x 4v regulated plus 1 x fused 12v, 150mA per input
	Resolution:	1mV
	Digital Filtering:	64 sample integration
	Storage Capacity:	2336, 3270 or 5450 scans inc Time and Date data (depends on logger input configuration)
	Data Backup:	10 years without primary power
	Logger Timing:	Real-time clock, non-volatile operation 10 year count without primary power
	Scanning Intervals:	1 min, 10 min, 1 hour, 6 hour, 12 hour, 24 hour Manual trigger mode via computer interface
<b>Alarm Logging:</b>	Logging Control:	Global enable/disable of all alarm functions
	Scan Rate:	Synchronous with data scan or 1 minute intervals
	Trigger Level:	Individual channel threshold value set by operator
	Trigger Sensing:	Threshold crossed in either [+ve] or [-ve] direction
	Signal Mode:	Set by operator to either Latched or Self-clear mode
	Signal Outputs:	Integrated alarm with 2 isolated relay terminals SMS Alert option when a GSM Modem is fitted

<b>Communications:</b>	Baud Rate:	9600 baud, 8 data, 1 start, 1 stop, no parity
	Data Format:	Data (mV units), Time, Date
	Data Separator:	Tab separated columns, text format
	Data Recovery:	Custom WINDOWS Interface software
<b>Modem Options:</b>	Type:	WAVECOM ASSSAM2W Quad-band GSM Modem
	Comms Rate:	9600 baud, Non-transparent mode
	SIM Card:	Micro-SIM
	Type:	NETCOMM IG6000 DC Industrial Grade PSTN
	Comms Rate:	ITU-T V.32 (9600bps)

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