

Geotechnical Systems Australia P/L

**VIBRATING WIRE DATA LOGGER
COMMUNICATION SOFTWARE**

VERSION 8.6G

OPERATING MANUAL

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Operating Manual

VW DATA LOGGER COMMUNICATION SOFTWARE

Version 8.6G

The VW Data Logger Communication software is a graphical user interface that enables remote access to functions of the Vibrating Wire Data Logger system. In addition it recovers stored piezometer 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[®] 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

The VW 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 will 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

INSTALLATION

1. The VW 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:-

VW860.exe	The software application
VW860.ini	LabVIEW initialisation file
Configuration Manager.exe	A utility to configure the logger operating mode
Modem Manager.exe	A utility to manage access numbers for modem connections
Operating Manual.pdf	A copy of this document
ReadMe.pdf	Warranty, disclaimer and installation information

Getting Started

OPERATING THE SOFTWARE

The VW Data Logger Communication software is a graphical user interface designed to enable an operator to send and receive data from the microprocessor-based control system of the Vibrating Wire Data Logger System. 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.

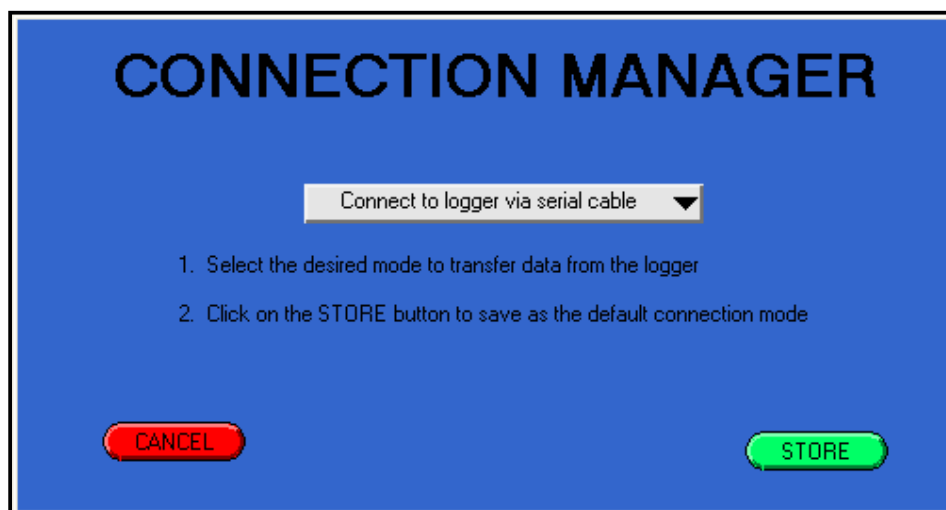
Windows® OPERATING SYSTEM SETTINGS

The VW Data Logger Communication software can download the current date and time settings from 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 easily 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



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 **VW860.ini** file entry to read [Installed=0]. The selection mode can then be altered if required.

DIRECT SERIAL LINK

The VW 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 top of 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 that is to be used to connect to the VW 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 VW Data 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 **VW860.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 VW 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 **VW860.ini** file and this file may be edited directly if required. Note that the configuration file format must be rigidly adhered to 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.

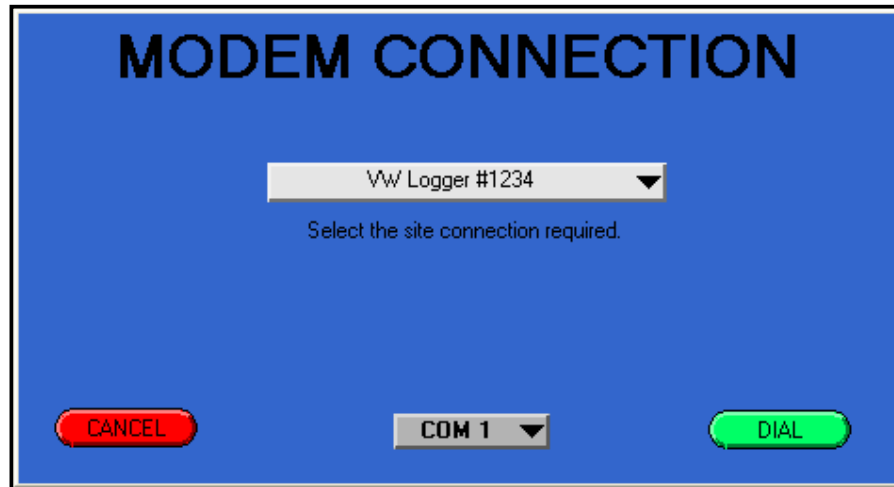
For installations utilising a GSM Modem with an extended capacity external battery, the external RS232 port is used to connect battery power and removing this plug will also remove power to the logger. This configuration is fitted with an internal lithium battery to maintain power to the logger and allow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

USB-SERIAL ADAPTER

The VW Data 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



The format of the connection screen will vary depending on the communication link to the logger. The display shown above will appear for GSM and PSTN links with a similar screen for loggers using radio modems. This screen will not appear if the logger is configured for a serial cable link.

[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 IDs may be customised with the **Modem Manager Utility** installed with the VW Data Logger software.

[COM PORT] MENU

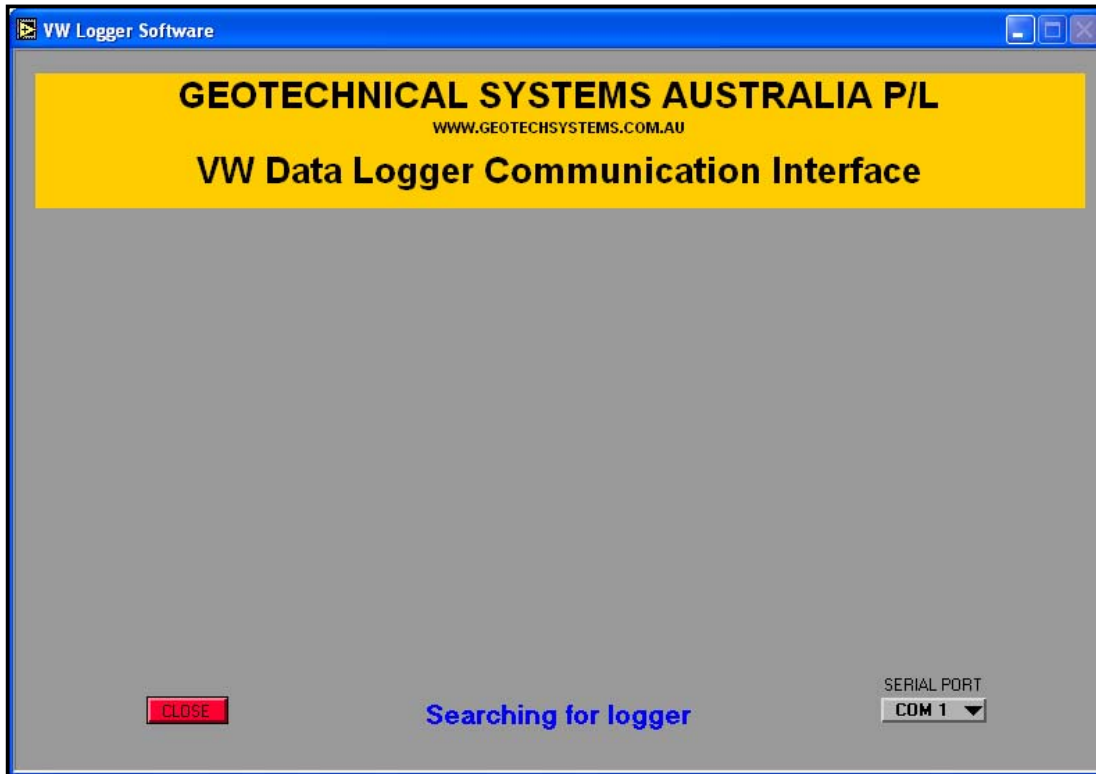
The range of this menu is 1-20 in line with conventional serial protocol. An alternative port may be selected by clicking on the arrow with the left mouse button.

[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.



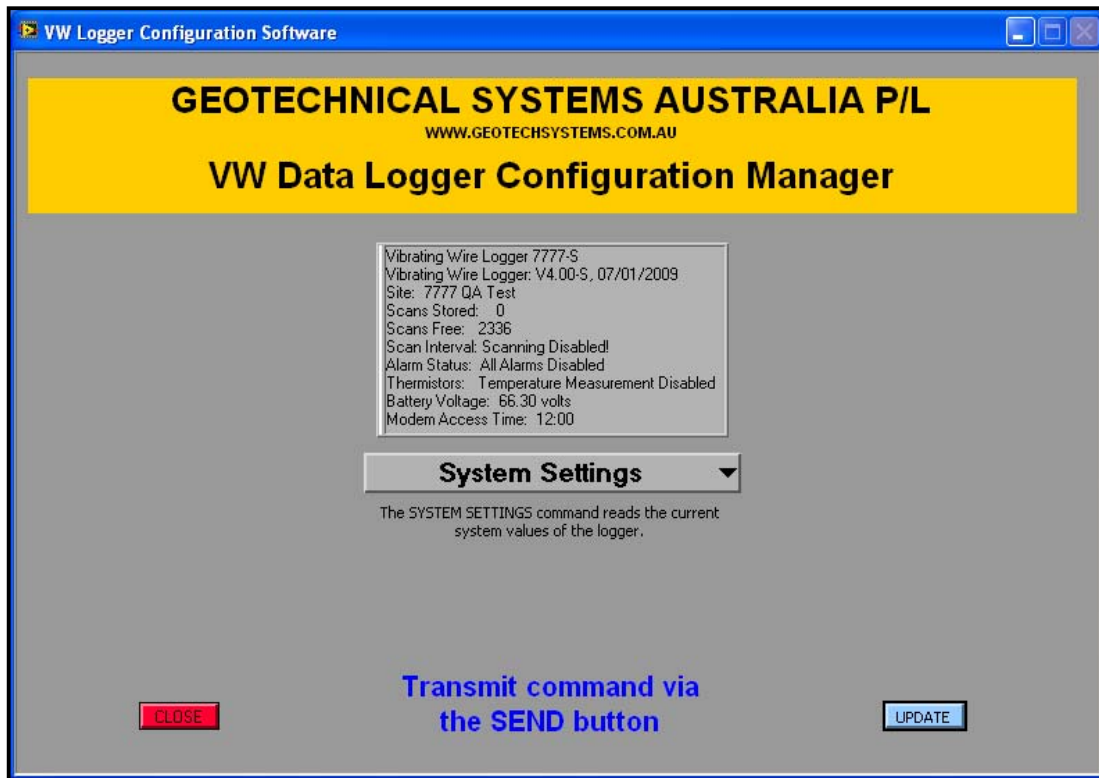
[SERIAL PORT] CONTROL

This data box will appear while the application is searching for the serial connection to a VW 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 1-20 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 a VW Data Logger system and return to the Communication Interface.



[System Settings] MENU OPTION

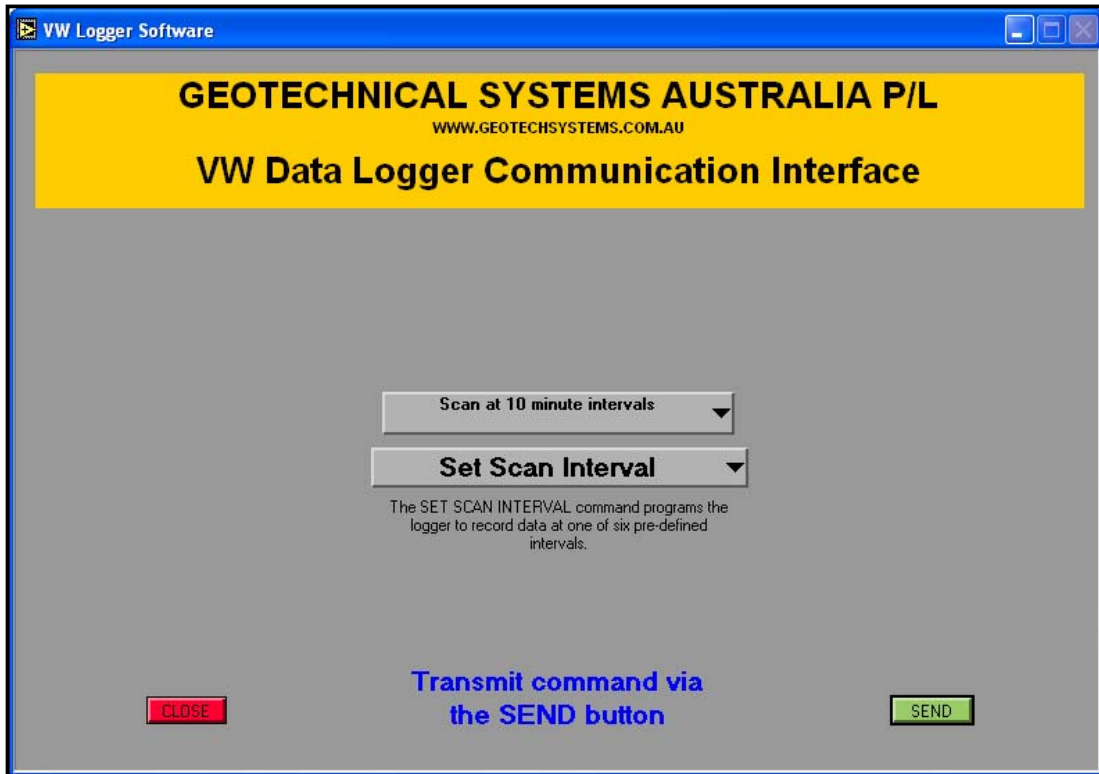
This menu selection displays the current status of the VW Data Logger. Alterations to these settings must be made from other appropriate menu commands and the display will automatically update and return to the above screen.

[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 VW 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 VW 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.

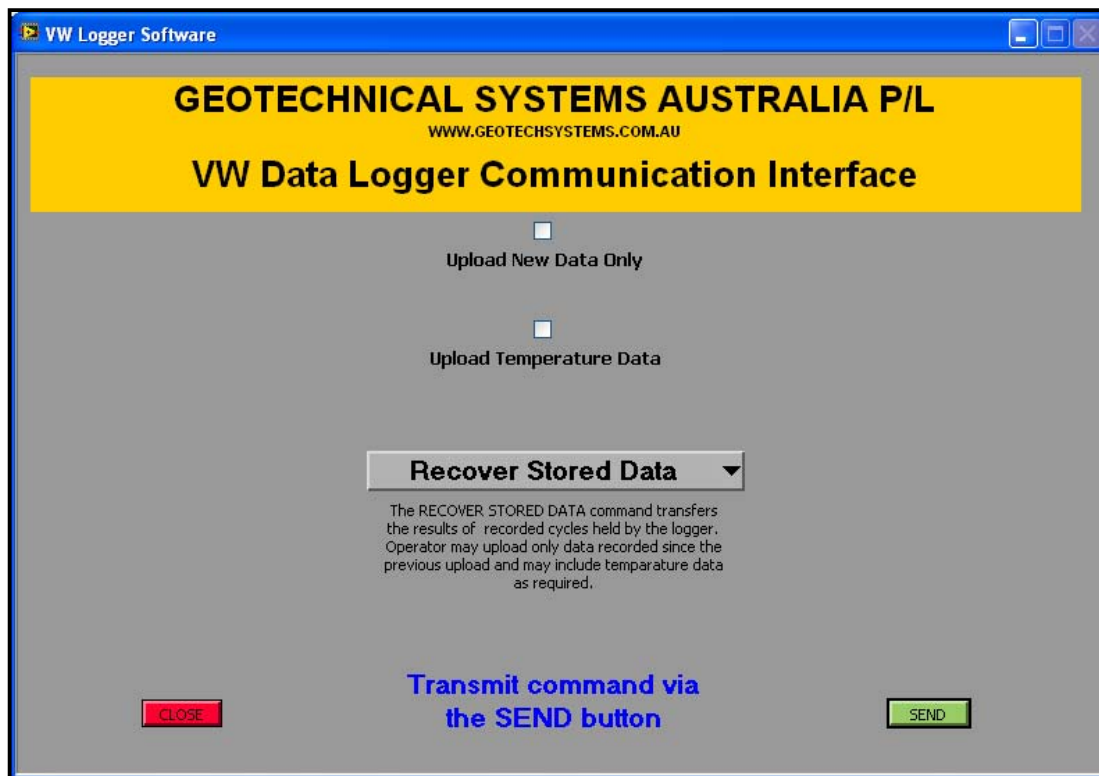
APPLICATION NOTE: All scanning is disabled while the logger is on-line to a host PC to reduce transmission errors and minimise data corruption.

[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 VW Data Logger Communication Interface.



[Recover Stored Data] MENU OPTION

Select this option to recover stored piezometer measurement scans from the VW Data Logger memory. A text file will be created on the host 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 <Upload New Data Only> to recover data recorded since the last upload.

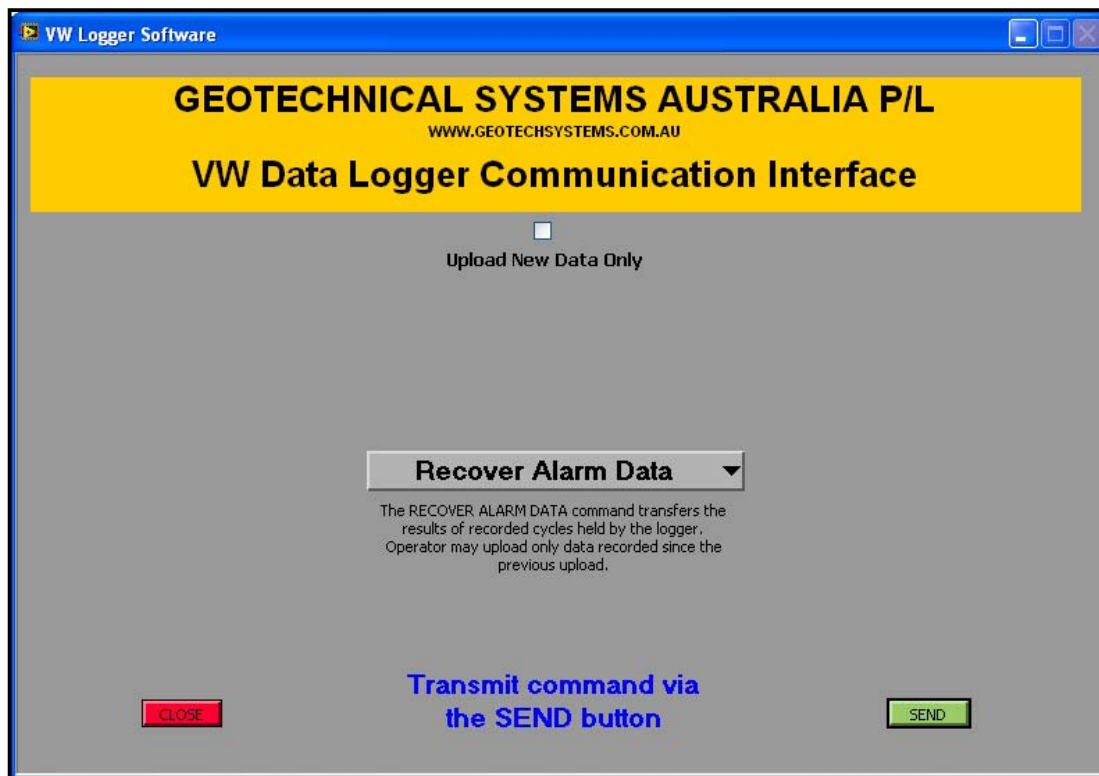
Select <Upload Temperature Data> to include temperature scans with the data upload.

[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 VW Data Logger Communication Interface.



[Recover Alarm Data] MENU OPTION

Select this option to recover stored alarm scans from the VW Data Logger memory. A text file will be created on the host 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.

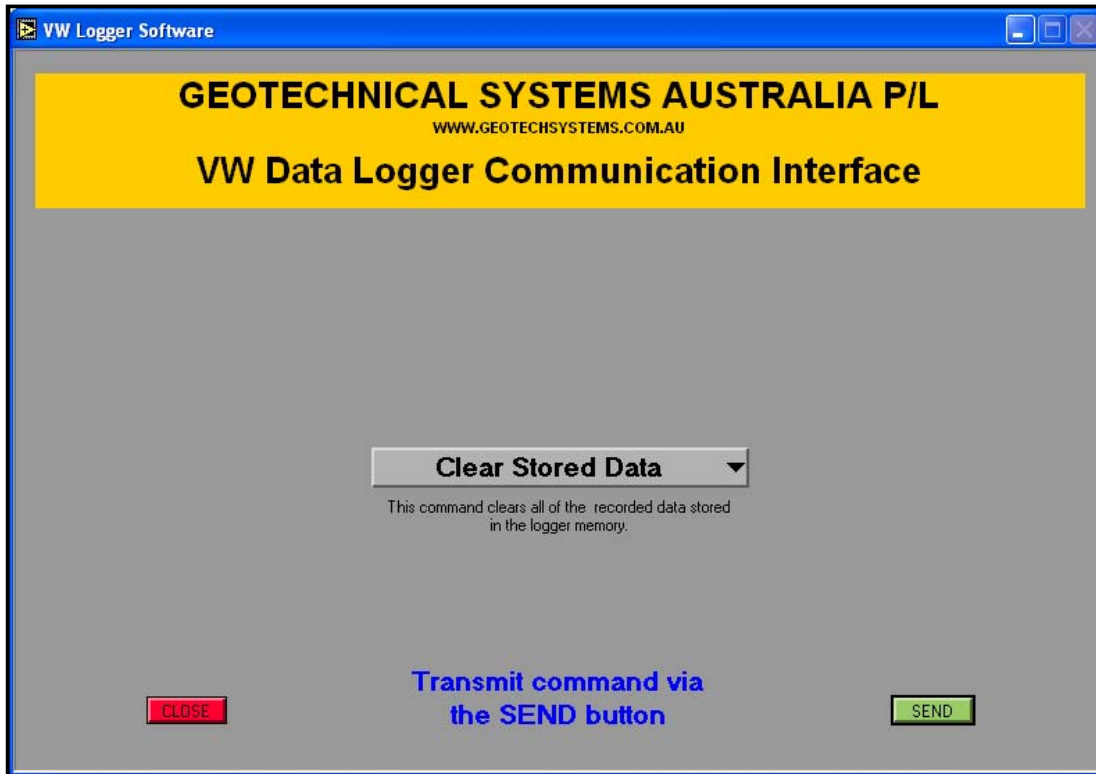
Select <Upload New Data Only> to recover alarm data recorded since the last upload.

[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 VW Data Logger Communication Interface.



[Clear Stored Data] MENU OPTION

Select this option to clear stored piezometer scans from the VW Data Logger memory. The operator will be prompted to confirm the menu selection. (The system can store up to 5470 scans) Clearing piezometer data will also clear stored alarm data and a warning will be shown to the operator if alarm data is not recovered prior to using this command.

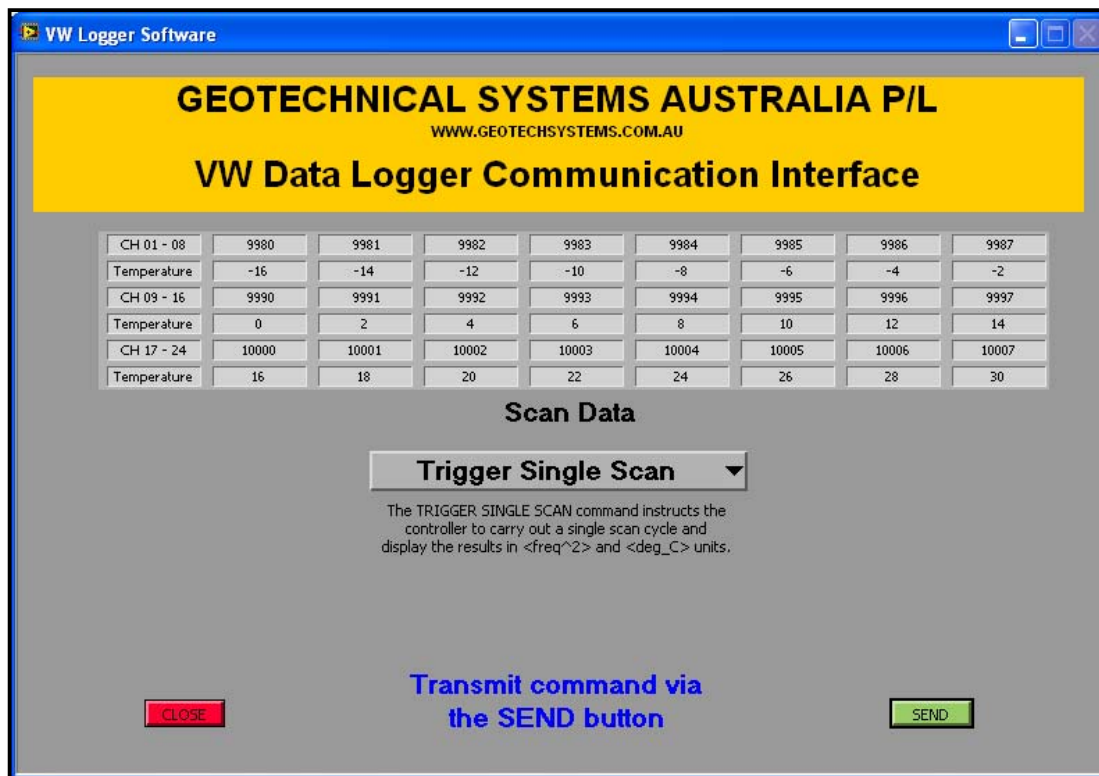
NB This command will not function if there is unrecovered piezometer data in the system. The system will respond with a visual warning to the operator and return to the Recovery Interface display.

[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 VW Data Logger Communication Interface.



[Trigger Piezometer Scan] MENU OPTION

This option will instruct the VW Data Logger system to carry out a single scan of all connected piezometers. This command should be used to confirm that the system is operating correctly prior to leaving it for unattended operation.

If temperature sensing is enabled, the thermistor wiring will be automatically tested every time the command is used. An error message will be displayed indicating the faulty channel to allow the operator to correct the problem before leaving the logger for unattended operation.

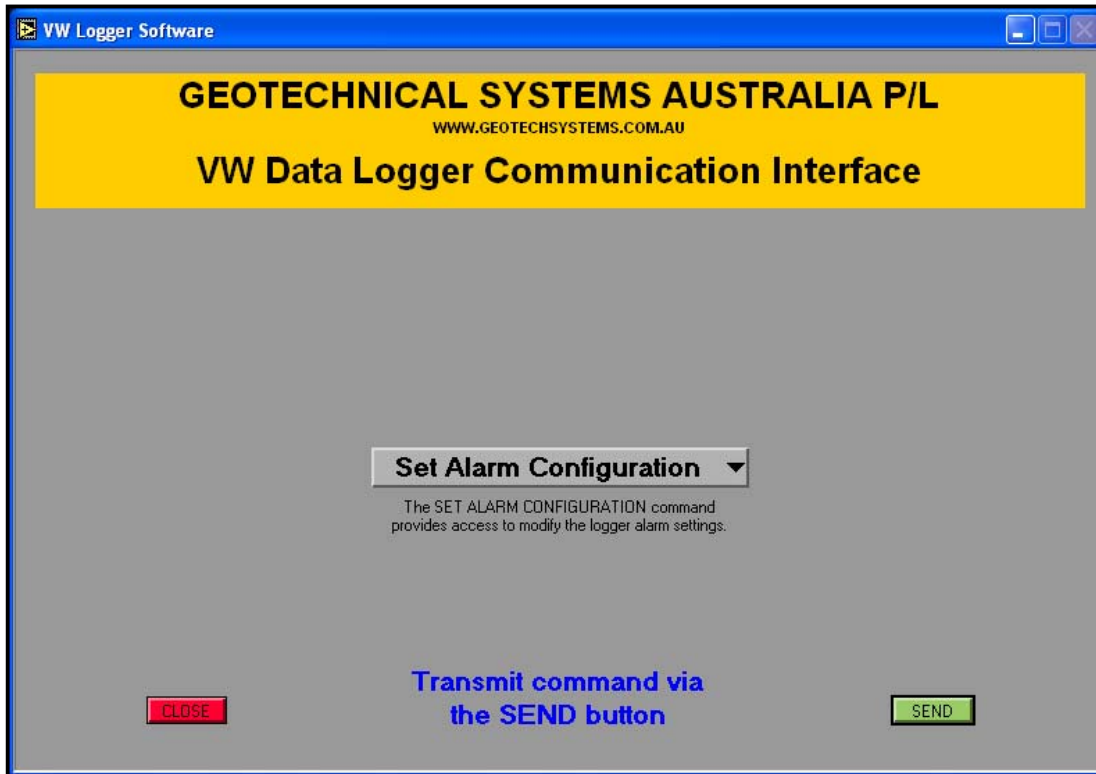
The display data format will vary depending on the configuration of the logger.

[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 Scan Data 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 VW Data Logger Communication Interface.



[Set Alarm Configuration] MENU OPTION

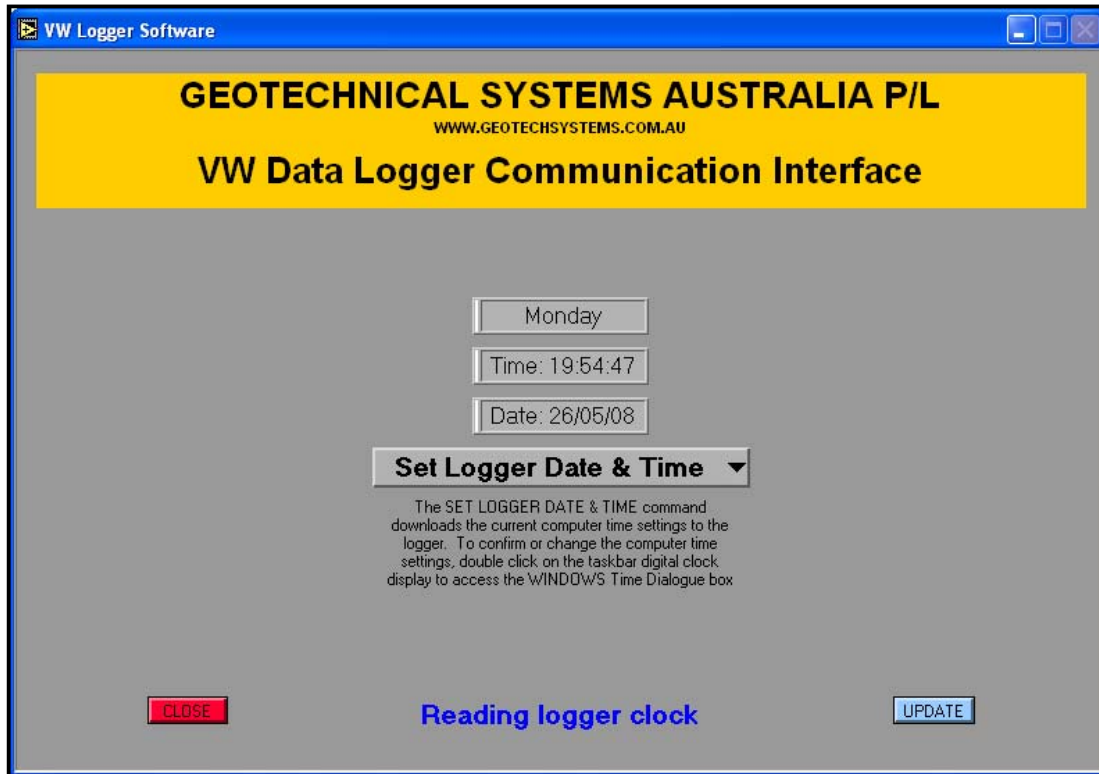
This option will load the Alarm Configuration Interface to allow access to the set-up options for the logger alarm features.

[SEND] BUTTON

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

[CLOSE] BUTTON

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



[Set Logger Date & Time] MENU OPTION

Select this option to view the current DAY, TIME and DATE settings of the VW Data Logger system. The displayed values are recovered from the system on-line as an indication that a communication link has been established. If a GSM modem connection is established the operation will be slow due to transmission delays in the mobile phone network.

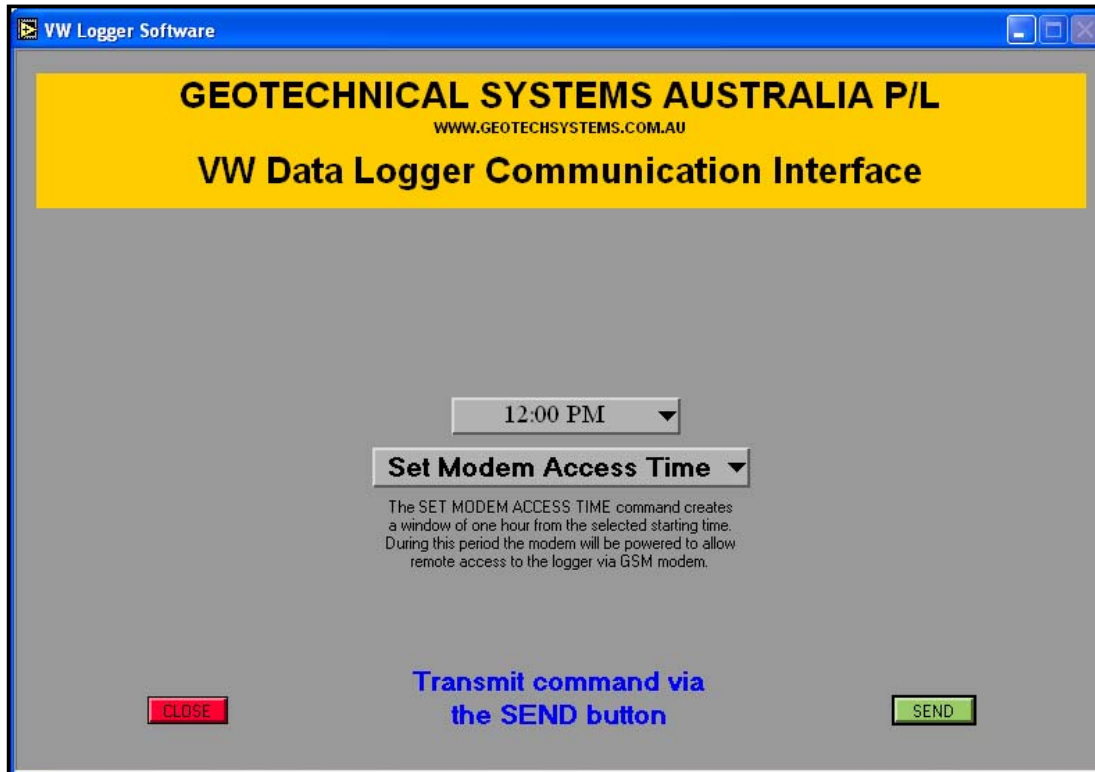
[UPDATE] BUTTON

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 VW Data Logger Communication Interface.



[Set Modem Access Time] MENU OPTION

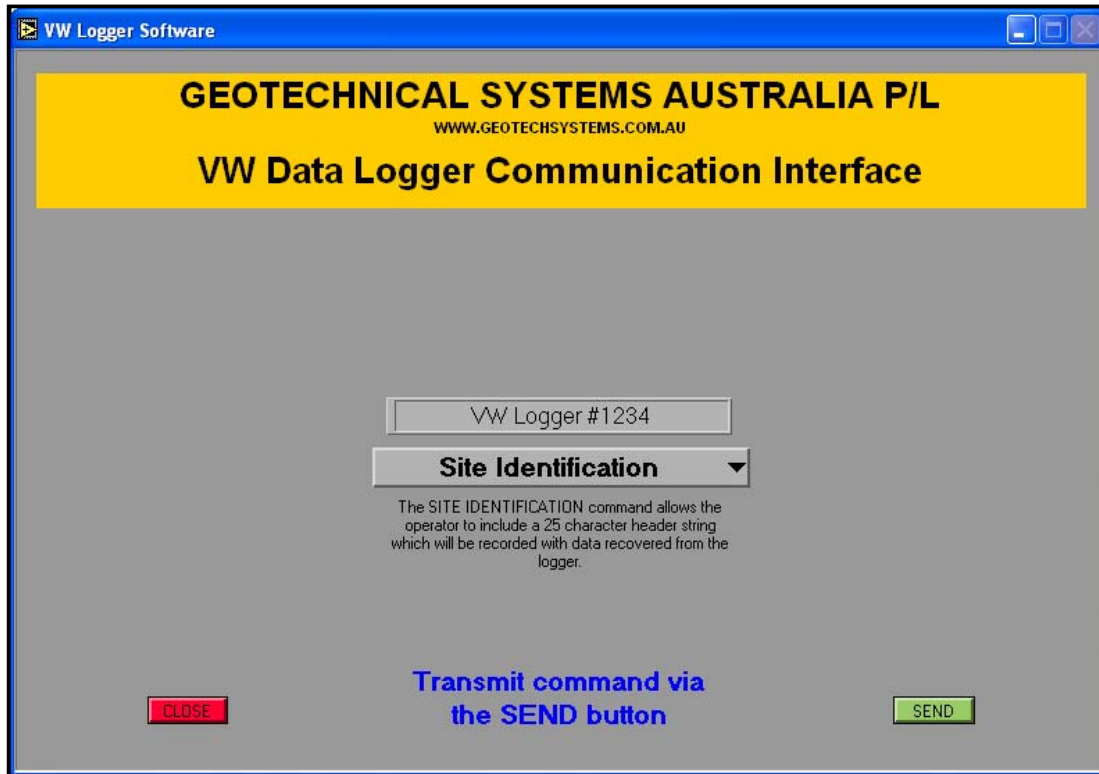
Select this option to view a list of start times for remote modem access to the logger. The logger modem will be powered for a 2-hour interval from the selected start time to enable it to answer incoming calls. Once on-line, all available features of the logger are accessible to the remote user. The 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 VW Data Logger Communication Interface.



[Site Identification] MENU OPTION

Select this option to load a Site Identification header to the VW 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.

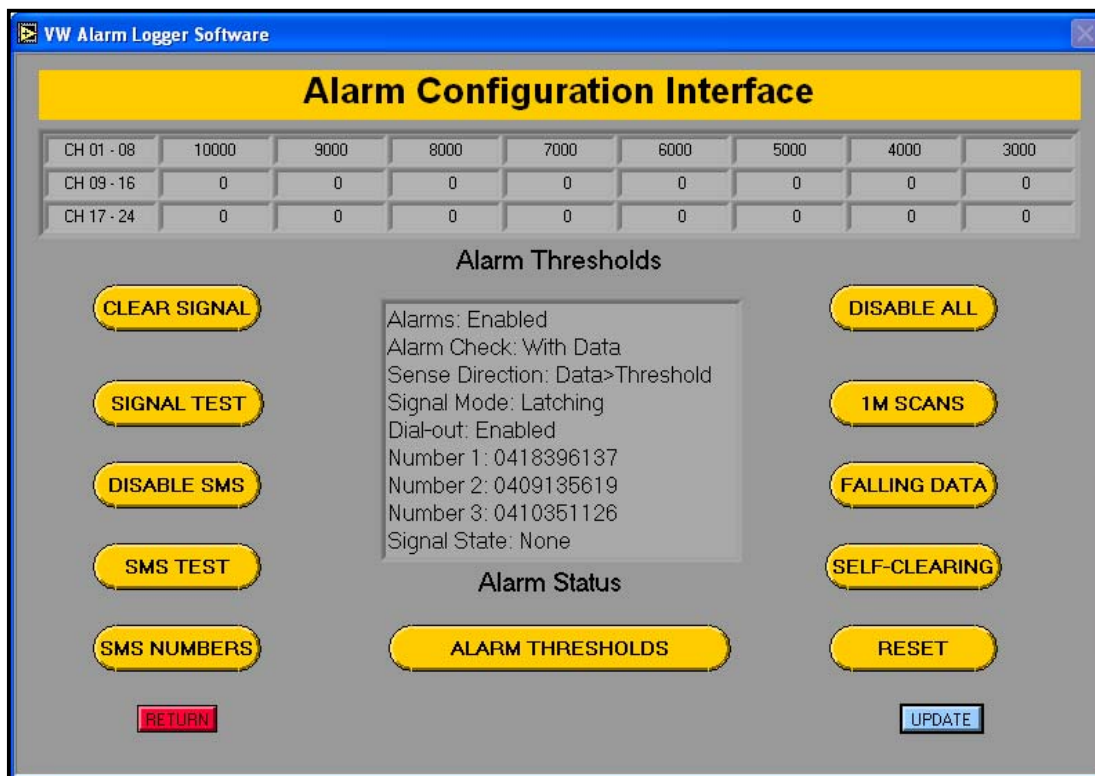
[SEND] BUTTON

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

[CLOSE] BUTTON

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

Alarm Configuration Interface



[Alarm Thresholds] DISPLAY

Shows the current trigger level settings of the configured alarm channels in (f^2) units. Access to non-configured channels will be inhibited and these channels will be ignored by the logger when testing input channels.

[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.

APPLICATION NOTE. For vibrating wire pressure transducers, the (f^2) value decreases with increasing diaphragm pressure. In this case the sense direction should be set to FALLING DATA when a setting the channel trigger value to sense a rise in pressure.

[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

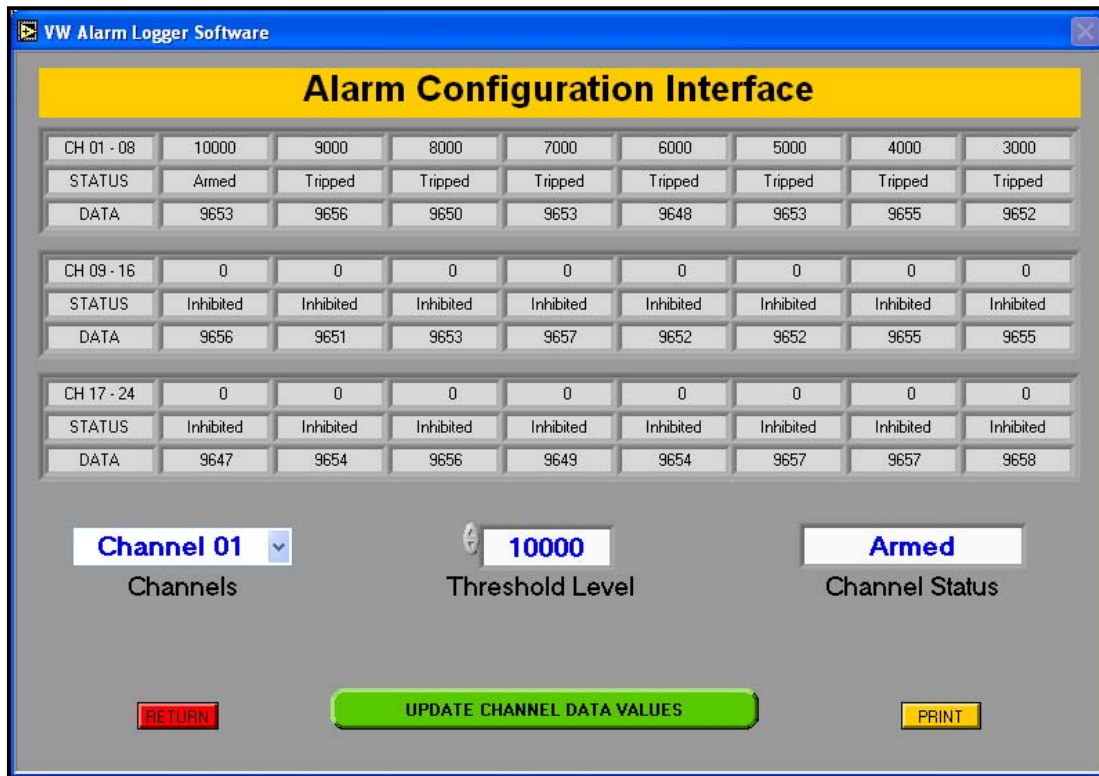
Click to access and adjust the alarm trigger point of individual configured data channels.

[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.



[Alarm States] DISPLAY

This display shows the status of individual channels. This display assists the operator to set threshold level offsets with respect to the current value of each individual channel.

[Threshold Level] DATA ENTRY

Enter channel threshold value in (f^2) units. New data may be directly entered into the dialogue box. The data may also be incremented and decremented by one (f^2) unit at a time by clicking on the direction arrows with the left mouse button.

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

Channels with an alarm threshold value of ZERO are automatically inhibited and will be ignored by the logger during alarm scanning.

[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 exceeded its threshold at any time.

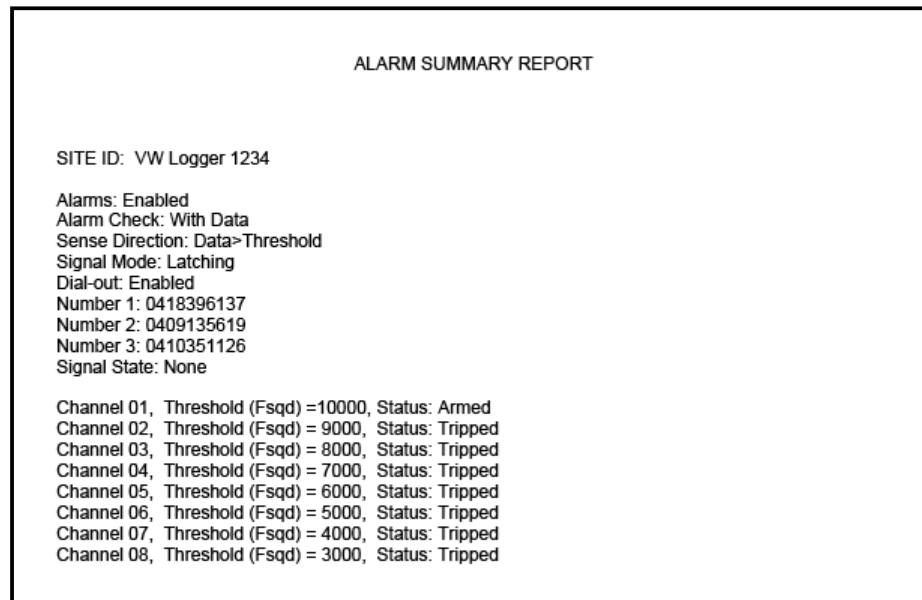
Tripped: The channel data has exceeded its threshold and has triggered an alarm. The channel is marked to prevent it causing multiple SMS alerts.

Cancelled: The channel data has exceeded 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.

[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 manual scan and update the channel data values shown in the display.

[RETURN] BUTTON

Click to return to the alarm interface display.

Configuration Manager Utility

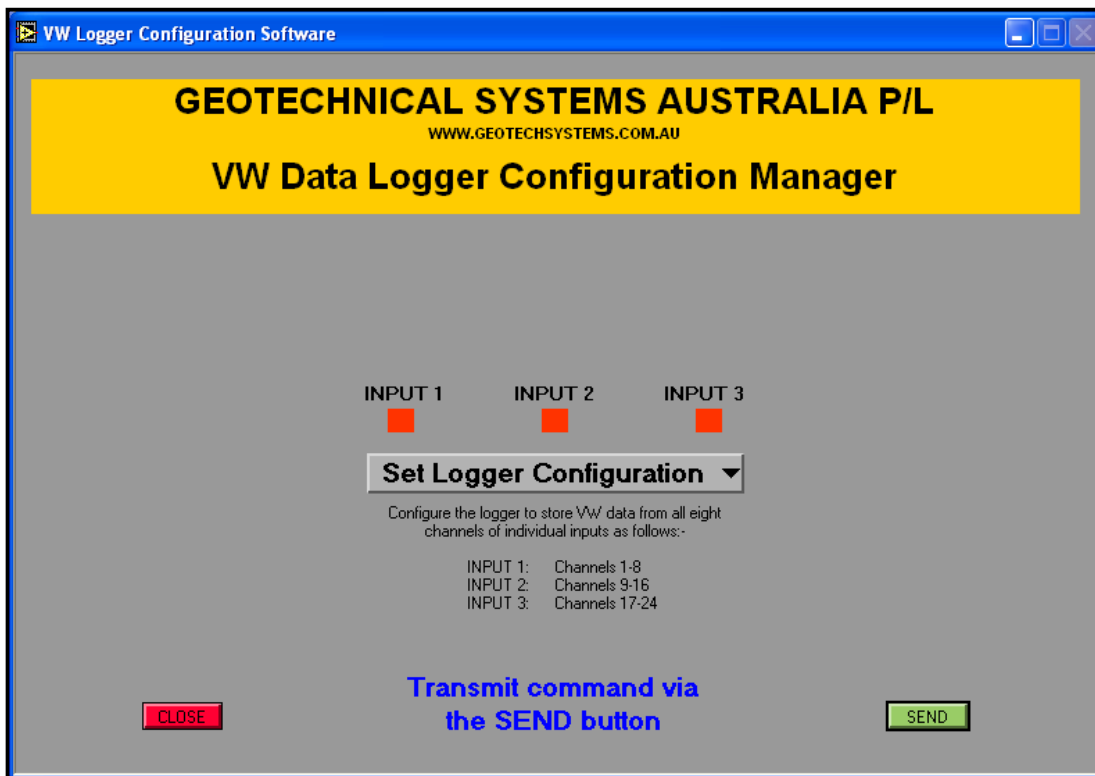
OVERVIEW

The Configuration Manager is used to set the operating mode of logger prior to deployment in the field. In addition to the input configuration screen 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.



[Set Logger Configuration] MENU OPTION

Select the required input connection(s) for up to 24 vibrating wire input channels. The inputs will be read in groups of 8 channels and unused input connection channels may be left open. The logger system will be optimised for data acquisition, memory usage and serial data transfer.

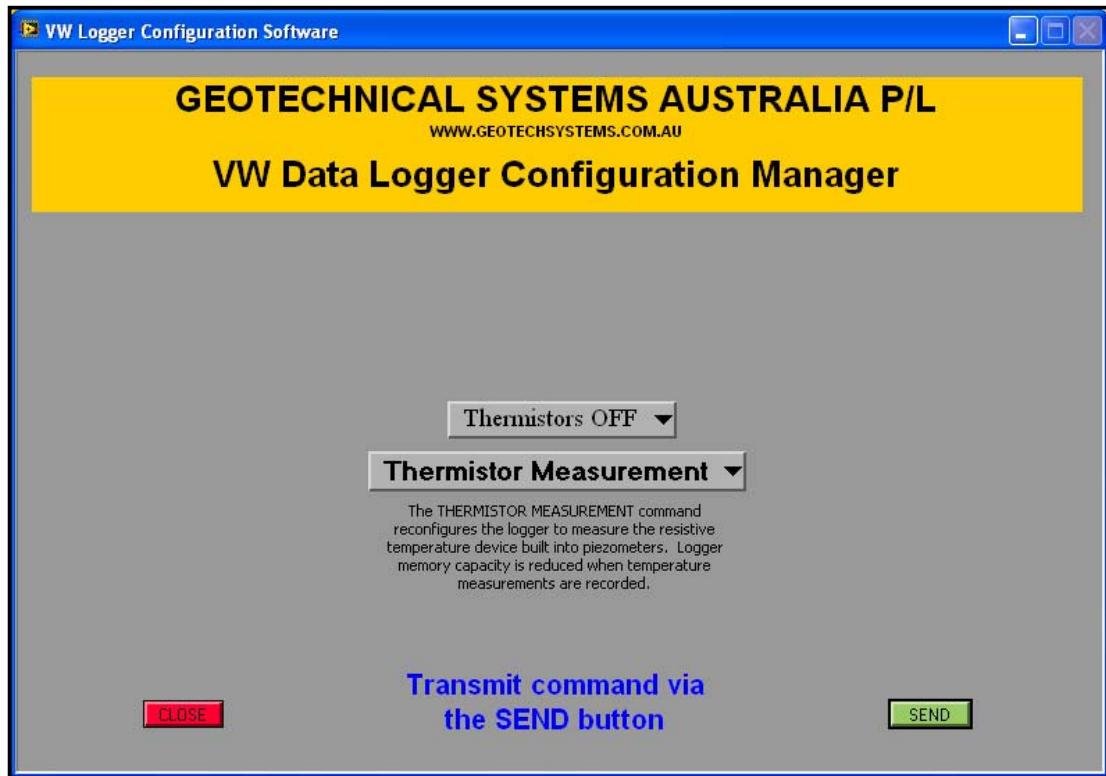
Refer to the Logger Operation section for input connector pin configurations.

[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 VW Logger Configuration Interface.



[Thermistor Measurement] MENU OPTION

Select to record temperatures from the thermistors built into vibrating wire sensors. Temperature measurement channels will match the selected vibrating wire input channels. The logger system will be optimised for data acquisition, memory usage and serial data transfer and any existing data will be cleared from the logger memory.

Recording temperature will reduce the number of available scans.

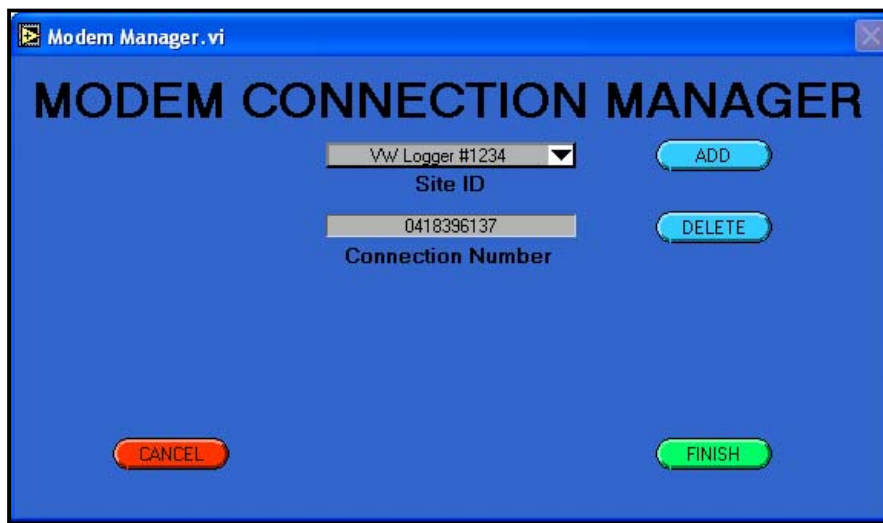
[SEND] BUTTON

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 VW Logger Configuration Interface.

Modem Manager Utility



SELECTING THE INITIALIZATION FILE

Modem connection numbers are always written to the **VW860.ini** file.

[Site ID] MENU

Click on the arrow with the left mouse button and select from the list of available logger sites and connection number. This site 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.

Piezometer Data File Format

```

Vibrating Wire Logger Piezometer Data File
VW Logger #1234
Date: 27/01/09
Time: 19:54:33
Battery Voltage: 12.51
CH 1 CH 2 CH 3 CH 4 CH 5 CH 6 CH 7 CH 8 Time Date Th 1 Th 2 Th 3
Th 4 Th 5 Th 6 Th 7 Th 8
9997 9996 11000 10996 11390 11390 11390 0 10:00:59 26/01/2009 22 21
22 21 22 21 22 21
9997 9996 11000 10997 11390 11388 11390 0 11:00:59 26/01/2009 22 21
22 21 22 21 22 21
10000 9996 11000 10997 11390 11388 11390 0 12:00:59 26/01/2009 22 21
22 21 22 21 22 21
.
.
.
10002 9996 11000 10997 11390 11388 11390 0 18:00:59 27/01/2009 22 21
22 21 22 21 22 21
10001 9996 11000 10997 11390 11388 11390 0 19:00:59 27/01/2009 22 21
22 21 22 21 22 21
Data transfer complete.

```

The piezometer 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 channel identification header

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

- i) The data from connected vibrating wire piezometers will be recorded in (f^2) units, which is the industry standard for this type of instrument.
- ii) Piezometer inputs are automatically sensed and there is no requirement to allocate the connected channels. In the event that a piezometer channel does not respond to the excitation signal from the logger, the system will record a zero value for the particular input. Alarm scanning does not take place for channels measured as zero.

NB The system cannot distinguish between a connected piezometer that has failed in operation and a vacant input channel.

- iii) The time and date that the scan occurred.
- iv) The temperature of each individual sensor in °C units (if selected for upload). The temperature measurement range of the logger is -28°C to $+99^{\circ}\text{C}$ and measurements are rounded to the nearest degree
 - over-range measurements or open thermistor connections will be shown as [--]
 - under-range measurements or shorted thermistor connections will be shown as [Err]
- v) All data scans use tab separation between columns for easy conversion to spreadsheet applications.

Alarm Data File Format

```

Vibrating Wire Logger Alarm Data File
VW Logger #1234
Date: 27/01/09
Time: 19:55:38
Battery Voltage: 12.51
CH 1  CH 2  CH 3  CH 4  CH 5  CH 6  CH 7  CH 8  Time  Date
    0    0    0    0    0    0    0    0    0 07:00:59  26/01/2009
    0    0    0    0    0    0    0    0    0 08:00:59  26/01/2009

(Alarms enabled by operator)

    0    0    0    0    0    0    0    0    0 09:00:59  26/01/2009
    0    0    0    0    0    0    0    0    0 10:00:59  26/01/2009

(Channel #2 crosses threshold value)

    0    2    0    0    0    0    0    0    0 11:00:59  26/01/2009
    0    2    0    0    0    0    0    0    0 12:00:59  26/01/2009

(Channel #2 alarm state cancelled by operator)

    0   -2    0    0    0    0    0    0    0 18:00:59  27/01/2009
    0   -2    0    0    0    0    0    0    0 19:00:59  27/01/2009
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

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 for easy conversion to spreadsheet applications.

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 sealing 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[®] 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.

8-Channel IP67 Logger

Individual vibrating wire sensors 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 compromising the waterproof nature of the sensor input(s).

Sensors are allocated according to the input connection table on Page 31-32 of this manual. Un-used connections may be left open circuit and the logger will record their value as zero. The thermistor commons should be returned to the allocated input connector.

NB The system cannot distinguish between a connected piezometer that has failed in operation and a vacant input channel.

The waterproof connectors may be supplied with the logger to join each conductor. The logger and sensor conductors to be joined should be held with their ends level and fed into the connector block until they are fully home. Compress the connector using a pair of pliers until the cap is flush with the connector body, observing that silicon sealant extrudes around the conductors. While holding the connector with the pliers, gently apply pressure to each conductor in turn to ensure the displacement fingers pierce the insulation and lock onto the wire strands. To disconnect a sensor, simply cut through both conductors as close to each waterproof connector as possible.

24-Channel 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 Page 33-35 of this manual. Un-used connections may be left open circuit and the logger will record their value as zero. The thermistor commons should all be returned to the allocated input terminal

NB The system cannot distinguish between a connected piezometer that has failed in operation and a vacant input channel.

RE-CHARGING LOGGER BATTERY

8-Channel IP67 Logger

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

Connections for this plug are shown in the input connection table 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.

24-Channel 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.

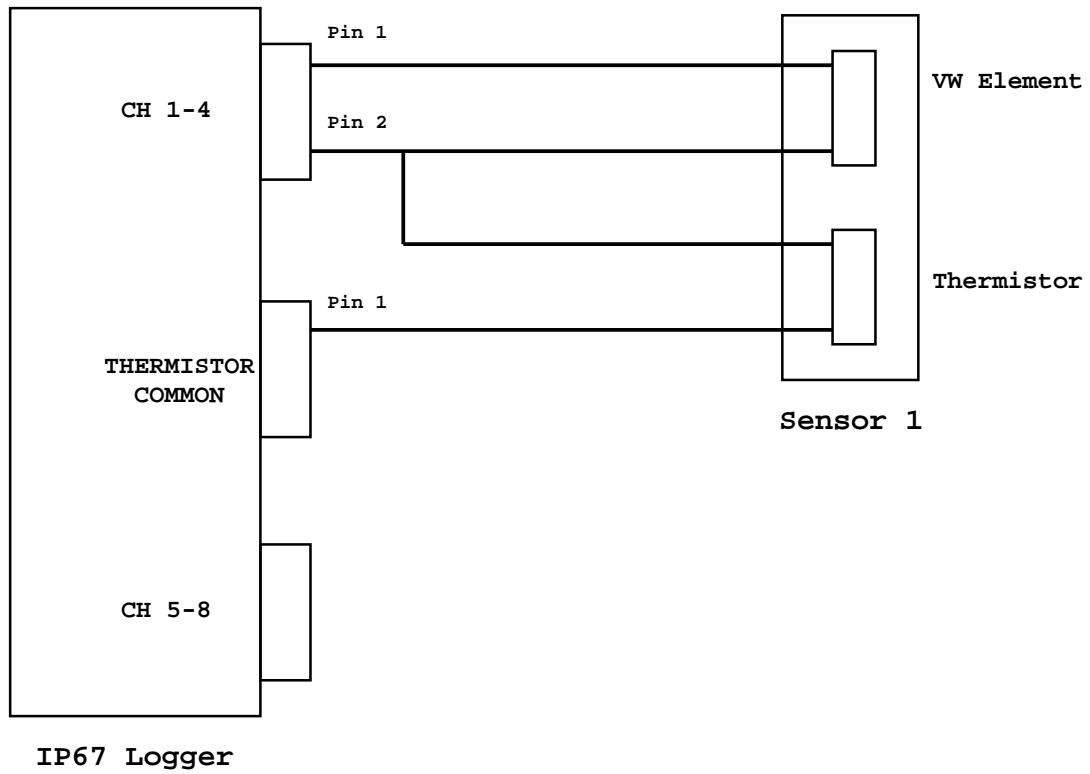
Connections for this terminal are shown in the input connection table as follows:-

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

8-Channel IP67 Logger Input Connections

<u>LOGGER INPUT</u>	<u>FUNCTION</u>	<u>PIN NO</u>	<u>CABLE COLOUR</u>
CH 1-4	VW Sensor 1	1	Red
		2	Black
	VW Sensor 2	3	Blue
		4	Black
	VW Sensor 3	5	Green
		6	Black
	VW Sensor 4	7	White
		8	Black
CH 5-8	VW Sensor 5	1	Red
		2	Black
	VW Sensor 6	3	Blue
		4	Black
	VW Sensor 7	5	Green
		6	Black
	VW Sensor 8	7	White
		8	Black
THERMISTOR COMMON	Sensor 1 Thermistor	2	CH 1-4 Input (Black)
		1	Common Input (Red)
	Sensor 2 Thermistor	4	CH 1-4 Input (Black)
		2	Common Input (Black)
	Sensor 3 Thermistor	6	CH 1-4 Input (Black)
		3	Common Input (Blue)
	Sensor 4 Thermistor	8	CH 1-4 Input (Black)
		4	Common Input (Black)
	Sensor 5 Thermistor	2	CH 5-8 Input (Black)
		5	Common Input (Green)
	Sensor 6 Thermistor	4	CH 5-8 Input (Black)
		6	Common Input (Black)
	Sensor 7 Thermistor	6	CH 5-8 Input (Black)
		7	Common Input (White)
	Sensor 8 Thermistor	8	CH 5-8 Input (Black)
		8	Common Input (Black)
POWER RS232	Battery Charger	5	-
		6	-
	Solar Panel	5	-
		6	-

APPLICATION NOTE: The user should understand fully the wiring code of the vibrating wire sensor and its associated thermistor. Connecting the sensor cables incorrectly will result in an error message when the TRIGGER SCAN menu option is activated.



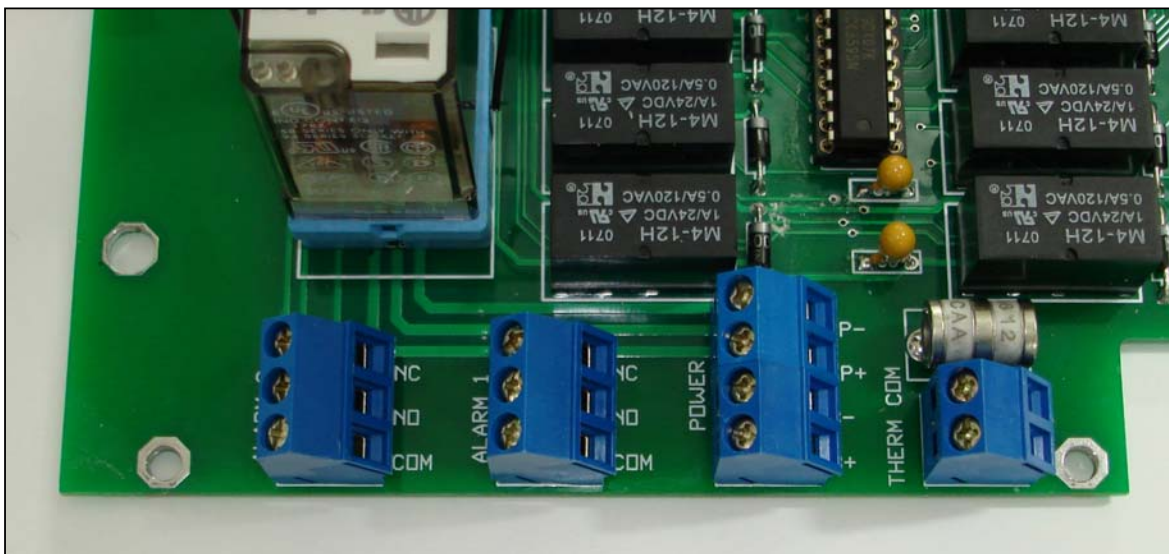
IP67 Logger Wiring

24-Channel OEM Logger Input Connections

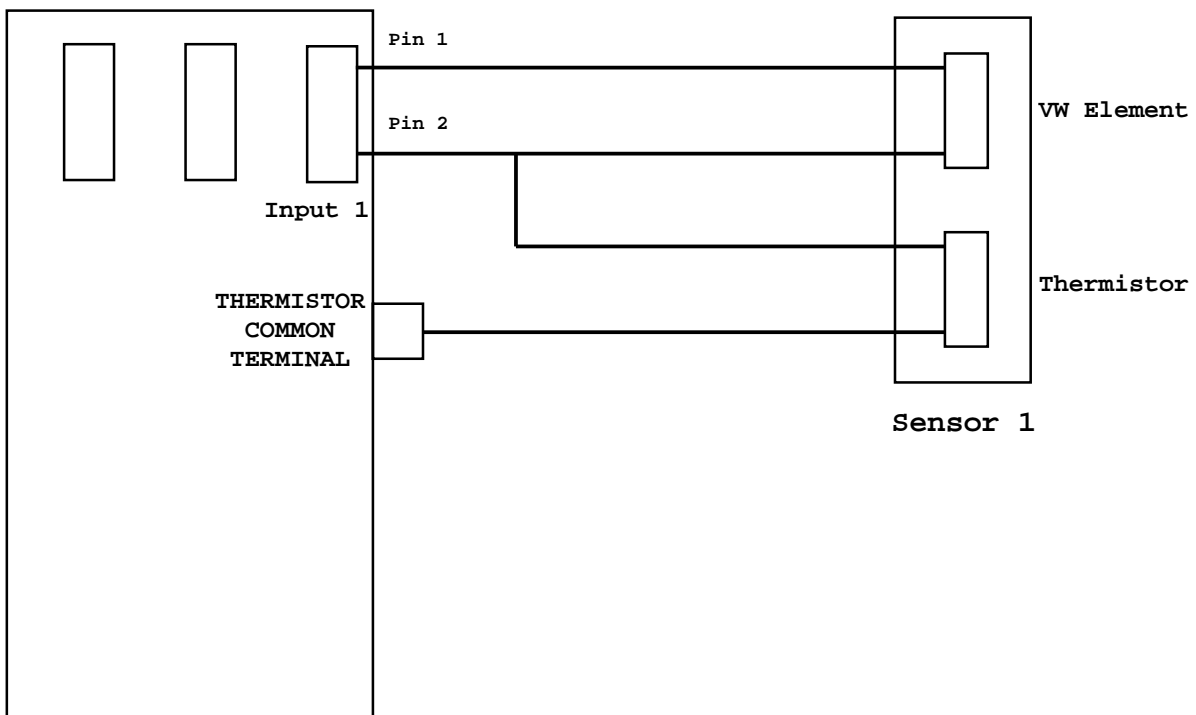
<u>LOGGER INPUT</u>	<u>FUNCTION</u>	<u>TERMINAL No</u>
INPUT 1	VW Sensor 1	1
		2
	VW Sensor 2	3
		4
	VW Sensor 3	5
		6
	VW Sensor 4	7
		8
INPUT 2	VW Sensor 5	9
		10
	VW Sensor 6	11
		12
	VW Sensor 7	13
		14
	VW Sensor 8	15
		16
INPUT 3	VW Sensor 9	1
		2
	VW Sensor 10	3
		4
	VW Sensor 11	5
		6
	VW Sensor 12	7
		8
INPUT 3	VW Sensor 13	9
		10
	VW Sensor 14	11
		12
	VW Sensor 15	13
		14
	VW Sensor 16	15
		16
INPUT 3	VW Sensor 17	1
		2
	VW Sensor 18	3
		4
	VW Sensor 19	5
		6
	VW Sensor 20	7
		8
INPUT 3	VW Sensor 21	9
		10
	VW Sensor 22	11
		12
	VW Sensor 23	13
		14
	VW Sensor 24	15
		16
POWER	External Battery +ve	B+
	External Battery -ve	B-
	Solar Panel +ve	SP+
	Solar Panel -ve	SP-
ALARM 1 & 2	Normally Closed Input	NC
	Normally Open Input	NO
	Common Terminal	COM

<u>LOGGER INPUT</u>	<u>FUNCTION</u>	<u>TERMINAL No</u>
INPUT 1	Sensor 1 Thermistor	2 Thermistor Common Terminal
	Sensor 2 Thermistor	4 Thermistor Common Terminal
	Sensor 3 Thermistor	6 Thermistor Common Terminal
	Sensor 4 Thermistor	8 Thermistor Common Terminal
	Sensor 5 Thermistor	10 Thermistor Common Terminal
	Sensor 6 Thermistor	12 Thermistor Common Terminal
	Sensor 7 Thermistor	14 Thermistor Common Terminal
	Sensor 8 Thermistor	16 Thermistor Common Terminal
INPUT 2	Sensor 9 Thermistor	2 Thermistor Common Terminal
	Sensor 10 Thermistor	4 Thermistor Common Terminal
	Sensor 11 Thermistor	6 Thermistor Common Terminal
	Sensor 12 Thermistor	8 Thermistor Common Terminal
	Sensor 13 Thermistor	10 Thermistor Common Terminal
	Sensor 14 Thermistor	12 Thermistor Common Terminal
	Sensor 15 Thermistor	14 Thermistor Common Terminal
	Sensor 16 Thermistor	16 Thermistor Common Terminal
INPUT 3	Sensor 17 Thermistor	2 Thermistor Common Terminal
	Sensor 18 Thermistor	4 Thermistor Common Terminal
	Sensor 198 Thermistor	6 Thermistor Common Terminal
	Sensor 20 Thermistor	8 Thermistor Common Terminal
	Sensor 21 Thermistor	10 Thermistor Common Terminal
	Sensor 22 Thermistor	12 Thermistor Common Terminal
	Sensor 23 Thermistor	14 Thermistor Common Terminal
	Sensor 24 Thermistor	16 Thermistor Common Terminal

APPLICATION NOTE: The user should understand fully the wiring code of the vibrating wire sensor and its associated thermistor. Connecting the sensor cables incorrectly will result in an error message when the TRIGGER SCAN menu option is activated.



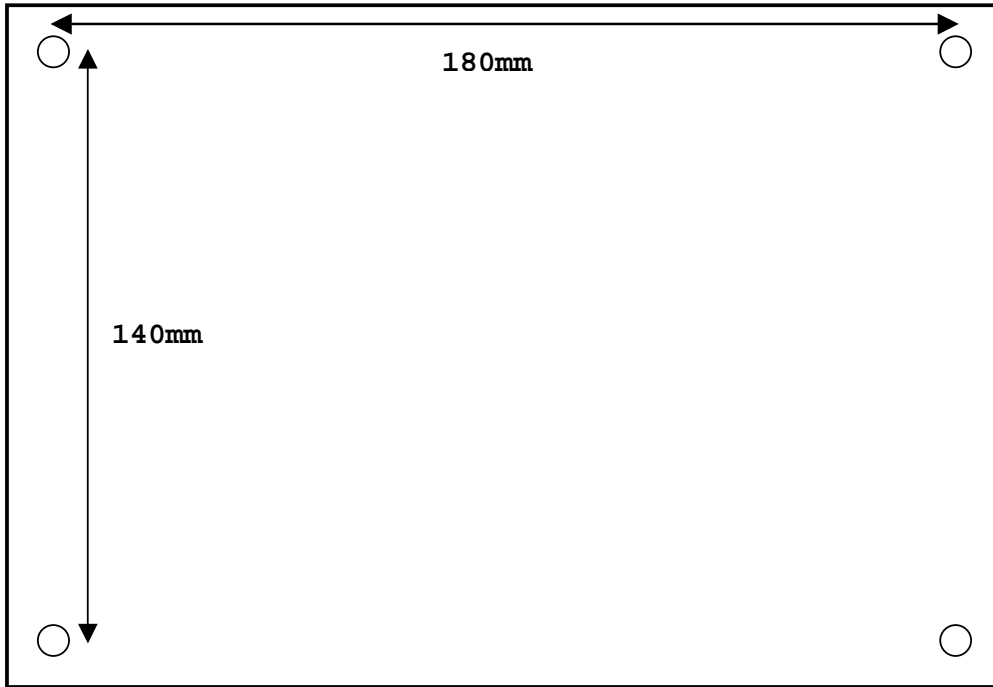
Alarm 1 Alarm 2 Battery & Solar Inputs Thermistor Common



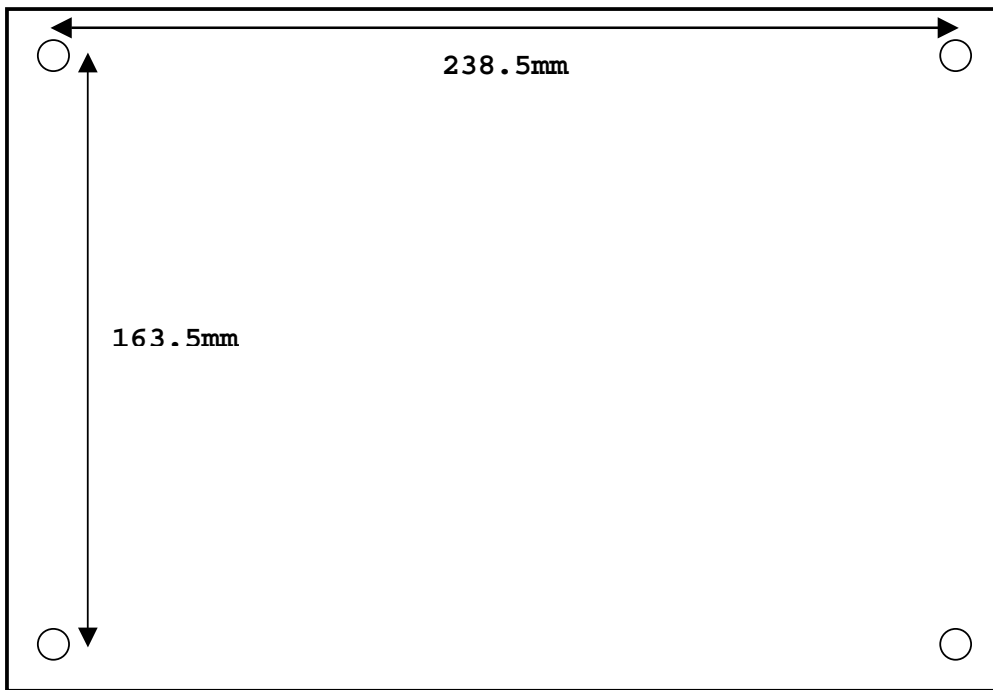
OEM Logger

OEM Logger Wiring

Logger Case Mounting Layout



IP67 Case Mounting Dimensions



OEM Case Mounting Dimensions

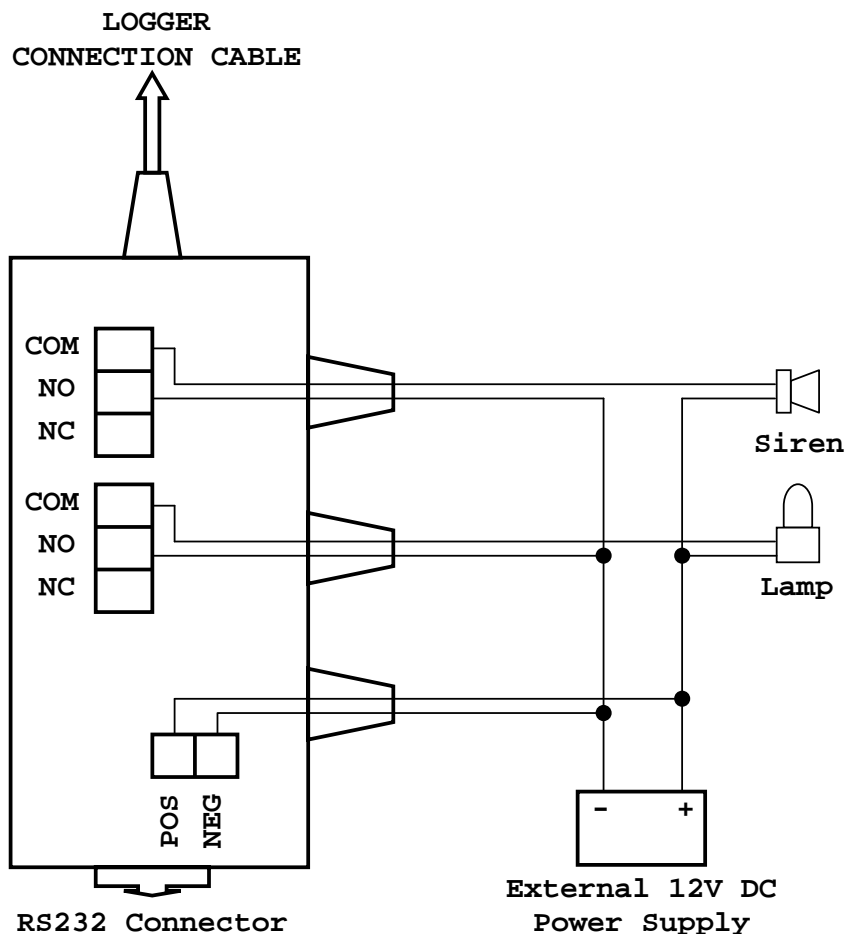
IP67 Logger Alarm Module

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 8-channel IP67 case version of the logger. The 24-channel OEM logger has an integrated alarm system with terminal connection for direct wiring of both NO and NC alarms.

WIRING CONFIGURATION



8-Channel IP67 Logger System Specifications

PHYSICAL SPECIFICATIONS:

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

ELECTRICAL SPECIFICATIONS:

Power:	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
Data Logging:	Input Channels:	Up to a maximum of 8
	Storage Capacity:	5450 scans of vibrating wire data (inc Time and Date) 4088 scans with thermistor temperature data
	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
Alarm Logging:	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 Maximum relay current of 2A 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 (f ² 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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24-Channel OEM Logger System Specifications

PHYSICAL SPECIFICATIONS:

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

ELECTRICAL SPECIFICATIONS:

Power:	External Battery:	Suggested minimum: Sealed Lead Acid, 12V-1.3Ah
	Options:	10W Solar Charger 240V Plug-pack Charger Module
Data Logging:	Input Channels:	Up to a maximum of 24 via 3 x 8-ch inputs
	Storage Capacity:	8 Channels: 5450 scans of vibrating wire data 4088 scans with thermistor temp data 16 Channels: 3270 scans of vibrating wire data 2336 scans with thermistor temp data 24 Channels: 2336 scans of vibrating wire data 1635 scans with thermistor temp data
	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
Alarm Logging:	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 Maximum relay current of 2A 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 (f ² 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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