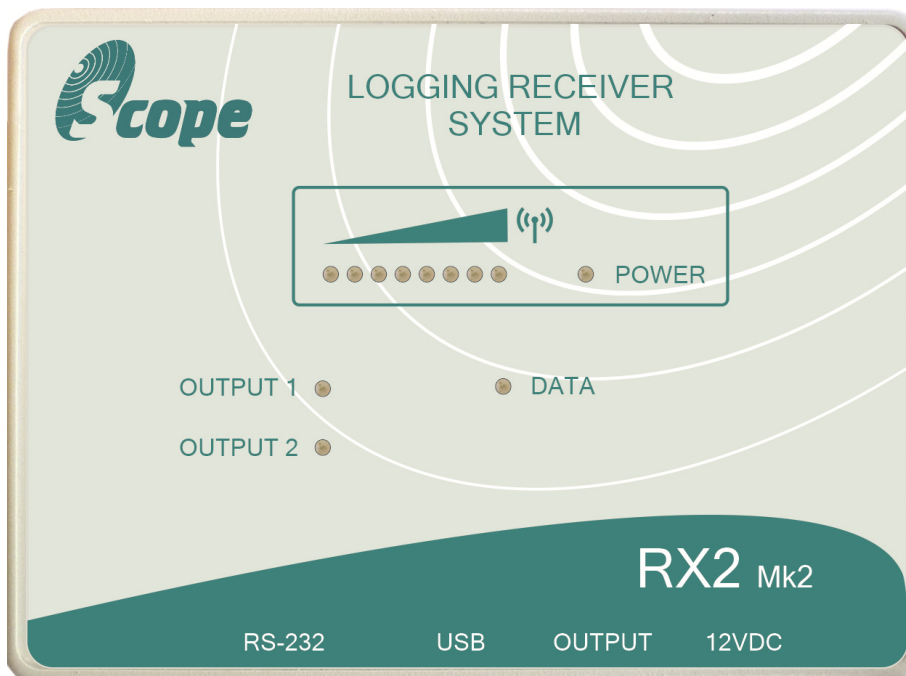




RX2 (Mk2) Logging Receiver System



USER MANUAL

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RX2 (Mk2) Logging Receiver System

About this manual...

This is the user manual for the Scope RX2 (Mk2) logging receiver system. It provides general user information, connection and configuration details.

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RX2 (Mk2) Logging Receiver System

1 : Brief Overview

The RX2 is a POCSAG receiver decoder equipped with 2 individually switchable output relays, an RS232 serial port, SD Card logging and graphing functionality. An on board RTC (real time clock) is also included for date/time stamping of decoded messages or continuous signal strength logging, this feature allows for site surveys or live viewing of signal strength and incoming messages to be performed using the supplied PC software.

A full function PC programming utility allows each relay to be configured to respond to a transmitted RIC (receiver identity code) or a range of RICs. This will allow the user to independently energise (Close), de-energise (Open) or change the state of each relay by transmitting specified RICs or ranges of RICs, with or without a beep type filter enabled.

Additionally, the user can latch each relay for a defined time period (5 - 255 seconds, in 5 second intervals). Sending repeat transmissions during the set time period will reset the timer, which allows a relay to be used as an 'in service' monitor, i.e. so long as the unit keeps seeing the repeat transmissions within the set time period, the relay will remain latched. If a transmission fails to be received within the set window, the relay will drop out at the end of the set time period.

Both relays have N/O (normally open), N/C (normally closed) and Common connections available through the RJ45 connector. The maximum contact rating of each relay is 0.5A @ 240V AC, 1A @ 60V DC.

The relays can be reset by transmitting a programmed RIC or range of RICs. This will return the relays to their default states.

The RS232 serial port provides additional logging or repeater functionality. This can be programmed to send the transmitted messages to the serial port when a range of RICs is specified. Additionally the unit can be configured to output in various protocols (see below for details), with the option to add 'identification' and 'signal strength LED' information to the output string. A selectable output delay of 0.5 to 3 seconds is also available in 0.5 second intervals or until the carrier has gone (with a 10 second timeout).

Front panel LEDs indicate the state of each output relay and a flashing LED advises when transmitted data has been decoded. A cool blue power LED completes the picture.

Recommended power input is 12V DC @ 500mA.

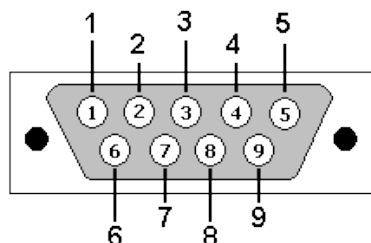
An SD Card with a maximum capacity of 32GB is required for data logging functionality, and should be formatted to use the FAT filing system, NTFS will **not** work.

*** Each RIC must be a seven digit number in the range 0000008 – 2097143, excluding ranges 2007664 – 2007671 and 2045056 – 2045063.**

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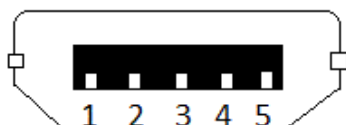
2 : Port Pin-out Connections

2.1 : RS232 Pin-out



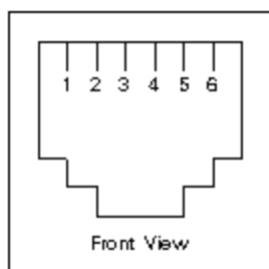
<u>PIN</u>	<u>DESCRIPTION</u>
1	Not Connected
2	RX
3	TX
4	Not Connected
5	Ground
6	Not Connected
7	Not Connected
8	Not Connected
9	5V

2.2 : Micro USB B Pin-out



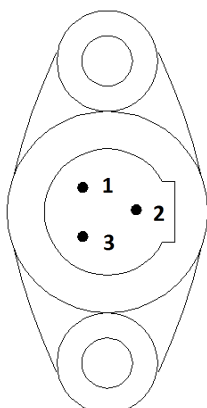
<u>PIN</u>	<u>DESCRIPTION</u>
1	VBUS
2	Data -
3	Data +
4	Not Connected
5	Ground

2.3 : RJ-45 (Relays) Pin-out



<u>PIN</u>	<u>DESCRIPTION</u>
1	Relay 1 Normally Open Contact
2	Relay 1 Common Contact
3	Relay 1 Normally Closed Contact
4	Relay 2 Normally Open Contact
5	Relay 2 Common Contact
6	Relay 2 Normally Closed Contact

2.4 : HIROSE Power Input Pin-out

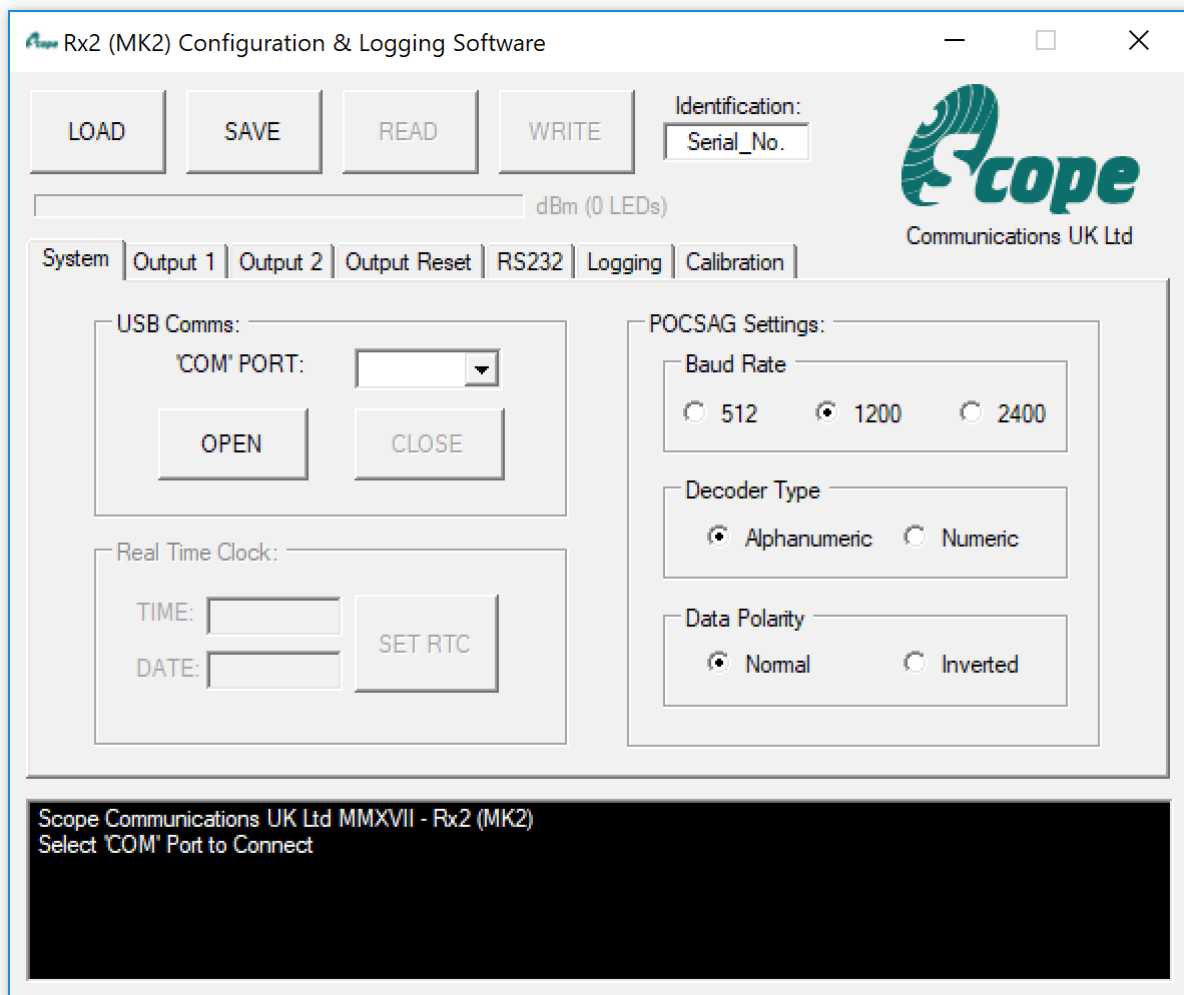


<u>PIN</u>	<u>DESCRIPTION</u>
1	12V DC
2	Not Connected
3	Ground

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3 : Programming Utility

3.1 : Main Window



i) 'LOAD' Button

Loads a previously saved '.rx2' configuration file.

ii) 'SAVE' Button

Saves the configuration to a file with a '.rx2' extension.

iii) 'READ' Button

Reads the current configuration from the device.

iv) 'WRITE' Button

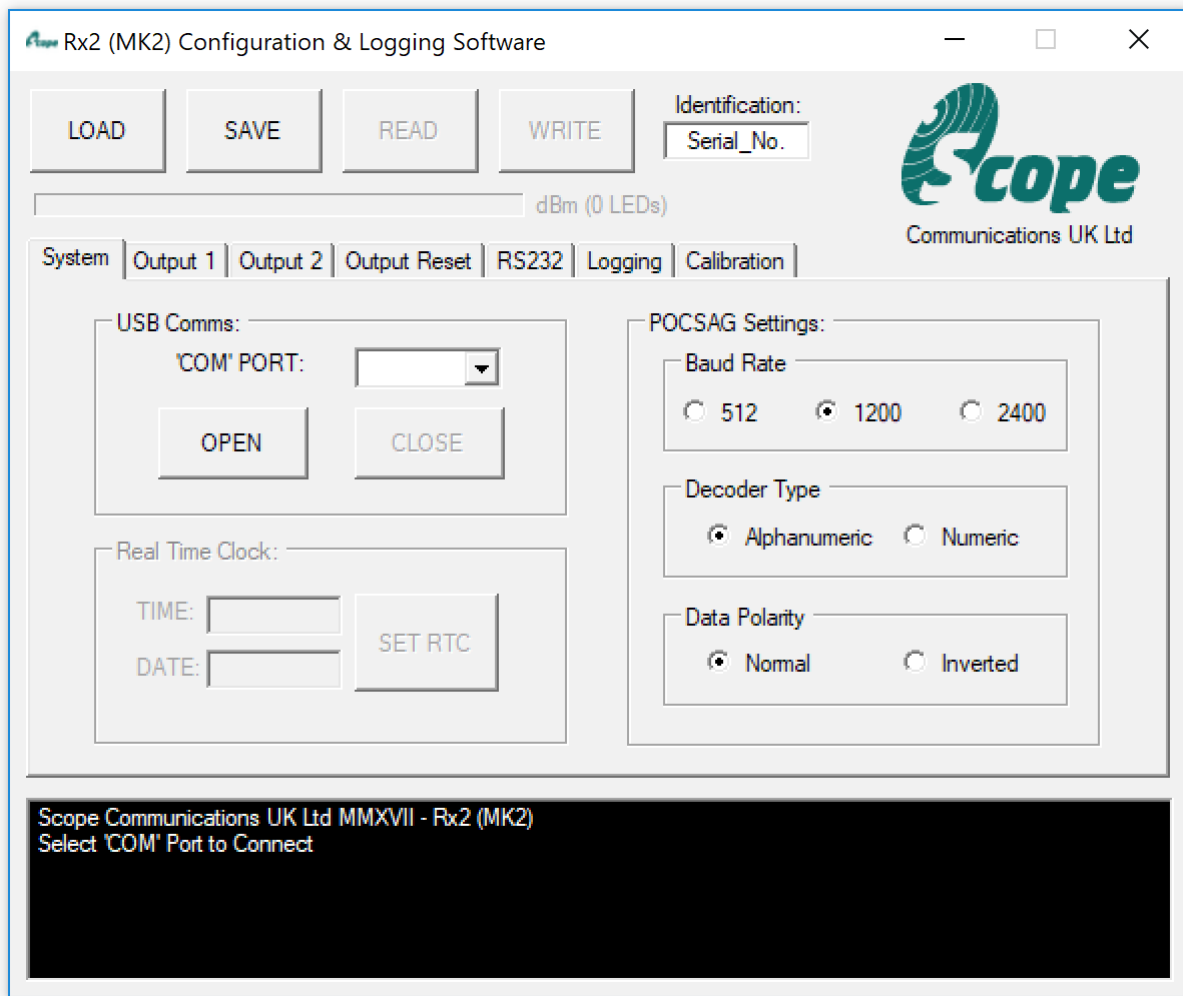
Writes the configuration to the device.

v) 'Identification' Text Box

Allows for a unique id to be programmed into the device (mandatory 10 characters, with no spaces).

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3.2 : 'SYSTEM' Tab



i) USB Comms

To connect and program the RX2, first select the 'COM' port from the list of available ports and click the 'OPEN' button. If a correct connection is established you will then be asked if you want to read configuration information from the device.

ii) Real Time Clock

This displays the current 'TIME' and 'DATE' settings of the on board real time clock, click 'SET RTC' to set the time and date.

iii) POCSAG Settings

Baud Rate: There are three different POCSAG baud rates to choose from 512, 1200 or 2400bps.*

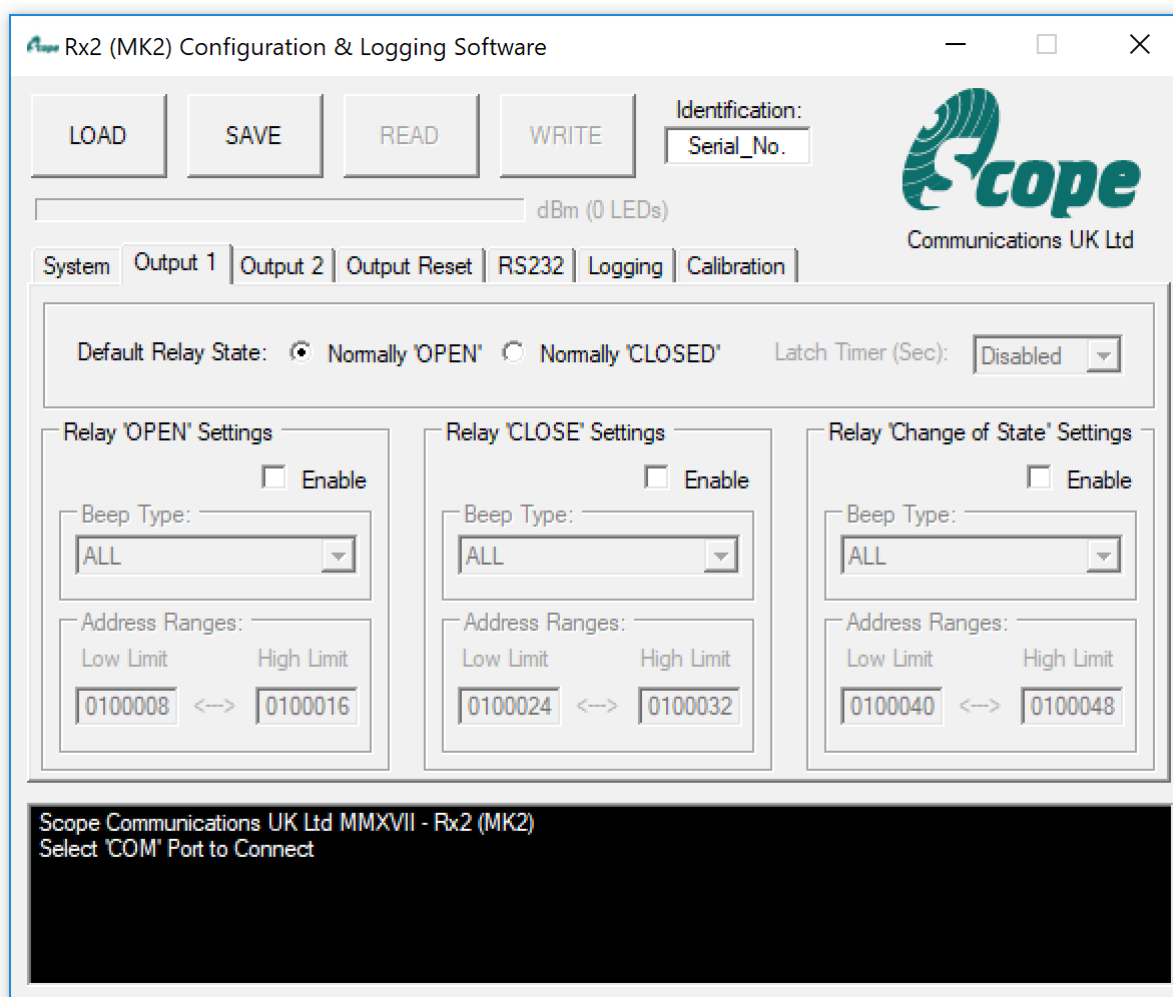
Decoder Type: Receiver can decode 'Alphanumeric' or 'Numeric' messages.*

Polarity: Data polarity can be either 'Normal' or 'Inverted'.*

* These must be chosen to match the settings of the transmitter used with the system.

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3.3 : 'OUTPUT 1' and 'OUTPUT 2' Tabs



i) Default Relay State

This setting determines whether the output relay is 'Normally Open' (de-energised) or 'Normally Closed' (energised) in its default state.

ii) Relay 'OPEN' Settings

Enable: Enable or Disable the relay 'OPEN' function.

Beep Type: Allows a beep-type filter to be added. Choose from either A, B, C, D or ALL.

Address Ranges: Specifies the range of Addresses or RICs that cause the relay contact to open.

iii) Relay 'CLOSE' Settings

Enable: Enable or Disable the relay 'CLOSE' function.

Beep Type: Allows a beep-type filter to be added. Choose from either A, B, C, D or ALL.

Address Ranges: Specifies the range of Addresses or RICs that cause the relay contact to close.

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iv) Relay 'Change of State' Settings

Enable: Enable or Disable the relay 'Change of State' function.

Beep Type: Allows a beep-type filter to be added. Choose from either A, B, C, D or ALL.

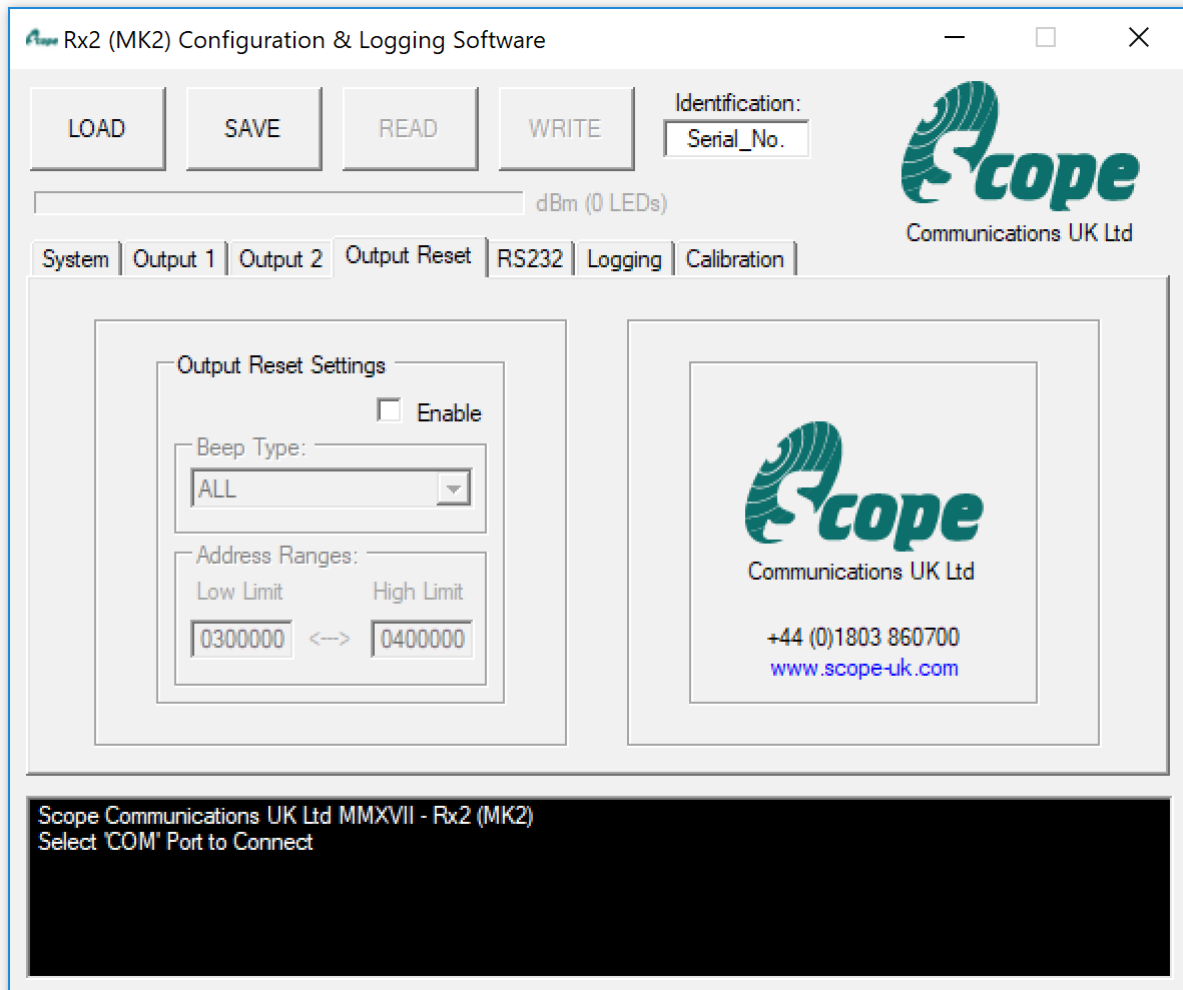
Address Ranges: Specifies the range of Address or RICs that cause the relay contacts to change state.

v) Latch Timer

If selected the latch timer returns the relay contact to its default state after a given time (0 – 255 seconds, in 5 second intervals). If activated again within the given time the counter is reset, thereby extending the period by the set time – This feature allows output relays to be used for 'Out of Service' checking.

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3.4 : 'OUTPUT RESET' Tab



i) Reset Settings

Enable: Enable or Disable the 'OUTPUT RESET' function.

Beep Type: Allows a beep-type filter to be added. Choose from either A, B, C, D or ALL.

Address Ranges: Specifies the range of Address or RICs that cause the relay contacts to change state.

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3.5 : 'RS232' Tab

The screenshot shows the 'Rx2 (MK2) Configuration & Logging Software' window. At the top, there are buttons for 'LOAD', 'SAVE', 'READ', and 'WRITE', along with an 'Identification: Serial_No.' field. A progress bar shows 'dBm (0 LEDs)'. The 'RS232' tab is selected in the navigation bar. The 'RS232 Port Settings' section has an 'Enable' checkbox checked and four dropdown menus: 'Baud Rate' (9600), 'Data Bits' (8), 'Parity' (None), and 'Stop Bits' (1). The 'RS232 Port Output' section has several checkboxes: 'Inc 'RSSI LEDs'', 'Inc 'Identification'', 'Inc 'Baud Rate'', 'Change Beep Type', and 'Delay Output'. Below these are dropdown menus for 'Beep Type' (ALL) and 'Protocol' (Scope). At the bottom, there are 'Address Ranges' with 'Low Limit' (0000008) and 'High Limit' (2097143) fields.

i) RS232 Port Settings

Baud Rate: The following baud rate settings can be applied.

1200, 2400, 4800, 9600, 14400, 19200, 28800, 38400, 57600, 76800 or 115200bps.
(default - 9600bps)

Data Bits: The following data bit settings can be applied.

5, 6, 7, 8 or 9. (default - 8)

Parity: The following parity settings can be applied.

None, Even or Odd. (default - None)

Stop Bits: The following stop bit settings can be applied.

1 or 2. (default - 1)

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ii) RS232 Port Output

Enable: Enables or Disables the RS232 port output function.

Inc. 'Baud Rate': Selects whether the output string includes the following baud rate characters. N (512bps), F (1200bps) or V (2400bps).

Inc. 'Identification': Selects whether the output string includes the identification string.

Inc. 'RSSI LEDs': Selects whether the signal strength LED count is included in the output string (0 - 8).

Delay Output: Enables or Disables a delay in the serial output data (this is useful for when used in a repeater configuration). Delay time is selected from the drop down box directly below this control and has the options of delaying the output by 0.5, 1, 1.5, 2, 2.5 or 3 seconds or until the carrier has gone (with a 10 second timeout).

Please note that when an output delay is used the receiver will not decode during the delay period, this is because there is only a single storage buffer for the received message and any subsequent messages would overwrite any previous data before it was outputted.

Beep Type: Allows a beep-type filter to be added. Choose from either A, B, C, D or ALL.

Protocol: The following serial output protocols are available:

Codewords – This option outputs the raw sampled codewords in hexadecimal format.

Message – Outputs just the message string.

Repeater_A – This option allows the receiver to be used as a repeater, the characters 'RP:' are added to the start of the received message string before being sent to the serial output, when the message gets re-transmitted and received a filter then looks for the 'RP:' characters in the message, if found the message is not then re-forwarded to the serial output, thus preventing infinite looping.

Repeater_B – This option is similar to the Repeater_A function, differing in that no extra characters are added to the message, instead the receiver will ignore the next message (within a timeout period or 6 seconds), this is also to prevent infinite loops.

Scope – The output string is formatted to conform to scope protocol.

Log Format – Outputs a string in the same format as is written to the SD card.

RP0: – When selected, this option will only forward messages to the serial port which don't contain the 'RPx:' suffix.

RP1: - This option will only forward messages to the serial port if the message contains the 'RP0:' suffix or no suffix is present. (RP1: + Ignore is the same except that messages without the 'RP0:' suffix are ignored, i.e. the original message is ignored).

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RP2: - This option will only forward messages to the serial port if the message contains the 'RP1:' suffix or no suffix is present. (RP2: + Ignore is the same except that messages without the 'RP1:' suffix are ignored, i.e. the original message is ignored).

RP3: - This option will only forward messages to the serial port if the message contains the 'RP2:' suffix or no suffix is present. (RP3: + Ignore is the same except that messages without the 'RP2:' suffix are ignored, i.e. the original message is ignored).

RP4: - This option will only forward messages to the serial port if the message contains the 'RP3:' suffix or no suffix is present. (RP4: + Ignore is the same except that messages without the 'RP3:' suffix are ignored, i.e. the original message is ignored).

RP5: - This option will only forward messages to the serial port if the message contains the 'RP4:' suffix or no suffix is present. (RP5: + Ignore is the same except that messages without the 'RP4:' suffix are ignored, i.e. the original message is ignored).

RP6: - This option will only forward messages to the serial port if the message contains the 'RP5:' suffix or no suffix is present. (RP6: + Ignore is the same except that messages without the 'RP5:' suffix are ignored, i.e. the original message is ignored).

RP7: - This option will only forward messages to the serial port if the message contains the 'RP6:' suffix or no suffix is present. (RP7: + Ignore is the same except that messages without the 'RP6:' suffix are ignored, i.e. the original message is ignored).

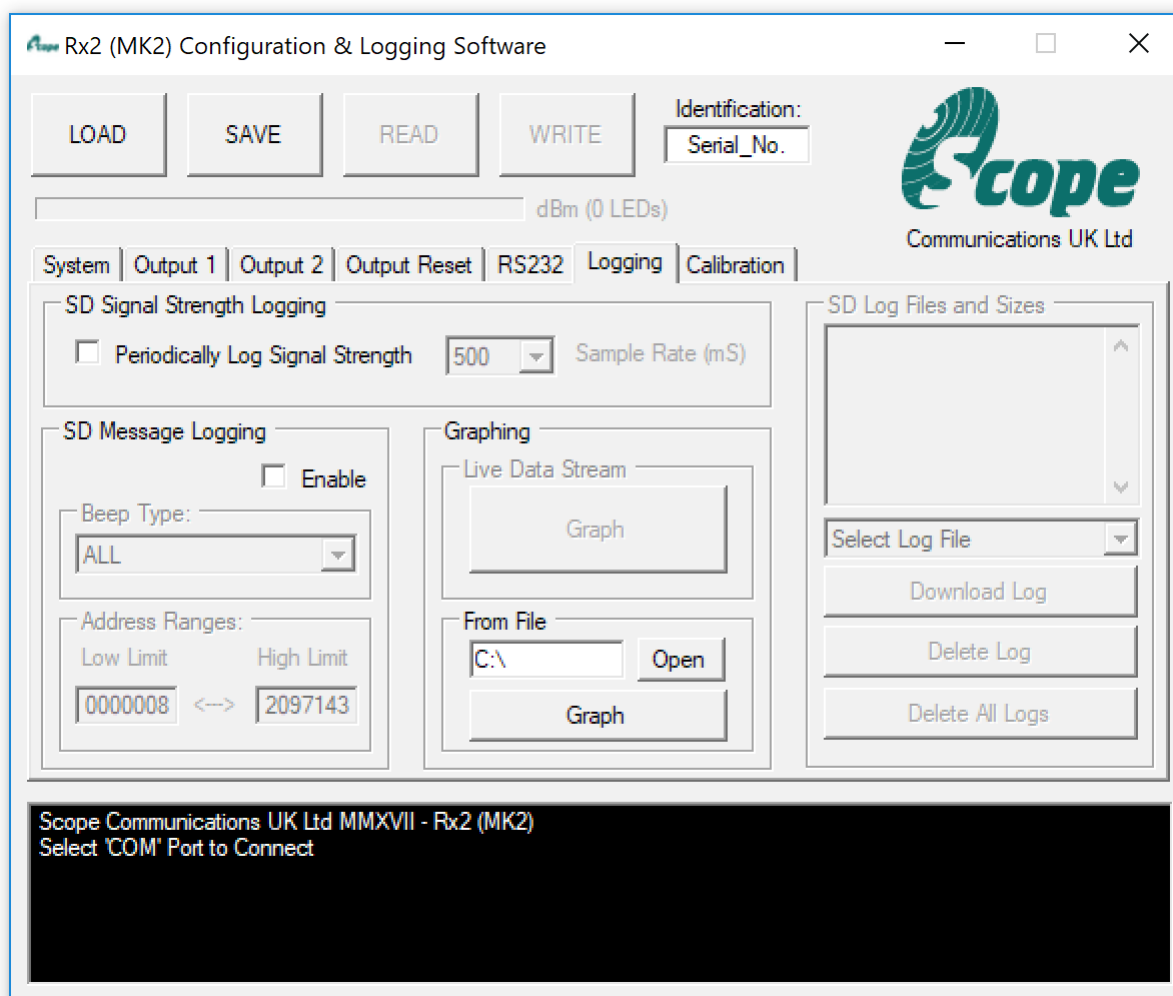
RP8: - This option will only forward messages to the serial port if the message contains the 'RP7:' suffix or no suffix is present. (RP8: + Ignore is the same except that messages without the 'RP7:' suffix are ignored, i.e. the original message is ignored).

RP9: - This option will only forward messages to the serial port if the message contains the 'RP8:' suffix or no suffix is present. (RP9: + Ignore is the same except that messages without the 'RP8:' suffix are ignored, i.e. the original message is ignored).

Address Ranges: Specifies the range of Addresses or RICs that allow for serial output.

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3.6 : 'LOGGING' Tab



i) SD Signal Strength Logging

When the 'Periodically Log Signal Strength' tick box is enabled the received signal strength is logged to the SD Card with selectable sample rates of 100, 200, 300, 400 or 500mS.

ii) SD Message Logging

Enable: Enable or Disable the 'SD Message Logging' function.

Beep Type: Allows a beep-type filter to be added. Choose from either A, B, C, D or ALL.

Address Ranges: Specifies the range of Addresses or RICs that allow message logging.

iii) Graphing

Live Data Stream: This function allows for viewing the live data stream in graph form. (see graphing section of the manual for further details).

From File: Downloaded log files can also be viewed in graph form with this function. (see graphing section of the manual for further details).

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iv) SD Log Files and Sizes

This section shows the available stored SD log files and their sizes, in bytes. Working with a particular file is as easy as picking the file using the drop down menu and choosing to either download or delete (please note that downloading is slow, so a little patience is required. Preferred method is to remove the SD card and read directly using a card reader and PC).

A running total of the amount of downloaded bytes is displayed in the message window.

Alternatively all logs can be deleted by clicking the 'Delete All Logs' button.

NOTE: To access the logged files the 'Logging Password' must be entered, located under the 'CALIBRATION' tab, this prevents unauthorised access.

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3.7 : 'CALIBRATION' Tab

Rx2 (MK2) Configuration & Logging Software

LOAD SAVE READ WRITE Identification: Serial_No.

dBm (0 LEDs)

System | Output 1 | Output 2 | Output Reset | RS232 | Logging | Calibration

Logging Password
Password:
New Password:
Confirm Password:
Change

Calibration Password
Password:
New Password:
Confirm Password:
Change

POCSAG Timer Offset:
3
Output CLK

Signal Strength:
Current ADC:
Min Value: 10
Max Value: 605

Scope Communications UK Ltd MMXVII - Rx2 (MK2)
Select 'COM' Port to Connect

i) Logging Password

To prevent unauthorised access to the saved log files the 'Logging Password' must be entered here. The default password is 'scope' and can be changed by entering and confirming the new password in the text boxes provided, then clicking on the 'Change' button.

ii) Calibration Password

To enable the calibration functions the 'Calibration Password' must be entered here (this is for Scope use and settings should not require changing by the customer). The password can be changed by entering and confirming the new password in the text boxes provided, then clicking the 'Change' button.

iii) POCSAG Timer Offset

This setting is for fine tuning the timer used to sample the incoming POCSAG signal and should not be altered by the customer as a two channel oscilloscope or logic analyser is required to physically check that the clock and data signals are synchronised, for this reason the option is protected with a calibration password. (this should not need altering unless there is lots of corruption in the decoded data). The 'Output CLK' button outputs the sample clock on a GPIO pin which can be probed at test point TP1.

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iv) Signal Strength

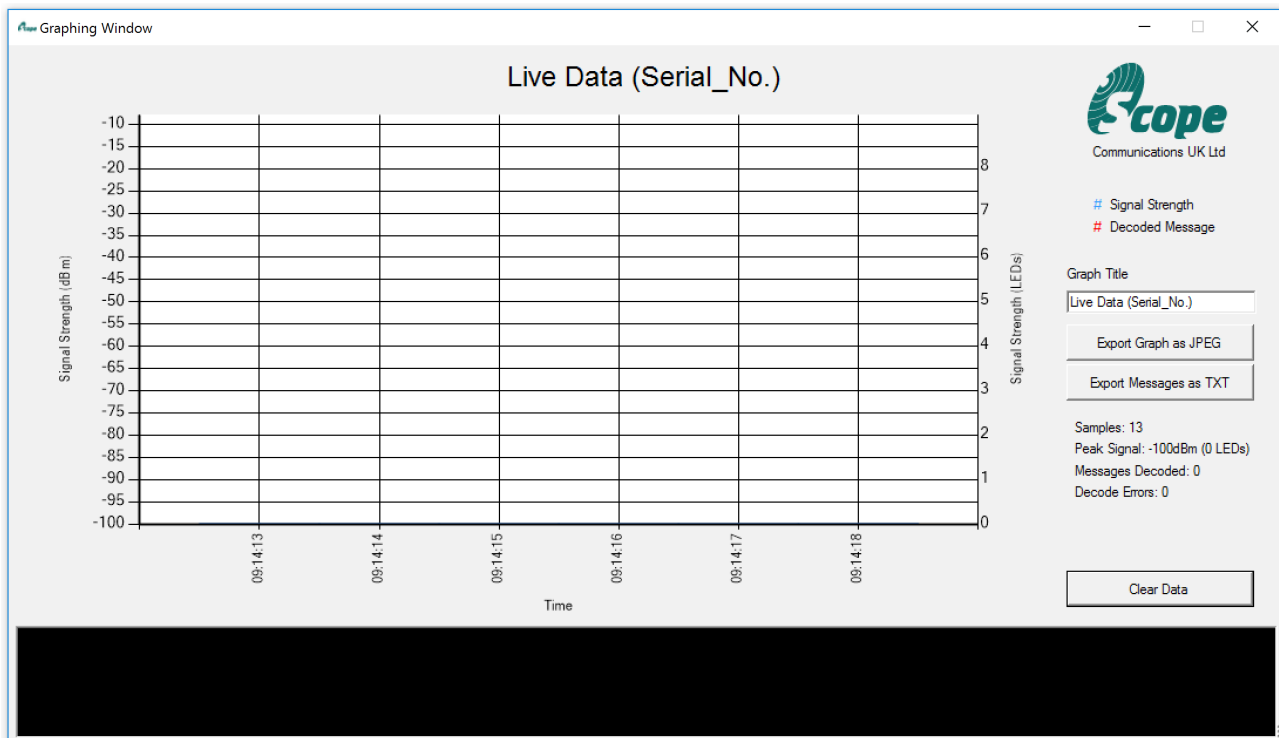
Current ADC: Displays the raw ADC value that corresponds the analogue RSSI output pin of the receiver (0 – 1023), this is used to set the Min and Max values of the Signal Strength.

Min Value: This value is used to represent the state when no carrier signal is present, all RSSI LEDs will be off

Max Value: This value represents the maximum carrier signal that the receiver can measure, all RSSI LEDs will be on.

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3.8 : Graphing Utility



The graphing utility allows for the visualisation of the current RSSI level and any decoded data. Also any saved log file can be loaded and displayed, this is ideal for site surveying applications.

Graph statistics can be viewed in the right-hand column, and include:

'Samples' – The amount of captured samples,

'Peak Signal' – Displays the highest signal strength recorded,

'Messages Decoded' – Shows the decoded messages count.

'Decode Errors' – If errors occur in the message decode, they are counted and displayed here.

The graph title can be changed by entering text in the 'Graph Title' text box.

Zooming into graph data is possible by clicking and holding the mouse button in the graphing window and dragging either left or right over the desired data (this can be quite slow when there are a lot data points, so please be patient). To zoom back out press the small square button that appears in the bottom left of the X/Y axis.

Export Graph as JPEG

This option exports a current screen shot of the graph in .jpg format to a specified location.

Export Messages as TXT

Any decoded messages can also be exported to a specified location as a .txt file.

Clear Data

To reset the graph, and clear all the data, press the 'Clear Data' button.