

**SHM LOGGER UTILITIES V4
USER'S GUIDE**

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Author : J.J.Moyce

SHM Communications

Change History

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2A	28/06/05	JJM		Added support for RL32 logger (Utility versions 4.04 onwards).
2B	21/01/07	JJM		Changes for version 4.05 of utilities.
2C	12/06/09	JJM		Changes for version 4.06 of utilities.

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1. INTRODUCTION

This guide describes how to install and use the logger utilities **UCOMM**, **UREAD** and **UCSV**. These utilities are used with SHM Communications UL8, UL24, RL32, ML32 and DL4 loggers.

The functions of the these utilities are as follows :-

UCOMM	A utility to read and modify the configuration of any SHM logger (DL4, UL8, UL24, RL32, ML32 etc.).
UREAD	A utility to read historic data from a logger and append it to a file in "DF2" format. This file can be subsequently imported into Stark Reality energy monitoring software. This is useful if it is not possible to interrogate the logger directly from the Reality host.
UCSV	A utility to read historic data from a logger and store it in comma-separated-variable (CSV) format. This file can subsequently be read by a spreadsheet program such as Microsoft Excel. Support files are also provided to assist in using Excel to produce charts from the raw data.

The installation and operation sections apply to all utilities. Each utility has its own section describing how to use it.

1.1 Operating Systems

The applications will run under Windows 95, Windows 98, Windows NT4, Windows 2000 and Windows XP, and should also work under Windows Vista, although this has not been tested.

1.2 Communications

1.2.1 Logger

All loggers have an RS232 serial data port for communications. This consists of a 9-way D-type socket on the case.

Loggers can optionally be supplied with an internal RS485 interface, which permits longer cable runs and allows several loggers to be connected together in a network and interrogated from one point.

Loggers can optionally supplied with an internal or external modem, or a terminal server which allows communications to take place over an Ethernet network.

1.2.2 Utilities

In the simplest case, the logger is directly connected to a serial port on the PC running the utilities.

If your PC does not have a serial port, you will need to purchase a USB to Serial port adapter and install it on your PC. The assigned COM port must be in the range COM1 to COM16.

The serial port will use a 9-way D-type plug, and a straight-through 9-way to 9-way cable is all that is required for direct connection to the local interrogation port of a logger.

To communicate with loggers via RS485, the PC serial port is connected to an RS232 to RS485 adapter, which then communicates with the loggers. Alternatively, USB to RS485 Serial adapters are available.

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To communicate with loggers via a modem, the PC serial port is connected to an external modem, or an internal PC modem may be used.

The utilities support ports COM1 to COM16, and will work with COM ports on PCMCIA modem cards and USB adapters.

The utilities also support connection to a logger via an Ethernet network using the TCP/IP protocol.

2. INSTALLATION

If previous versions of the utilities are installed on the PC, they must be removed before the new utilities are installed.

From "Control Panel", select "Add/Remove Programs". Find the entries for UCOMM, UREAD or UCSV as appropriate, select one and click the "Add/Remove" button.

2.1 Setup Programs

The utilities come as separate Windows "Setup" packages on a CDROM. A file **README.TXT** in the root directory gives further information about installing the utilities.

Normally, inserting the CDROM into the PC will cause the "Install" program to run automatically. This presents the user with buttons to install each of the utilities.

Alternatively you can browse to the "Package" folder of each utility and run the Setup.exe program. For UCOMM, this would be :-

```
D:\UCOMM\Package\Setup.exe
```

The Setup programs will prompt the user to allow the default location for files etc. to be changed. The default settings should be best for most installations.

2.2 Program Options

If the utilities have been previously installed on the PC, the previous application settings will be picked up from the registry. If not, the utilities will prompt the user for a COM port (1 to 16), and use the default Baud Rate and Parity. Otherwise, program settings are stored in the Windows Registry, and the last used settings will be restored when the utility is next run.

Each utility has menu commands to change the program options.

2.3 Running the Utilities

If the utilities have been installed in the default location, then they can be selected from the Start Menu :-

```
Start | Programs | SHM Utilities | Ucomm/Uread/Ucsv
```

If you wish to place additional shortcuts on the Desktop, right-click the "Start" button and select "Explore From Here". Browse to the "SHM Utilities" folder. Right-click on the icon and drag it to the desktop. Select "Copy here" when prompted.

If the utilities have never been installed before, then the program will prompt the user to enter the port number (1 to 16) before continuing. Otherwise they will pick the last used communication parameters.

On starting up, the communications settings are displayed for 5 seconds, or until a key is pressed. Following that, the main menu is displayed.

The screen is split into two horizontally. The lower half is used to show messages sent to and from the logger. The upper half is used for displaying menus and inputting data.

3. OPERATING THE UTILITIES

3.1 Addressing Different Loggers

Each logger has a programmable Commissioning parameter known as its Logical Logger Number or LLN. This number is used within the communication protocol to address messages to a particular logger.

If a number of loggers are connected together on a LAN system, they must each have a different Logical Logger Number. This number appears in all messages sent to and from loggers, and only the logger that matches this number will act upon the message. It is thus possible to talk to any of the loggers on the LAN from a single point (the Network Access Node).

However, when a LAN is not involved, or when accessing any logger via its local port, you can always talk to the logger connected directly to the PC by setting this value to zero. This acts as a 'wild-card' and means you do not have to know the Logical Logger Number of the logger you are connected to.



It is recommended that the default Logical Logger Number "1" is not used when loggers are connected in a network. Loggers should be commissioned with Logical Logger Numbers 11, 12 etc.

The start-up value of the Logical Logger Number used by the utilities is the wild-card value zero.

3.2 Different Logger Types

The utilities automatically change their behaviour depending on the version of logger firmware and the type of logger (UL8, UL24, RL32, ML32, DL4) that it encounters when it logs on.

Hence for early versions of firmware, Dial-In times and Alarm details are not displayed by **UCOMM**, and attempting to access menu items for unsupported features will produce a "Not supported..." message.

When connecting to a DL4 logger, only 4 channels will be readable or editable, and attempts to set the channel type to 'Analog' or 'Temperature' will be ignored.

When connecting to a UL24 logger, 24 channels will be available. Note that while channels 1 to 8 are Universal, channels 9 to 24 have restrictions on how they can be set up by **UCOMM**.

When connecting to an RL32 or ML32 logger, 32 channels will be available. Note that while channels 1 to 8 are Universal, channels 9 to 32 have restrictions on how they can be set up by **UCOMM**.

On start-up, the utilities assume a UL8 is connected. It is not until the first log-on that they find out what is actually connected. It is a good idea to "Read Time" (**UCOMM**) or "Monitor Channels" (**UREAD** or **UCSV**) first. This not only verifies communications, but ensures all subsequent commands operate correctly for that logger.

It is of course possible to confuse the utility by changing from one logger to another of a different type, particularly if you try to change a logger's configuration using data for a different type of logger, but if you stick to the "Read Personality – Modify – Write Personality" sequence (for **UCOMM**), you won't go wrong.

3.3 Aborting

In the unlikely event of the utility becoming 'stuck', or if you wish to quit without going through the normal menu exit sequence, then you can abort by holding down the <Ctrl> key and then pressing the <C> key, or by clicking the close box [X] at the top right of the main window. The closedown sequence may take a few seconds to complete.

3.4 Window Sizing

The size of the main program window can be changed by dragging the sides or corners as usual. The size of the characters on screen will change to best fit the width of the resized window. Be aware that if the window is not high enough, the bottom rows of the upper half of the screen may not be visible.

3.5 Troubleshooting

The following sections give guidance in case of difficulty.

3.5.1 Log-on failures

If the message "Logon Failure" "Hit any key to continue" is shown, then the utility is unable to establish a dialogue with the logger.

Possible causes are :-

- 1) Cable fault.
- 2) Logger connected to wrong PC serial port.
- 3) Logger Baud Rate does not match PC Baud Rate.
- 4) Logger passwords are not Null, and "Read" passwords do not match those programmed into the logger.
- 5) Current Logical Logger Number is not zero and does not match that of the logger (see section 3.1).
- 6) Communications timeout on RS485 network with a large number of loggers. Increase the timeout using UTIMEOUT (see section 0 or "Edit Program Options" command).
- 7) If communicating via a modem, a problem can occur if the modem profile causes the modem DTE baud rate to follow the connection speed (this setting is the exception rather than the rule). This will cause the modem baud rate to change after it connects. Refer to the modem documentation for details on how to fix this.

4. UCOMM

4.1 Using UCOMM

SHM loggers are versatile devices that can be tailored to a wide range of applications. All the logger's operating parameters are stored within the logger in non-volatile memory (i.e. the information is retained, even when the logger is un-powered). It is these parameters (known as the logger 'Personality') that can be programmed by **UCOMM**.

The process known as 'Commissioning' will program parameters that apply to the operation of the whole logger.

The process known as 'Configuration' will program parameters that control the operation of a single channel. The channels within the logger can each be configured independently.

There is a third process known as 'Set Up' which is normally only used during manufacture, to program the logger's Electronic Serial Number. It can only be performed if certain hardware modifications are carried out, which requires access to the logger circuit board.



It is important to understand how UCOMM works before using it, otherwise you can easily overwrite a logger's existing configuration with default values by mistake.

4.1.1 Typical Sequence

UCOMM maintains two logger personalities, the "Read Personality" (which is read-only) and the "Edit Personality" (which can be modified by the user). To start with, these will both be set to default values.

The first step is to read the existing logger configuration into the "Read Personality". This must then be copied to the "Edit Personality".

The Edit commands can be used to make changes to the "Edit Personality". The new personality is written to the logger using the "Commission" or "Configure" menu commands as appropriate.

Once the logger configuration has been changed, it can be read back into the "Read Personality" to verify the changes.

A typical sequence would be :-

- 1) Main Menu **1** - Choose Channel(s). You will be presented with a list of channels (1 to 8) and asked to enter **Y** or **N** to indicate whether or not you wish to read or configure that channel. Initially, all channels are selected. Use this command if you only want to change the configuration of only one or two channels.
- 2) Main Menu **2** - Read Logger Personality. The messages between the PC and the logger are shown in one half of the screen. The process takes several seconds, depending on the Baud Rate and the number of channels selected.
- 3) Main Menu **3** - Show Read Personality. This displays the data you have just read, showing the logger's existing personality.
- 4) Main Menu **4** - Copy Read Personality to Edit Personality. The software maintains two sets of data - the "Read" data and the "Edit" data. The "Read" data cannot be modified by the user and serves as a reference. The "Edit" data can be changed by the user and subsequently written to the logger.

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- 5) Main Menu **5** - Edit Menu. This produces a different menu that allows the Edit data to be modified (see below). Make your changes to the Edit data and return to the Main Menu when finished.
- 6) Main Menu **6** - Show Edit Personality. This allows you to check that the changes you made in step (5) above are correct.
- 7) Main **7** - Configure Menu. This produces a different menu that allows parts of the Edit data to be sent to the logger to change its personality (see below).
- 8) Main Menu **2** - Read Logger Personality. This can be done as a double-check to ensure that the new personality has been accepted by the logger.
- 9) Main Menu **3** - Show Read Personality. This displays the new logger personality, which should have incorporated your changes.

4.2 Menus and Commands

4.2.1 Main Menu

The Main Menu is shown below :-

```
1    Choose Channel(s)
2    Read Logger Personality
3    Show Read Personality
4    Copy Read Personality to Edit Personality
5    Edit Menu . . .
6    Show Edit Personality
7    Configure Menu . . .
8    Commission Menu . . .
9    Read Time
10   Monitor Channels
11   Configuration Certificate
12   Dial Out
13   Set Logical Logger Number
```

Menu item **1** – Choose Channel(s)

This command selects which channels will be read from and written to the logger. By default, all logger channels are selected. This only affects Configuration Data. Commissioning data, which is not channel-specific, is unaffected.

The user is first prompted to enter the number of channels in the logger (ie. 4, 8, 24 or 32) since this is not known unless the utility has already communicated with the logger concerned.

Menu item **2** – Read Logger Personality

This command reads the logger configuration and commissioning data into the "Read Personality".

Menu item **3** – Show Read Personality

This command displays the contents of the "Read Personality" read from the logger by the "Read Logger Personality" command.

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For UL24, RL32 and ML32 loggers the Warnings shown on Page 4 of the personality data indicate if channels 9 upwards are healthy. The Warning codes are described in section 7.2.

Menu Item 4 - Copy Read Personality to Edit Personality

This command produces an editable copy of the logger personality.

Menu Item 5 - Edit Menu

This presents a menu of Editing commands. See section 4.2.2.

Menu item 6 – Show Edit Personality

This command displays the contents of the "Edit Personality" that can be written to the logger using the Configure or Commission menu commands.

Menu Item 7 - Configure Menu

This presents a menu of Configure commands to update the channel configuration. See section 0.

Menu Item 8 - Commission Menu

This presents a menu of Commission commands to update the logger personality. See section 4.2.4.

Menu item 9 - Read Time

This command can be used to check the logger's internal time and date. The time and date of the PC's own time reference are also displayed. The time difference between PC time and logger time is also shown.

Menu item 10 - Monitor Channels, can be used to monitor the instantaneous readings of up to 8 channels. The display shows the channel type (Digital, Analog, Status etc.) and its associated reading. The logger's time and date are also shown.

For the UL24/RL32/ML32 logger, the channels are shown 8 at a time. Press keys '1', '2' '3' or '4' to see channels 1 to 8, 9 to 16, 17 to 24 or 23 to 32 respectively.

The display is continuously updated. Press any key to return to the main menu.

Menu item 11 - Configuration Certificate

This command can be used to provide a permanent record of a logger's configuration. The data printed is the same as that shown by the 'Show Read Personality' menu item. In addition, if the logger's inputs have been monitored using the 'Monitor Channels' command, then the readings at the start and end of the monitoring period are shown. This can be used to prove that the inputs are operational, by showing an advance of the pulse count, for example.

The data is always written to the PC's disk, and can optionally be sent to a printer. The user is initially asked if a printed output is required (answer **Y** or **N**).

UCOMM then reads the entire logger configuration (all channels) and writes the information to a file **xxxxxxx_ddmmyy-hhmm.CFG**, where xxxxxxxx represents the 8-digit Electronic Serial Number of the logger.

If a printed output was requested, then the same data is sent to the PC's printer.

The directory to which the file is written and the printer device can be controlled by the "Edit Program Options" command (see section 4.2.2). The default printer device is **LPT1:**. Also the file name has the date and time appended to it in the form **ddmmyy-hhmm** eg.

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F0000342_310107-1435.CFG.

Menu Item 12 – Dial Out

This presents a menu of modem control commands which can be used to contact a remote logger via a dial-up telephone modem, and also to hang up the line afterwards. See section 0.

Menu Item 13 - Current Logical Logger Number

This command controls which logger the software communicates with.

This item is only needed when talking to a number of loggers on a network. Otherwise the default setting (zero) will permit operation with any directly-connected logger. See section 3.1.

4.2.2 Edit Menu

The Edit Menu is shown below :-

```
1      Edit Channel Configuration
2      Edit Channel Intervals Only
3      Edit Channel Alarms
4      Edit Commissioning Data
5      Edit Electronic Serial Number
6      Edit Read Passwords
7      Edit Write Passwords
8      Edit New Logical Logger Number
9      Edit PC COM Port & Baud Rate
10     Edit Program Options
X      Exit back to Main Menu
```

When editing data, the user is presented with each quantity in turn, with a message indicating the range of values expected. A new value can be typed in or the <Return> key can be pressed to leave the value unchanged.

Note that any changes made are NOT sent to the logger at this stage.

Menu Item 1 – Edit Channel Configuration

This command allows the user to change the configuration of each channel that was selected using item (1) in the Main Menu.

The channel's type (**D**igital, **A**nalog, **T**emperature or **S**tatus) can be changed by typing the corresponding initial letter, along with the physical input line, logging interval, channel memory size, pulse count pre-scaler and initial count setting.

A channel can be totally disabled by setting its type to **X** and memory size to zero.

For details of all configuration parameters, see section 7.1.1.

Menu Item 2 – Edit Channel Intervals Only

This command allows editing of only the channel logging intervals, and is more convenient if this is the only thing to be changed. Changing the logging interval of a channel does not cause any of the previously logged data to be lost, whereas changing any other configuration item causes the channel log to be cleared.

See section 0 for details of Triggered channels and valid logging intervals.

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Menu Item 3 – Edit Channel Alarms

This command allows the channel alarm settings to be changed.

See section 7.1.1.7 for details of how channel alarms work.

Menu Item 4 – Edit Commissioning Data

This command allows the user to change the logger's Commissioning data (LAN address, Option codes, Baud Rate, Modem Answer Window etc.).

The LAN address is entered as a 16-digit hexadecimal number. The last 4 digits are used to set the address if a Neuron LAN option board is fitted. All loggers on a Neuron LAN must have identical values of these last 4 digits. *NB. The Neuron LAN option board is now obsolete.*

For details of Option Codes, see section 7.1.2.2. For details of all commissioning parameters, see section 7.1.2.

Menu Item 5 – Edit Electronic Serial Number

The user does not normally need to use this command. The logger will only accept a new ESN if certain hardware modifications are carried out, which requires access to the logger circuit board.

Menu Item 6 – Edit Read Passwords

Loggers as shipped from the factory have Null passwords, which allow universal access. This command changes the passwords used when reading data from loggers that have been commissioned with non-null passwords.

Menu Item 7 – Edit Write Passwords

Loggers as shipped from the factory have Null passwords, which allow universal access. This command changes the passwords which must be subsequently commissioned in the logger to prevent unauthorized access.

Menu Item 8 – Edit New Logical Logger Number

This command controls the Logical Logger Number that is programmed into the personality as part of the Commissioning process.

Menu Item 9 – Edit PC COM Port & Baud Rate

This command changes the PC COM Port, Baud Rate and Parity that **UCOMM** uses to communicate with the logger.

Allowable settings of the Parity are Even, Odd, Mark (One) and Space (0). The number of data bits is always 7.

Note that 7 data bits plus Space is equivalent to 8 data bits with no parity.

The standard setting is 7 data bits Even parity. Other parity settings should only be used where some form of modem is used that cannot support the standard setting.

There is an additional option to use a TCP/IP Ethernet connection to communicate with the logger. If the user specifies a COM port of zero, then this will be followed by a prompt for an IP Address and IP Port number to use. The remote logger must be connected to an Ethernet Terminal Server with the given IP Address, and listening on the given port for this to work.

The user is prompted to make the new setting the default, to be written to the Windows Registry.

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Menu Item 10 – Edit Program Options

This command changes the program options, which are stored in the registry. For each parameter, the user is prompted to make the new setting the default, to be written to the Windows Registry. Parameters are as follows :-

File Directories

The utilities can write files (Eg. Configuration Certificate, Historic Data) on the PC's disk. By default, they are placed in the current working directory. However, if you want all files to be written to a specific directory, then you can specify the directory here. Be sure that the directory exists.

Printer Port

UCOMM can print a Configuration Certificate on the PC's printer. By default, it sends it to printer device **LPT1:**. In addition to the standard LPT1: and LPT2:, you can also specify a network printer in the form :-

\\PC_Name\Printer_Share_Name

Default Telephone Number

The default telephone number displayed when dialling out can be specified. The number may be prefixed by the letter 'T' if required, to force the modem to use tone dialling.

Dial Pattern Delay

If dialling a logger using the 'Dial Pattern' option (because the line is shared), then the delay between the first ring and the second may need adjustment, as the timing is determined to some extent by the types of telephone exchange involved in the call. The delay can be adjusted this command.

The default value of this parameter is 13.5 (seconds). It should not need more than +/- 1 second of adjustment, and can only be set by experiment.

Communications Timeout

A default timeout of 3 seconds is used when waiting for replies from the logger. This should be satisfactory for most applications. However, when communicating with loggers on an RS485 ring with a large number of nodes, it may be necessary to increase this timeout.

4.2.3 Configuration Menu

The configuration menu is shown below :-

```
1   Basic Configuration
2   Configure Intervals Only
3   Configure Passwords
4   Configure Alarms
X   Exit back to Main Menu
```

Menu Item 1 – Basic Configuration

This command writes to the logger the configuration of each channel that was selected using item (1) in the Main Menu.

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The channel type, physical input line, logging interval, channel memory size, pulse count pre-scaler and initial count setting are all written.

Note that writing this data causes all previously logged data to be cleared from the selected channels. Channels not selected remain unchanged.

Menu Item 2 – Intervals Only

This command writes to the logger the logging interval of each channel that was selected using item (1) in the Main Menu.

Note that this does NOT cause any previously logged data to be lost.

Menu Item 3 – Passwords

Loggers as shipped from the factory have Null passwords, which allow universal access. This command writes the passwords used to read data and configure each selected channel.



WARNING. This command should be used with care. If non-Null passwords are written to the logger then the user must remember these passwords, or it will not be possible to access the logger. The passwords cannot be read back from the logger, and can only be forced back to Null passwords if certain hardware modifications are carried out, which requires access to the logger circuit board.

Menu Item 4 – Channel Alarms

This command only works with versions of logger firmware version 2.40 or later.

It writes to the logger the alarm thresholds for each channel that was selected using item (1) in the Main Menu.

Note that this does NOT cause any previously logged data to be lost.

4.2.4 Commissioning Menu

The commissioning menu is shown below :-

- 1 Basic Commissioning
- 2 Commission Passwords
- 3 Calibrate Analog Inputs
- 4 Commission Time
- 5 Send Commands to Modem
- 6 Set Up Logger
- 7 Pull Clock Fast
- 8 Pull Clock Slow
- X Exit back to Main Menu

Menu Item 1 – Basic Commissioning

This command writes the commissioning data to the logger. This data consists of the Logical Logger Number, Baud Rate, Parity, Local Area Network Address, Option Codes, Modem Answer Window, Dial-In time and Alarm Notification (as appropriate).

Menu Item 2 – Commission Passwords

This command writes the Commission and Time Control passwords to the logger.



WARNING. This command should be used with care. If non-Null passwords are written to the logger then the user must remember these passwords, or it will not be possible to access the logger. The passwords cannot be read back from the logger, and can only be forced back to Null passwords if certain hardware modifications are carried out, which requires access to the logger circuit board.

Menu Item 3 – Calibrate Analog Inputs

This command should not be selected unless you have the knowledge and equipment to perform the calibration.

Menu Item 4 – Commission Time

Selecting this command causes the PC's own internal time and date to be written to the logger. Note that it is common to operate the logger on a fixed time standard (eg. GMT).

Menu Item 5 – Send Commands to Modem

This command only works with versions of logger firmware version 2.40 or later. If the logger has an integral or external modem connected, then the modem profile can be set up by sending 'AT' commands using this item.

It is not possible to see the responses from the modem, or to send 'AT' commands via an RS485 network, or to send them remotely through the same modem connection.

It is important NOT to send any command that enables modem echo, as this may disrupt further communication with the logger. Particular care should be taken when using 'restore factory profile' commands.

The sequence to set up an External US Robotics Modem is as follows :-

AT&F2E0	Select XON/XOFF factory template WITHOUT echo.
ATS0=1	Auto-Answer after 1 ring.
ATS7=30	Hang up after 30 seconds if no carrier.
AT&Z0=xxx	Store dial-in number of host PC.
AT&W0	Store as power-up profile.

Refer to SHM for details of setting the profile of the integral modem.

Menu Item 6 – Set Up Logger

This command will only work if certain hardware modifications are carried out, which requires access to the logger circuit board. It updates the logger Electronic Serial Number and clears certain diagnostic information.

Menu Item 7 – Pull Clock Fast

This command alters the frequency of the real-time-clock oscillator so that it runs fast. It does not alter the time-of-day.

Menu Item 8 – Pull Clock Slow

This command alters the frequency of the real-time-clock oscillator so that it runs slow. It does not alter the time-of-day.

4.2.5 Dial Out Menu

The dial out menu is shown below :-

- 1 Dial Out via Modem
- 2 Dial Out via Modem using Ring Pattern
- 3 Hang Up Line
- 4 View Phone Book
- 5 Update Phone Book
- X Exit back to Main Menu

The Dial Out functions can control a modem which is connected to the PC's serial port.

The modem must be one that supports the 'Hayes AT command set' (most modern modems do).

To operate correctly, the modem should be programmed to use verbal result codes (eg. "OK") rather than numeric codes (eg. "0"). This is the normal setting for most modems. For US Robotics modems, this mode can be set using the command **ATQ0V1**.

Menu Item 1 – Dial Out via Modem

This command asks for the telephone number to dial. By specifying a number starting with **T** or **P**, the modem will be forced to use Tone or Pulse dialling respectively, rather than using its default method of dialling. However in most cases, the modem's default dialling method will be correct, and only the number will be required.

If you enter a speed-dial code (#0 to #9), then the corresponding Phone Book entry will be displayed. Hit <Return> to accept this number and dial, or type in another number or speed-dial code.

The utility attempts to determine if the line is connected by monitoring the messages generated by the modem. However, if the modem is not programmed suitably, this may not work, but the user can interrupt the dialling process by hitting a key when the modem has connected. The user will then be asked to answer **Yes** if the modem has indeed connected. The user should answer this, as the utility behaves slightly differently when communicating via a modem.

Menu Item 2 – Dial Out via Modem using Ring Pattern

This command can be used to contact loggers with firmware version 2.40 or later.

If a logger is programmed to answer the modem only during a window, or is programmed not to answer it at all (the usual case when using dial-in), then it is still possible to contact the logger remotely over the telephone line. These options are normally used when the logger shares a telephone line with a fax, modem or a speech phone.

If the logger detects a short burst of ringing, followed by a gap of 11 to 12 seconds of silence, followed by ringing again, then the logger will force the modem to answer, even if this would normally be disabled.

Note that when the call finishes, the logger will answer any incoming call immediately for 60 seconds after the end of the call.

Note that if this item is erroneously used on a logger that answers incoming calls immediately, then the second call will fail with 'BUSY', as the logger will have answered on the first call.

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Menu Item 3 – Hang Up Line

This command can be used to request the modem to hang up the line. The utility attempts to determine if the line is disconnected by monitoring the messages generated by the modem. However, if the modem is not programmed suitably, this may not work, but the user can terminate the hang-up process by hitting a key when the modem has disconnected.

Menu Item 4 – View Phone Book

This command displays the 10 Phone Book entries #0 to #9.

Menu Item 5 – Update Phone Book

This command prompts you to edit the 10 Phone Book entries in turn. You can specify a comment for each entry by entering a '#' after the number and following it by any text you want. For example :-

```
01962 862451 # SHM Winchester FAX Line
```

The Phone Book entries are stored in an INI file **Phonebook.ini**.

4.3 Specialized Topics

4.3.1 Changing Passwords

It is not normally recommended that passwords be changed from the normal Null passwords if the logger is used for demonstration purposes.

However, if you wish to change the passwords, it is necessary to make a note of the passwords you have assigned.

The passwords are changed by using the "Edit Write Passwords" item in the Edit menu (section 4.2.2 above), and these passwords are written to the logger using the "Configure Passwords" command (section 0 above) for the channel-specific passwords (Read Data, Configure, and Authenticator Key), and the "Commission Passwords" command (section 4.2.4 above) for the Commission and Time Control passwords.

Subsequent to this, you must enter these new passwords using the "Edit Read Passwords" item in the Edit menu before you will be able to read any information from the logger. If this is not done, "Logon Failure" messages will be encountered when attempting to communicate with the logger.

4.3.2 Changing Baud Rate

To change the Baud Rate, first ensure the "PC Baud Rate" corresponds to the current logger Baud Rate. Read the logger personality and copy it to the "Edit Personality".

Edit the new Baud Rate and Parity using the "Edit Commissioning Data" item in the Edit menu (section 4.2.2 above).

Write the new Baud Rate and Parity to the logger using the "Basic Commissioning" item in the Commission menu (section 4.2.4 above).

The new Baud Rate will be written, and the PC will automatically change its Baud Rate and Parity to match, so that subsequent communications with the logger should be successful.

NB. If the utility is communicating via a modem, then this automatic change of PC baud rate by **UCOMM** will not occur.

4.3.3 Changing Channel Size

The UL8 logger has eight channels, and eight blocks of memory that can be allocated to these channels.

If all channels are required to log data, then each channel must be assigned one (and one only) memory block.

If less than eight channels are required to log data, then the eight blocks of memory can be assigned to these channels in any combination, provided the total memory requirement does not exceed eight blocks.

To achieve the maximum log size, all eight blocks can be assigned to a single channel.

NB. Channels that are configured with zero memory blocks can still provide 'immediate' (instantaneous) readings, even though they never log any data.

When changing the channel size, it is essential to do this in two stages, first releasing all the memory blocks for the channels to be changed (by editing the size to zero and configuring the channels), then editing the new channel size and configuring again.

NB. The DL4 logger has 4 channels and 8 blocks of memory. The default configuration assigns 2 blocks to each channel.

NB. The UL24 logger has 24 channels and 32 blocks of memory. The default configuration assigns 2 blocks of memory to channels 1 to 8 and 1 block of memory to channels 9 to 24.

NB. The RL32 and ML32 loggers have 32 channels and 40 blocks of memory. The default configuration assigns 2 blocks of memory to channels 1 to 8 and 1 block of memory to channels 9 to 32.

Refer to section 7.1.1.4 for details of the memory block restrictions for each type of logger.

4.3.4 Setting Logger Input Links

The channel type of each universal channel can be configured to be one of Digital (pulse counting), Analog, Status or Temperature.

However, in order to log these quantities correctly, the link on the channel's corresponding input line must be set up appropriately.

Each input line on the UL8 (and the first 8 input lines on a UL24/RL32/ML32) has its own configuration link on the PCB. This link has three positions, marked **R**, **I** and **V**. The correspondence between Channel Type and Input Link is as follows :-

Digital channels	Insert link R .
Analog channels	Insert link V for 0-10 volts. Insert link I for 0-20 mA.
Status channels	Insert link R .
Temperature channels	Insert link R .
Trigger inputs	Insert link R .

NB. The DL4 logger has no universal channels. The UL24, RL32 and ML32 have 8 universal channels, just as the UL8.

4.3.5 Configuring a UL24,RL32 or ML32

The UL24, RL32 and ML32 have 8 universal channels (1 to 8) that work identically to those on a UL8. Channels 9 to 24 on a UL24 and 9 to 32 on an RL32 have certain restrictions as to how they can be configured.

Refer to section 7.1.1 for a summary of the restrictions on configuration parameters for channels 9 upwards on a UL24, RL32 or ML32 logger.

Note that as from firmware version 3.10, there is only one 'Authenticator Key' for the whole logger, and not one for each channel.

NB. When UL24/RL32/ML32 configuration parameters for channels 9 upwards are displayed by UCOMM, they are normally identified by '9+'.

4.3.6 Cloning / Initial Channel Counts

The following feature only applies to UCOMM version 4.05 and later.

This feature allows a logger to be replaced with a "Clone" (the Electronic Serial Number cannot be cloned however). To achieve this you must perform the following steps :-

- 1) Read the personality of the logger to be replaced using UCOMM via the local RS232 serial port.
- 2) Copy the Read Personality to the Edit Personality.
- 3) Remove the old logger and fit the new logger. Don't exit UCOMM. Connect UCOMM to the new logger via the local serial RS232 port.
- 4) Commission the new logger using **Commission Menu | Basic Commissioning**.
- 5) Commission the time in the new logger using **Commission Menu | Commission Time**.
- 6) Configure all channels using **Configure Menu | Basic Configuration**.
- 7) If you are using Alarms, also configure Alarms using **Configure Menu | Configure Alarms**.
- 8) If you are using Passwords, these will have to be configured manually.

The cloned logger will have the same channel counts on its digital channels, but will not retain the old logger's historical data.

When a logger personality is read in using the "Read Logger Personality" command in the Main menu (section 4.2.1 above), the Current Count value of all Digital channels is set to the actual channel count at that time.

If you then copy this Read Personality to the Edit Personality using the "Copy Read Personality to Edit Personality" command in the Main menu, then you can re-program these counts into a different logger. If you do not want to re-program these values, they can be changed via the Edit Menu.

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If you re-configure the channels of a logger using the "Basic Configuration" command in the Configuration menu (section 0 above) then these Current Counts will be re-programmed and the channels will continue to count up from the original values. However note that this command clears all historic data from the channel, so the history is lost but the channel counts will be maintained (NB. pulses received between reading the original personality and re-programming the channels will of course be lost, but the error is likely to be small if done quickly).

NB. The Configuration Certificate produced by UCOMM shows the Initial Count for each digital channel. This Initial Count will be equal to the actual channel count at the time the certificate was generated.

5. UREAD

5.1 Using UREAD

The historic logged data is normally read by a sophisticated software package (eg. Stark Reality) that can store the data and generate reports based on it. The reading of this data is scheduled automatically (typically daily). The logger or loggers are interrogated via the PC's serial port, possibly using a dial-up modem or Paknet. Several of the loggers may be connected in a network.

However, should there be a failure of the communications network, modem or telephone line, **UREAD** is designed to provide a fall-back mode of operation until communications are restored.

UREAD can be installed in a portable PC and taken to each logger that cannot be contacted by the host PC. SHM Loggers have a separate RS232 connector that is designed for local interrogation. By plugging the portable PC into this connector, the historic data can then be read and stored as a disk file in standard Stark DF2 format.

The resulting file is then transferred to the host PC. The Stark Reality software can then import the data from this file in lieu of 'live' data.

5.1.1 Typical Sequence

A typical sequence would be :-

- 1) Main Menu **1** - Choose Channel(s). The user is presented with a list of channels and asked to enter **Y** or **N** to indicate whether or not to read that channel. Initially, all channels are selected.
- 2) Main Menu **2** - Read Channels. The user is first prompted to enter a date and time of the earliest reading required. As the data is collected, messages between the PC and the logger are shown in one half of the screen. The process takes several seconds, depending on the Baud Rate and the number of channels selected. The Historic Data is decoded and stored on disk as a DF2-format text file.

The above sequence of operations is normally all that is necessary. The historic data is written to a single file on disk. New data is always appended to the end of the existing file. A header precedes each channel's readings to identify the logger and channel.

Once all the data has been collected, the resulting file should be transferred to the host PC and imported into Stark Reality (see section 5.3.1). The file on the portable PC should then be deleted (otherwise the next time UREAD is used, the old data will still be in the log file).

5.2 Menus and Commands

5.2.1 Main Menu

The Main Menu is shown below :-

```
1    Choose Channel(s)
2    Read Channels
3    Monitor Channels
4    Logical Logger Number
5    Change Log File Name
6    Delete Log File
7    Set Passwords
8    PC COM Port & Baud Rate
9    Dial Out
10   Edit Program Options
X    Exit
```

Menu item 1 – Choose Channel(s)

This command selects which channels will be read from the logger. By default, all logger channels are selected.

The user is first prompted to enter the number of channels in the logger (ie. 4, 8, 24 or 32) since this is not known unless the utility has already communicated with the logger concerned (eg. by using the 'Monitor Channels' command).

Menu item 2 – Read Channels

This command reads historic data from each enabled channel.

The time and date of the first historic reading must first be entered. Data from this time until the present are retrieved.

As each block of readings is collected, the value and time/date stamp of the last reading in the block is displayed on screen.

The data is appended to the file STARK.TXT (default), or the file name specified by the "Change Log File Name" command.

Menu item 3 - Monitor Channels, can be used to monitor the instantaneous readings of up to 8 channels. The display shows the channel type (Digital, Analog, Status etc.) and its associated reading. The logger's time and date are also shown.

For the UL24/RL32/ML32 logger, the channels are shown 8 at a time. Press keys '1', '2' '3' or '4' to see channels 1 to 8, 9 to 16, 17 to 24 or 23 to 32 respectively.

The display is continuously updated. Press any key to return to the main menu.

Menu Item 4 - Logical Logger Number

This command controls which logger the software communicates with.

This item is only needed when talking to a number of loggers on a network. Otherwise the default setting (zero) will permit operation with any directly-connected logger. See section 3.1.

Menu Item 5 - Change Log File Name

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This command sets the log file name. The default file name whenever the program is started is STARK.TXT. However, should another file name be required, the name can be specified using this item. All subsequent historic data will be appended to this file.

NB. This command should only be used to specify the file's Name, and not its Path. The directory into which all files are written is controlled by the **UPATH** environment variable (see section 0).

Menu Item 6 - Delete Log File

This command allows the Log File (STARK.TXT or the file name set by the command above) to be deleted. The user is prompted to confirm deletion, to avoid accidental loss of collected data.

The Log File should be deleted when all its data has been transferred to the host PC, otherwise the file will grow unnecessarily large with obsolete data.

Menu Item 7 - Set Passwords

If the loggers have been commissioned with non-null "Read" passwords, then these passwords must be entered before communicating with the logger. Otherwise, this command is not required.

The user is prompted to enter a password for each channel that has been enabled.

Menu Item 8 – PC COM Port & Baud Rate

This command changes the PC COM Port, Baud Rate and Parity that **UREAD** uses to communicate with the logger.

Allowable settings of the Parity are Even, Odd, Mark (One) and Space (0). The number of data bits is always 7.

Note that 7 data bits plus Space is equivalent to 8 data bits with no parity.

The standard setting is 7 data bits Even parity. Other parity settings should only be used where some form of modem is used that cannot support the standard setting.

There is an additional option to use a TCP/IP Ethernet connection to communicate with the logger. If the user specifies a COM port of zero, then this will be followed by a prompt for an IP Address and IP Port number to use. The remote logger must be connected to an Ethernet Terminal Server with the given IP Address, and listening on the given port for this to work.

The user is prompted to make the new setting the default, to be written to the Windows Registry.

Menu Item 9 – Dial Out

This presents a menu of modem control commands which can be used to contact a remote logger via a dial-up telephone modem, and also to hang up the line afterwards. See the corresponding section for UCOMM, section 4.2.5.

Menu Item 10 – Edit Program Options

This command changes the Program Options stored in the registry. See the corresponding section for UCOMM, section 4.2.2.

5.3 Specialized Topics

5.3.1 Importing the Data into Stark Reality

Data is imported using the 'Maintain Data' utility. Use the 'Data Import' item in the 'Utilities' menu to select the DF2-format text file. For full details, refer to the Stark Reality documentation.

After all the data has been imported, the message "Storing Data in the Database" will be displayed briefly. If this message is not displayed, the Outstation/Sensor references in the DF2 file may not match those in the Reality database.

Versions of Stark RT prior to version 6.2 do not support the editing of a 'Serial Number' field for SHM outstations (which is used to match the 'Outstation' references in the DF2 file). It is thus not possible to import the DF2-format data file directly into the logger channels without changing the RT set-up.

If this problem is encountered, it is possible to create special Manual outstations for this purpose. Start the 'Outstations' utility and select 'Set-up' 'Add' followed by 'Manual'. The logger Serial Number should be entered in the 'Comment' field of the dialog box that appears. Create a Manual Outstation for each logger referred to in the DF2 file.

To ensure the DF2 data is imported into the correct Stark Channels, activate the 'Channels' utility, and for each Channel that is to receive data :-

- (1) Double-click on the channel's reference line on the 'Channels' screen.
- (2) Edit the 'Outstation/Sensor' fields in the 'Update Channel' dialog box that appears. Change the 'Outstation' box to the outstation number of the appropriate 'Manual' logger. Ensure the 'Sensor' box contains the correct sensor number (the same as the logger channel number).
- (3) Click the OK button.

Now import the DF2 file using the 'Maintain Data' utility.

Afterwards, remember to re-edit the Channel set-up to restore the 'Outstation' numbers to refer to the 'Real' outstations.

5.3.2 DF2 File Format

For a full specification of the DF2 file format, contact Stark Software International.

This section gives details of the file **UREAD** generates.

5.3.2.1 First Line

The first line of the file is always :-

```
#F2
```

which specifies the 'Format' as Stark DF2. This line may also be repeated within the file.

5.3.2.2 Channel Header

For each channel written, 5 lines of Header information precede the data. For example :-

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```
#R UREAD.EXE Version 4.01 - 14/11/02
#R Historic Data from UL8 Logger 1 ESN=B0000002
#R Recorded at 18:20:32 18-11-2002
#O B0000002
#S 1
```

The #R lines are "Remark" lines and are used to make the file more readable.

The #O line specifies the 'Outstation' identifier. **UREAD** sets this to the logger's Electronic Serial Number. The 'Serial Number' field in Stark Reality's Outstations window should be edited so that this is the same as the corresponding logger's ESN.

The #S line specifies the 'Sensor' number. For Stark Reality the Sensor Numbers of a logger correspond to the Channel Numbers.

5.3.2.3 Channel Values

Each line following the header corresponds to a single reading. Each has three numeric values separated by commas. For example :-

```
6530 , 640 , 65569
6530 , 645 , 65569
6530 , 650 , 65569
```

The first number corresponds to the Date of the reading. It is expressed as the number of days since 01/01/1985.

The second number corresponds to the Time of the reading. It is expressed as the number of minutes since midnight.

The third number is the actual reading value.

6. UCSV

6.1 Using UCSV

This utility provides a means of extracting historic data from a logger and storing it as a file in a format that allows the data to be imported into common spreadsheet and database applications (eg. Microsoft Excel).

6.2 Typical Sequence

A typical sequence would be :-

- 1) Main Menu **1** - Choose Channel(s). The user is presented with a list of channels and asked to enter **Y** or **N** to indicate whether or not to read that channel. Initially, all 8 channels are selected.
- 2) Select **2** - Read Channels. The user is first prompted to enter the start time and date and other parameters to specify the range of data required.

The messages between the PC and the logger as the historic data is fetched are shown in one half of the screen. The process takes several seconds, depending on the Baud Rate and the number of channels selected. The Historic Data is decoded and stored on disk as a CSV-format text file.

The above sequence of operations is normally all that is necessary. The historic data is written to a single file on disk. A header row specifies the electronic serial number of the logger. The file includes row and column labels for the data.

Once all the data has been collected, the resulting file can be read and processed by other applications such as Microsoft Excel.

6.3 Menus and Commands

6.3.1 Main Menu

The Main Menu is shown below :-

```
1    Choose Channel(s)
2    Read Channels
3    Monitor Channels
4    Logical Logger Number
5    Set Passwords
6    PC COM Port & Baud Rate
7    Dial Out
8    Edit Program Options
X    Exit
```

Menu item **1** – Choose Channel(s)

This command selects which channels will be read from the logger. By default, all logger channels are selected.

The user is first prompted to enter the number of channels in the logger (ie. 4, 8, 24 or 32) since this is not known unless the utility has already communicated with the logger concerned (eg. by using the 'Monitor Channels' command).

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Menu item 2 – Read Channels

This command reads historic data from each enabled channel.

The user is first prompted for the following information :-

- The date and time of the earliest reading required.
- The interval between samples in minutes.
- The total number of samples to be collected.
- Whether to store readings as differences, as absolute values or as differences for digital channels and absolute values for other channels (the default).
- The name of the CSV format file to be generated.

The requested number of data samples are collected from each channel in turn, starting at the given time, and with the requested interval between samples.

As each block of readings is collected, the value and time/date stamp of the last reading in the block is displayed on screen.

The CSV file represents historic data at specific points in time. However, if a logger reading for the exact time is not available, then the nearest earlier reading is used. If readings are requested at a more frequent interval than the logging interval used by the logger, then values will be repeated (in the case of analog or temperature channels), or if reading differences has been selected, intermediate differences will be zero at times between the logging times.

If the requested start time is earlier than the first logged reading in the logger, then null values will be stored in the file until a valid time is reached.

If the requested start time, number of samples and sample interval means that readings in the future have been asked for, then null values will be stored for those times after the latest logged reading in the logger.

After reading the data, **UCSV** suggests a file name for the data based on the logger Serial Number and the date specified. The user can hit the 'Return' key to accept this file name, or type in any other valid file name. It is recommended that a file extension of **.CSV** is always used.

UCSV will alert the user if the chosen file already exists, and give the opportunity to change the name.

Menu item 3 - Monitor Channels, can be used to monitor the instantaneous readings of up to 8 channels. The display shows the channel type (Digital, Analog, Status etc.) and its associated reading. The logger's time and date are also shown.

For the UL24/RL32/ML32 logger, the channels are shown 8 at a time. Press keys '1', '2' '3' or '4' to see channels 1 to 8, 9 to 16, 17 to 24 or 23 to 32 respectively.

The display is continuously updated. Press any key to return to the main menu.

Menu Item 4 - Logical Logger Number

This command controls which logger the software communicates with.

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This item is only needed when talking to a number of loggers on a network. Otherwise the default setting (zero) will permit operation with any directly-connected logger. See section 3.1.

Menu Item 5 - Set Passwords

If the loggers have been commissioned with non-null "Read" passwords, then these passwords must be entered before communicating with the logger. Otherwise, this command is not required.

The user is prompted to enter a password for each channel that has been enabled.

Menu Item 6 – PC COM Port & Baud Rate

This command changes the PC COM Port, Baud Rate and Parity that **UCSV** uses to communicate with the logger.

Allowable settings of the Parity are Even, Odd, Mark (One) and Space (0). The number of data bits is always 7.

Note that 7 data bits plus Space is equivalent to 8 data bits with no parity.

The standard setting is 7 data bits Even parity. Other parity settings should only be used where some form of modem is used that cannot support the standard setting.

There is an additional option to use a TCP/IP Ethernet connection to communicate with the logger. If the user specifies a COM port of zero, then this will be followed by a prompt for an IP Address and IP Port number to use. The remote logger must be connected to an Ethernet Terminal Server with the given IP Address, and listening on the given port for this to work.

The user is prompted to make the new setting the default, to be written to the Windows Registry.

Menu Item 7 – Dial Out

This presents a menu of modem control commands which can be used to contact a remote logger via a dial-up telephone modem, and also to hang up the line afterwards. See the corresponding section for UCOMM, section 4.2.5.

Menu Item 8 – Edit Program Options

This command changes the Program Options stored in the registry. See the corresponding section for UCOMM, section 4.2.2.

6.4 Specialized Topics

6.4.1 Importing the Data into Microsoft Excel

6.4.1.1 Importing CSV files

After starting Excel, select File | Open from the menu.

In the "Open" dialog box, select :-

Text Files (*.prn, *.csv, *.txt)

in the "List Files of Type" list box. Browse for the CSV file and open it.

The data should appear with the logger ESN as the top left cell, the column labels along row 2, and the time and date in column 1. You will probably have to increase the width of column 1 to properly display the time and date.

To display the results as a chart, select the range of readings to be charted, along with the column labels and the time/date stamps. Then select Insert | Chart | As New Sheet from the menu.

This will activate the chart wizard. Simply step through the wizard, selecting the required options. The '3D Area' chart type is quite suitable for multiple channels, if the side-by-side style is used.

It is a simple matter to enhance the data, for example by adding a column that sums the channel data in each row, or by using formulae to convert electricity consumption data into the cost equivalent.

6.4.1.2 Using the Sample Files

The following sample files are included on the disk :-

SAMPLES1 . CSV	A raw data file containing 24 hours worth of data for 6 logger channels.
UL8SAMP . XLS	An Excel workbook containing the same raw data as SAMPLES1.CSV, along with the data displayed as a chart. The workbook contains a macro sheet with an Excel macro (DoUcsvChart) that converts raw data into a chart. Another sheet gives an extended description of the sample files and how to install them.
UL8MAC . XLS	This special workbook is designed to make the UCSV chart generation macro (DoUcsvChart) available to all workbooks, and to provide an additional menu item (U8 Chart) in the Tools menu. Refer to the documentation in UL8SAMP.XLS before installing it.

Start by opening the file UL8SAMP.XLS with Microsoft Excel. Look at the various sheets and read the "Description" sheet that explains things in more detail.

6.4.2 CSV File Format

This section gives details of the file **UCSV** generates.

The CSV (Comma Separated Variable) format is used to describe 2-dimensional tables as text. Each line of text in the file (terminated by a carriage-return character) describes one row of the table. Each row consists of a series of values separated by commas, corresponding to the columns within the row.

6.4.2.1 First Line

The first line of the file is always :-

```
Logger ESN XXXXXXXXX
```

Where XXXXXXXX represents the unique Electronic Serial Number of the logger whose data is stored.

6.4.2.2 Title Line

The second row is a list of column headings separated by commas :-

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Time, Channel 1, Channel 2, etc.

The number of channel labels depend on which channels have been selected.

6.4.2.3 Data Lines

Each row begins with the time and date, followed by the channel readings separated by commas :-

```
10:30:00 01-01-2002, 0, 1, 18.5
```

The format of the data depends on the channel type. Note that if reading differences are selected, values can be negative (except for digital channels, which always count up and so cannot give a negative difference).

Digital channel readings are positive integers.

Analog channel readings are integers in the range -16384 to +16383.

Temperature channel readings are displayed in degrees centigrade, with one decimal place of resolution.

Status channel readings are displayed as 1 or 0.

7. REFERENCE

7.1 Logger Personality Reference

7.1.1 Channel Configuration Parameters

NB. The UL24, RL32 and ML32 have 8 universal channels (1 to 8) that work identically to those on a UL8. Channels 9 and above have certain restrictions as to how they can be configured.

The following channel parameters CANNOT be changed for UL24/RL32/ML32 channels 9+ :-

- Channel Type. Always Digital for UL24. Defaults to Digital for RL32 but may change automatically to Analog or Temperature when first RF transmission received (if transmitter is an Analog or Temperature type). For an ML32 the Modbus setup determines if the channel is Analog or Digital.
- Input Line (always same as channel number)
- Alarms Settings (alarms not supported)

The following parameters are common to all UL24/RL32/ML32 channels 9+. These parameters can be set for any channel, but the value set will apply to all channels 9+ :-

- Log Interval
- Channel Size
- Pre-scaler
- 'Read Data' password
- 'Configure' password

7.1.1.1 Channel Type

	Description	Applies to
D	Digital (pulse counting)	DL4, UL8, UL24, RL32, ML32
A	Analog (current or voltage)	UL8, UL24 ch 1 to 8, RL32, ML32
T	Temperature	UL8, UL24/ML32 ch 1 to 8, RL32
S	Status	DL4, UL8, UL24/RL32/ML32 ch 1 to 8
X	Disabled	DL4, UL8, UL24/RL32/ML32 ch 1 to 8

NB. For a UL24, the channel type for channels 9 to 24 is always Digital. For an RL32 or ML32 the channel type for channels 9 to 32 can only be set to Digital by UCOMM; the channel type is ultimately determined by the type of RF transmitter or the Modbus setup.

7.1.1.2 Input Line

The default configuration has Input 1 assigned to Channel 1 and so on. However in most cases, it

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is possible to assign any input to a channel. It is thus possible to assign an input to two channels, allowing it to be logged at different time intervals, or to be accessed by two independent users, each having a different channel access password.

For a DL4, Channels 1 to 4 can be assigned to any Input 1 to 4.

For a UL8, Channels 1 to 8 can be assigned to any Input 1 to 8.

For a UL24, Channels 1 to 8 can be assigned to any Input 1 to 8. Channels 9 to 24 are always assigned to Inputs 9 to 24 respectively.

For an RL32, Channels 1 to 8 can be assigned to any Input 1 to 8. Channels 9 to 32 are assigned to the appropriate RF transmitter unit by the transmitter address, which is configured via the Radio Receiver Port using the RLConfig utility. This assignment cannot be configured by UCOMM.

For an ML32, Channels 1 to 8 can be assigned to any Input 1 to 8. Channels 9 to 32 are assigned to the appropriate Modbus device which is configured via the Modbus Port using the MLConfig utility. This assignment cannot be configured by UCOMM.

7.1.1.3 Logging Interval

Allowed logging intervals for each channel are :-

	Comment
1	minute
2	minutes
5	minutes
10	minutes
15	minutes
20	minutes
30	minutes
60	minutes
-1	Trigger off input 1
-2	Trigger off input 2
-3	Trigger off input 3
-4	Trigger off input 4
-5	Trigger off input 5
-6	Trigger off input 6
-7	Trigger off input 7
-8	Trigger off input 8

For non-triggered logging, the log times always align "on the hour".

The Logging Interval is not relevant to Status channels. The log for Status channels consists of a series of timestamps for each transition of the input.

On a UL24/RL32/ML32, channels 9 upwards all have the same logging interval. In all other cases, the channels can be configured independently.

Versions of logger firmware from v2.20 onward support the use of 'Externally Triggered' channels. These channels log data in response to a negative-going transition on one of the logger inputs, rather than at specific times of day. This is useful when synchronizing logging to the half-hour pulse produced by the main tariff meter.

To configure a channel to use an input line as a trigger, set the logging interval to a negative

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number in the range -8 to -1 (-4 to -1 in the case of a DL4). An interval of **-8** triggers the channel from Input 8. An interval of **-1** triggers the channel from Input 1.

Typically, the last Universal Input is chosen as the trigger input. It is not necessary to link this input to a channel, so the memory that would have been used can be assigned to another channel to expand its capacity. Alternatively, the trigger input can be linked to a Status Channel, which will then record the times (by the logger's internal clock/calendar) at which the trigger pulses occurred.

Note that the trigger input must pulse at least once every 65535 seconds (approximately 18 hours), otherwise data will not be correctly logged. The change in count within each logging period must not exceed 65535.

The trigger input must go low for at least 1 second.

7.1.1.4 Channel Size

The maximum number of memory blocks per channel is as follows :-

Logger	Default	Maximum per Channel	Blocks per Logger
DL4	2	8	8
UL8	1	8	8
UL24 Ch 1..8	2	8	32
UL24 Ch 9..24	1	2	32
RL32/ML32 Ch 1..8	2	8	40
RL32/ML32 Ch 9..32	1	1	40

See section 4.3.3 for details of changing channel size.

On a UL24/RL32/ML32, channels 9 upwards all have the same channel size. In all other cases, the channels can be configured independently.

7.1.1.5 Pre-scaler

This parameter is only relevant to Digital channels.

It is a number in the range 0 to 255 which provides a divider between input pulses and the value logged in the channel.

The default is 1, which means the channel is a direct count of input pulses. A value of zero would result in the channel count incrementing by 1 for every 256 input pulses.

On a UL24/RL32, channels 9 upwards all have the same pre-scaler. In all other cases, the channels can be configured independently. The ML32 ignores the pre-scaler value for channels 9 upwards.

7.1.1.6 Initial Count

This parameter is only relevant to Digital channels.

This number sets the initial count for the channel when it is configured.

The default value is zero.

On a UL24/RL32, unique initial counts can be set for all channels.

7.1.1.7 Channel Alarms

Each channel in the logger can be programmed with two alarm thresholds (High and Low). The channel can be programmed to generate an alarm if the channel is between the two threshold values or outside the two values. Each channel alarm can be individually enabled or disabled.

When an alarm condition is detected, an Alarm flag is logged alongside the historical data.

In addition, the logger can inform the outside world that an alarm has occurred by dialling in, or by activating the on-board relay. The commissioning of this operation is termed 'Notification', and is described in section 7.1.2.7.

The way the alarm condition is detected depends on the type of channel as follows :-

Analog or Temperature channels are checked once per minute (at 00 seconds) using the value averaged over the previous minute.

Digital channels are checked once per minute (at 00 seconds) using the increase in count since the start of the logging period. Note that if the alarm becomes active during one logging period, it will stay on at least until the end of the next logging period (as it is only at this time that it is known if the channel is not going to generate an alarm again).

Status channels are checked once per second.

On a UL24/RL32/ML32, alarms are only available on channels 1 to 8.

7.1.1.8 "Read Data" Passwords

NB. Channels 9 upwards on a UL24/RL32/ML32 all share the same password.

Each channel has a unique numeric password that is used in the log-in sequence for reading. The default password is Zero, which allows access with any password response. If a non-zero password is programmed, then the password response during the logging-in must be correct.

The "Read Data Password" permits access to the historic logged data, immediate data and configuration (read only) for that channel.

Where the same password is assigned to several channels, logging in to read one channel will grant "Read" access to all other channels with the same password or with Zero passwords.

Knowledge of the "Read Data" password does not permit a user to change any logger parameters, or perform read operations on channels with a different password.

7.1.1.9 "Configure" Passwords

NB. Channels 9 upwards on a UL24/RL32/ML32 all share the same password.

Each channel has a unique numeric password that is used in the log-in sequence for configuring. The default password is Zero, which allows access with any password response. If a non-zero password is programmed, then the password response during the logging-in must be correct.

The "Configure Password" permits access to the historic logged data, immediate data and configuration (read and write) for that channel.

Logging to configure a channel does not grant access to configure any other channel, even if the password is the same or Zero.

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Knowledge of the "Configure" password does not permit a user to change the configuration of other channels, or the logger commissioning data. It does permit the configuration of the channels own "Configure" and "Read Data" passwords.

7.1.1.10 Authenticator Key

NB. UL24/RL32/ML32 loggers, and other loggers with firmware versions later than 3.10 have a single Authenticator Key for all channels. DL4 and UL8 loggers prior to version 3.10 had separate keys for each channel.

The Authenticator Key is used to generate a unique checksum for each Historic Data message sent by the logger. This key can be used to ensure the data has not been tampered with.

7.1.2 Logger Commissioning Parameters

7.1.2.1 LAN Address

The LAN address is entered as a 16-digit hexadecimal number. The last 4 digits are used to set the address if a Neuron LAN option board is fitted. All loggers on a Neuron LAN must have identical values of these last 4 digits.

If no Neuron LAN board is fitted, then this parameter is ignored by the logger.

NB. The Neuron LAN option board is now obsolete.

7.1.2.2 Option A

The Option A code tells the logger which option PCBs are fitted. The final number is obtained by adding up the codes for the options required as listed in the following table :-

	Description	Applies to
1	Neuron LAN Card	UL8
2	Early CP5-style LCD	UL8
4	LCD Display	UL8
16	Integral Modem	DL4, UL8, UL24, RL32
48	External Modem	DL4, UL8, UL24, RL32
128	Modem Serial Switch	DL4 only

NB. The Neuron LAN option board is now obsolete.

7.1.2.3 Option B

Option B should always be set to zero.

7.1.2.4 Baud Rate & Parity

Valid Baud Rates are :-

1200
2400
4800
9600

Valid Parity Settings are :-

E	Even
O	Odd
M	Mark (1)
S	Space (0)

7.1.2.5 Modem Answer Window

This parameter is only relevant if an Integral or External Modem has been commissioned using Option A (see section 7.1.2.2).

The Modem Answer Window is controlled by two times, the Start Time and the End Time. Both these are expressed in hours and minutes using the 24-hour clock. If both times are the same, then the modem will always answer when it detects ringing on the line. Otherwise, the modem will only answer if it detects ringing within the window beginning at the Start Time and ending at the End Time. Note that the window can be programmed to span midnight by setting the Start Time greater than the End Time.

The default setting (always answer) has both start and end times set to 00:00.

The logger can be prevented from answering the modem altogether by setting the start time to 24:00 and the end time to 24:01 (both invalid times).

UCOMM only offers the opportunity to edit the Modem Answer Window if the logger's firmware supports it (ie. version 2.30 onwards).

NB. The Modem Answer Window can only be applied to an External Modem if the logger firmware is version 2.40 or later.

7.1.2.6 Logger Dial-in

This parameter is only relevant if an Integral or External Modem has been commissioned using Option A (see section 7.1.2.2).

For versions of logger firmware from 2.40 onwards, the logger can be programmed to dial in once per day at a specific time. The logger will keep dialling in for one hour or until the host PC acknowledges it. The actual dial-in time is randomized by 10 minutes to prevent multiple loggers dialling the same number simultaneously.

Where several loggers are connected in an RS485 network, only the logger that is connected to the modem should have dial-in enabled.

The daily dial-in time is set using the 24-hour clock. It is normal to disable modem answer (see section 7.1.2.5) if dial-in is enabled.

Daily dial-in can be disabled by setting this time to 24:00 (the default value).

For firmware version after 2.40 but before 3.10, the actual number dialled is stored in the modem as 'Stored number zero', and must be commissioned separately. To initiate dial-out, the logger sends the command 'ATDS0' to the modem (interpreted as "Dial Stored Number Zero").

For firmware versions 3.10 and later (all logger models) the 'AT' command sent to the modem can be commissioned as '**Dial-in AT command**'. This should specify an 'ATD...' command and can be

used for modems that do not support 'ATDS0'. If this field is blank, the default 'ATDS0' command will be used by the logger.

7.1.2.7 Alarm Notification

This feature is only supported by logger firmware version 2.40 onwards.

When alarms occur, the logger can be commissioned to notify the user using the on-board relay and/or by dialling in to a host PC.

The relay contacts will be energized and closed for the non-alarm condition and open for the alarm condition. This allows for fail-safe operation - an alarm is raised if the logger power fails or if the cable is cut.

The dial-in number used is the same as that used if "Dial In" is enabled (see section 7.1.2.6).

Alarms can be commissioned to be either latching or non-latching.

Non-latching alarms are simplest, in that when the channel reading subsequently changes to a non-alarm value, the channel alarm goes off.

With latching alarms, the channel's alarm flag will stay 'ON' until it is acknowledged by sending a special message to the logger. Acknowledging the alarm will clear the alarm condition even if the channel reading is still at an alarm value. The channel alarm will only be re-activated if the reading changes from a non-alarm value to an alarm value.

The channels which are used to generate alarm notifications can also be selected.

If notification via the on-board relay has been commissioned, it is possible to program one of the logger inputs (1 to 8 for a UL8/UL24/RL32, 1 to 4 for a DL4) to be used for an alarm reset button. This input must then be shorted to ground for greater than 1 second to turn the notification off (close the relay contacts).

Commissioning an alarm reset input only makes sense if latched alarms have also been commissioned. Once the alarm relay has been reset, it will only be re-activated if any enabled channel alarm subsequently changes from off to on.

7.1.2.8 "Commission" Password

The "Commission Password" permits access to read and write the logger commissioning data. It also permits access to read and configure all channels.

Knowledge of the "Commission" password permits a user to read all logger parameters, and to modify all logger parameters (including all passwords), except for the Electronic Serial Number and the resetting of certain diagnostic information.

7.2 Logger Warnings

When using the 'Read Logger Personality' command in UCOMM, the utility reads a warning status code for each channel in the logger. These codes are displayed on the 'Warnings' page (Page 4) by the 'Show Read Personality' command. These Warning codes are only relevant to the extra channels (9 upwards) in UL24, RL32 and ML32 loggers, and show if these channels are working correctly. Possible values for the Warning Codes are shown in the following table :-

Channel	Code	Description
DL4, Ch 1..4	OK	Always 'OK'
UL8, Ch 1..8	OK	Always 'OK'
UL24, Ch 1..8	OK	Always 'OK'
UL24 Ch 9..24	OK	Channel healthy
	80H	Internal hardware fault. Resetting the logger may help, but logger is probably faulty.
RL32 Ch 1..8	OK	Always 'OK'
RL32 Ch 9..24	OK	Channel healthy
	80H	Internal hardware fault. Resetting the logger may help, but logger is probably faulty.
	44H	No RF from transmitter. No message received within last 3 minutes. This is OK if no transmitter has been assigned to this channel (ie. it is an unused channel).
	48H	Low Battery at transmitter. Transmitter & battery require replacement.
ML32 Ch 1..8	OK	Always 'OK'
ML32 Ch 9..24	OK	Channel healthy
	80H	Internal hardware fault. Resetting the logger may help, but logger is probably faulty.
	44H	Modbus timeout. Last poll of slave device failed.
	42H	Slave Rejected. The slave device rejected the last poll command. This probably indicates that the Modbus configuration programmed using the MLConfig utility is wrong.
	41H	CRC Error. The last poll response from the slave device had an invalid CRC code.

NB. If a logger channel has a Warning Code that is not 'OK', then the 'Alarm Flag' will be set for all logged readings for that channel while the Warning persists.