WeatherFile Mobile Unit (WMU)

User Manual

For the latest information and support please go to our website https://www.r-p-r.co.uk/weatherfile/weatherfile-mobile-unit.php

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FIGURES

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1 INTRODUCTION

The WeatherFile Mobile Unit (WMU).Wireless data logger is optimised for logging real-time wind speed and direction data when using Gill Instruments' WindSonic & WindObserver ultrasonic wind sensors and for logging full environmental data from MetPak and MaxiMet weather stations.

The WeatherFile Mobile Unit (WMU).Wireless data logger offers the following features:

- Compatible with Gill Instruments WindSonic, MetPak and MaxiMet sensors
- Recording of full raw meteorological data from the sensor (if required)
- Ten minute averaged data logged to a daily to file (interval configurable)
- Short term vector averaging of raw data e.g. gust response (interval configurable)
- Meteorological data can be made accessible via the internet (www.weatherfile.com)
- Two configurable notifications on meteorological data
- Supports WiFi configuration using WPS (push button mode only)
- SpaceLogger Launcher Software enables simple configuration
- SpaceLogger Launcher Software provides access to all loggers within the wireless network
- Wireless data download to PC
- microSD card for data storage
- Stored data files simple to read with standard PC office software
- GPS NMEA sentence support (RMC) for date, time and location
- Battery backup for time and date (optional)
- Powered via a standard Micro USB connector
- Compact, economical and robust design
- Local Display homepage for current wind data readings

Meteorological data is processed by the WMU to calculate averaged values with min and max readings during the averaging period. The average data is recorded every 10 minutes in a daily file. The raw meteorological data may also be logged to a separate file on the microSD card if required.

A Wi-Fi wireless local area network (WLAN) is required for remote access to the data stored on the WMU. In addition, the WMU can be configured to upload data over the WLAN, using FTP or HTTP, to a server on the local network or public internet. This enables the creation of weather stations which can be viewed on the internet e.g. www.weatherfile.com.

SpaceLogger Launcher PC Software is provided with the WMU to enable the generation of the WMU configuration file. The SpaceLogger Launcher software also enables simple browsing of multiple WMU's within the same WLAN to view data stored on the WMU's microSD card, and can also be used to set the time and date on the WMU. If the WLAN is temporarily unavailable, the microSD card may be removed to directly download data from the MicroSD card to a PC.

1.1 Document revision history

Issue	Date	Description
3	25-Sep-18	Updated to include GMX sensors and general updates
2	30-Mar-2017	Updated to correct RS232 pinout. V1.3.1.604 and later
1	20-Jan-2017	Initial release for model SL-018-PL-066 variant, baseline software v1.3.1.569

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Our products are in continuous development and therefore specifications may be subject to change and design improvements may be implemented without prior notice. Please visit our web site www.r-p-r.co.uk for the most up to date information on our products.

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2 QUICK START: EASY STEPS TO DATA LOGGING

❶.....	Connect & fit sensor to top of mast	
❷.....	Configure WiFi and Sensor settings using SpaceLogger Launcher	see section 5
❸.....	Insert MicroSD card	see section 6.1
❹.....	Power on	see section 4.4
❺.....	Start recording data	see section 6
❻.....	Browse from PC to view, analyse or download data	See section 6.4

3 EXAMPLE APPLICATIONS

3.1 New pic

Figure 1: new title

3.2

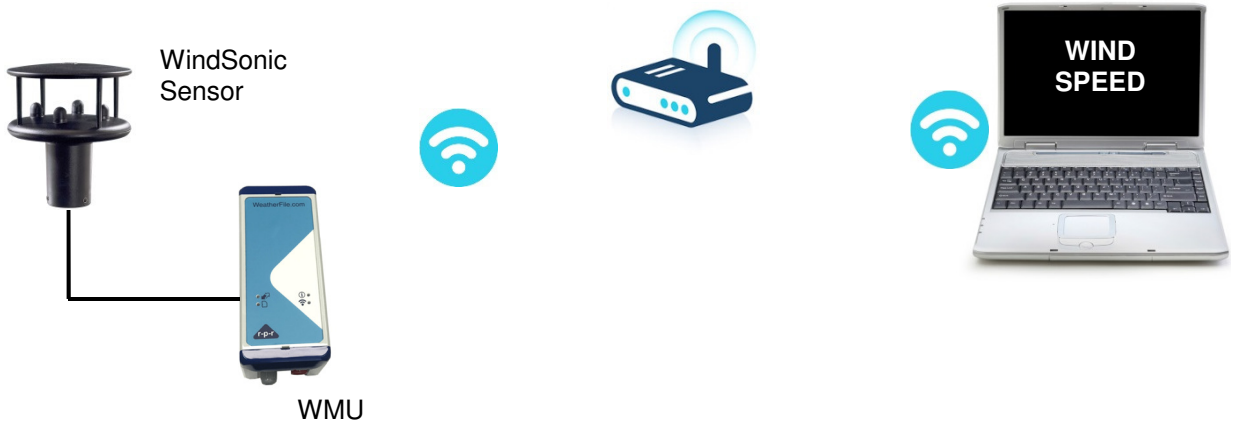

Figure 2: Standalone Application

3.3

Figure 3: Internet Connected Weather Station

4 CONNECTING

Figure 4 shows the front panel of the WMU with the user interface indicators. In addition, the WMU incorporates an internal buzzer which is used to provide audible indications. All interfaces with the WMU are via its own internal WiFi network.

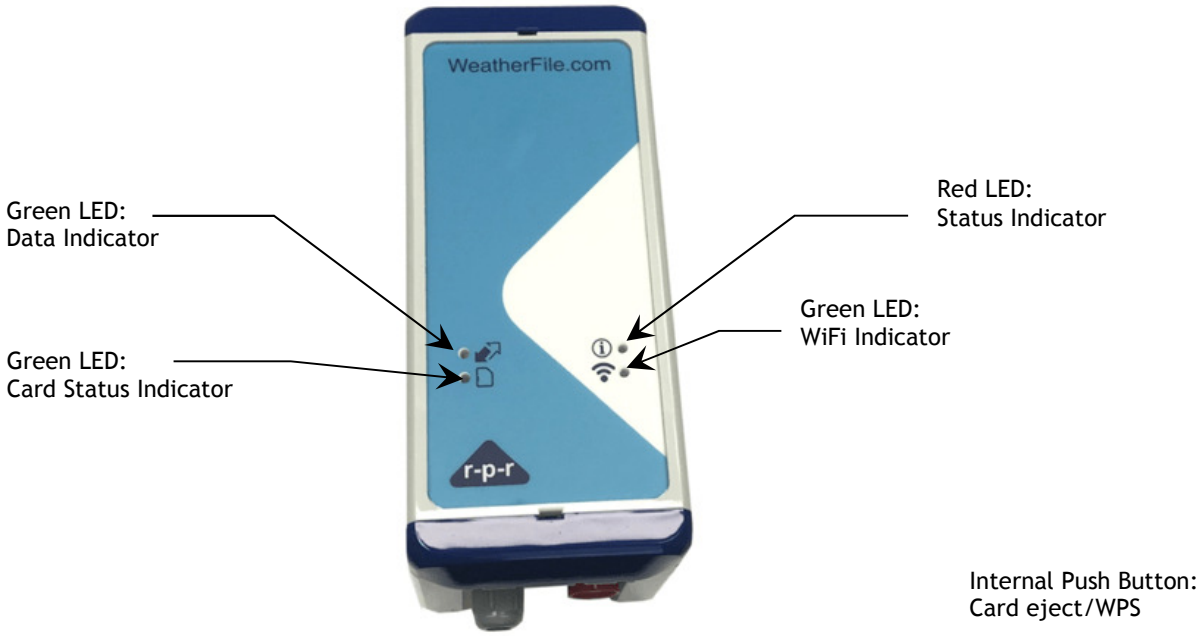

Figure 4: WMU Indicators

4.1 Visible Indicators

Four LED indications are provided on the front panel of the WMU which provide visual information about the state of the WMU.

When power is applied to the WMU, the following sequence will be observed (with a MicroSD card inserted and no sensor connected)

- Power applied – Red Status Indicator will come on immediately
- After ~1sec, remaining indicators will flash for ~0.5 sec, after which the Red Status LED will remain on
- After ~4seconds, the Data Indicator will come on.
- After ~10 seconds, Data and Status Indicators will go out and the Card Status Indicator will come on, accompanied by a short two tone beep.

In normal operation (logging data from a sensor) the indicators provide the following information

Indicator	Use
Data	On: Sensor data is being received by the unit Off: No sensor data
Status	On: Sensor/Configuration Error. Momentary On: A sentence was received with abnormal status. Flashing briefly every 3 seconds: Time not set since reset. On with MicroSD card Indicator flashing and a short beep every 3 seconds: No MicroSD card present when power applied. Off: No errors detected in the sensor data.
MicroSD card	On: Writable MicroSD card present. Off: No MicroSD card, or MicroSD ready to be removed. Flashing: MicroSD card is being prepared for removal.
WiFi	On: Connected to a WiFi Access Point Off: Not connected to a WiFi Access Point Flashing: WPS in progress

Table 1: Visible Indicators

See section 8.1.2 for the indicator sequence that will be observed when programming the WMU from a MicroSD card.

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4.2 Push Button operation

The push button can be used to initiate MicroSD card ejection or WiFi connection using WPS. When the button is pressed and held the following sequence will be observed:

Time	Indications	Effect upon release of Button
<1 second	None	No action taken
1 to 5 seconds	Short beep, Card Status indicator starts flashing.	Card Status indicator will go out; card can be ejected. If the card is not ejected within 10 seconds, the operation is cancelled.
5 to 10 seconds	Short two tone beep, WiFi Indicator starts flashing, Card Status indicator returns to normal operation	WPS mode is initiated. Unit will reset into WPS mode and attempt to establish a WiFi connection
>10 seconds	Short beep, indicators return to normal operation	No action is taken

Table 2: Push Button Operation Sequence

4.3 Audible Indications

In normal operation (logging data and sending data over the WiFi link) the WMU will not produce any audible indications.

The following audible indications are used to notify the operator of an event/condition that may need attention.

Indication	Event
Two tone beep (~1sec in duration)	WMU has been powered/reset, or a MicroSD card has been inserted.
Continuous beep	MicroSD card has been extracted while the WMU is receiving data from the sensor (possible data loss)
Short beep (0.25 sec) every minute	The WMU does not have (or has lost) its WiFi connection.
Short beep (0.25 sec) every 3 seconds	The WMU has been powered up without an MicroSD card inserted
Short beep while push button is pressed	Card Status Indicator will start flashing indicating that the card can be ejected
Two tone beep while push button is pressed	WiFi indicator will start flashing to indicate that upon release of the push button, the unit will attempt to establish a WiFi link using WPS.

Table 3: Audible Indications

4.4 Power Supply

The WMU is powered using a 12 V DC power supply unit via a red IP67 connector

Warning: All GNDs are common and so damage to the logger may result if they are connected to different voltages.

Note that the WMU will only receive RS232 input. When RS422/485 output is required from the sensor (for example, where a longer cable run is necessary or when using a WindObserver II sensor), a WS-15A display or a suitable RS485 to RS232 converter at the WMU end must be used.

To be compatible with the WMU, the output must be set to ASCII Polar Continuous (default WindSonic setting).

4.4.1 WS-15A Display

For Richard Paul Russell Ltd's **WS-15A wind display unit**, the following table describes the connections required.

WMU		WS-15A terminal
Not connected	24	Screen
Power GND	25	Power GND
+5V DC	26	+12v DC
RS232 input 1	28	RS232 Tx Output

Table 4: WS-15A Connections

The connections should be made with the power to the display unit switched off. For more details on wiring the WS-15A display please refer to the WS-15A User Manual.
When the WMU is powered from a WS-15A power should not be applied via the red power connector.

4.5 MaxiMet, MetPak and Modified WindSonic Outputs

By default, RPR systems are configured to communicate at 9600 baud.

The wind speed units on the sensor should be configured as meters per second. This is the default setting for the MetPak, Windsonic & GMX sensors.

5 CONFIGURATION

The SpaceLogger Launcher PC software can be used to generate a SETUP.TXT configuration file for the WMU, to browse log files on a WMU and to set the time and date on the WMU.

5.1 SpaceLogger Launcher Software Installation

The SpaceLogger Launcher software is supplied on the MicroSD card shipped with your WMU.

Insert the MicroSD card in to a card reader on the PC you wish to install the software on. The software may be found in folder WWW/LAUNCHER/SpaceLogger_Launcher_v2_0_0_4. Run the setup.exe application and follow the installation instructions. Once installed the program may be opened via the desktop icon.

The Database settings enable the WMU to send latest and average data to a database using the HTTP protocol. In normal use it should not be necessary to change any of the database settings unless directed to do so by RPR. Please see section 9.3 for details of the Database commands.

Connection to the RPR database enables remote software updates to be performed without user intervention, enabling additional features to be added and re-configuration to be performed as necessary.

5.1.1.1 Custom Settings

The custom setting tab can be used to set any parameter that is not listed in the WiFi, Sensor or Internet settings.

The parameter name and value (if required) should be entered in the Attribute Name and Value field respectively. Refer to section 9 for a complete list of all parameters.

5.2 Setting the Time and Date

The WMU will set and maintain its time using the Simple Network Time Protocol (SNTP) via the connection to the public internet in normal operation. In situations where it is not possible to connect the WMU to the public internet, time may be synchronized to an SNTP server on the local network by changing the SNTP_SERVER parameter to the server's URL or IP address.

If no SNTP server is available, then the time and date can be set using the SpaceLogger Launcher software as follows. (Note that the WMU should be powered on and have a MicroSD card inserted)

1. Select the relevant WMU device by a left mouse click on the device's name
2. Right mouse click to bring up the options on actions that be taken on the selected device
3. Click on Synchronize logger time, and then click ok to confirm that the time should be updated

Note: If access to the public internet or local intranet is blocked on UDP port 123 the WMU will be unable to access an external SNTP server.

The time provided by SNTP will effectively be UTC, though no allowance is made for network delays etc.

5.3 Manual Configuration

The WMU is configured by means of a SETUP.TXT file on an MicroSD card. The SETUP.TXT file consists of a number of commands on separate lines, each of which configures a specific parameter. Parameters are broadly aligned to WiFi, Sensor or Internet configuration as detailed in the Section 9.

5.3.1 Creating the SETUP.TXT file

The SETUP.TXT file is created as follows:

1. Insert MicroSD card into card reader attached to USB port of PC (or use integrated card reader if the PC has one).

2. Open notepad or similar text editor and type the required command line or lines. Refer to section 9 for explanation of commands.

3. Commands may be typed in upper or lower case but they will be converted to upper case before execution.

4. If it is necessary to modify more than one of the default settings, the SETUP.TXT file may contain a list of commands. Command must be placed on separate lines within the file.

5. Comments may be added to the SETUP.TXT file using //. The WMU will not read any text following // until the end of the line.

6. Save this text file as **SETUP.TXT** on the MicroSD card in the root folder. (Note: if folder DATA already exists on the card, ensure the file SETUP.TXT is not in this folder but at the top level in the root directory.)

7. Remove card from card reader and insert the card into the WMU.

8. The command lines will now be effective. The configuration is saved to the WMU and the file SETUP.TXT is automatically renamed to SETUPOLD.TXT on the microSD card. Settings are stored in eeprom and are preserved when power is switched off.

9. To intentionally return to the default settings, a new SETUP.TXT file must be created containing the command **RESET**.

5.3.2 Saving the SETUP.TXT file

File SETUP.TXT ***must*** have its name and file extension in capitals, e.g. SETUP.TXT.

To ensure saving correctly from Notepad or similar text editor, select 'Save As...'. When the Save As box appears, select 'All Files' from the pull down list next to 'Save as type:' and type SETUP.TXT in the File name box.

With Windows Vista (and higher versions of Windows) it is beneficial to have File Extensions visible when viewing documents in Explorer.

5.4 Advanced WMU Configuration

This section provides information on some advanced WMU configuration topics.

5.4.1 Vector vs Scalar Averaging

In scalar averaging, the wind speed and wind direction are averaged independently such that (essentially) only the magnitude of the parameter has any significance. In contrast, vector averaging combines the wind speed and direction to produce a vector in rectangular co-ordinates, and then average these vectors over a specific (rolling) interval.

The WMU can be configured so that the raw wind data from the sensor is passed through a vector based moving average filter, with the output from the vector based moving average filter then being scalar averaged over a further interval specified by AVE_TIME. The vector based moving average filter produces a new output after each input sample i.e. it performs an average over the last N samples, where N is the length of the filter. Typically this would be used to average the gust response over a short period (e.g. 3 seconds). Figure 5 below illustrates the data flow.

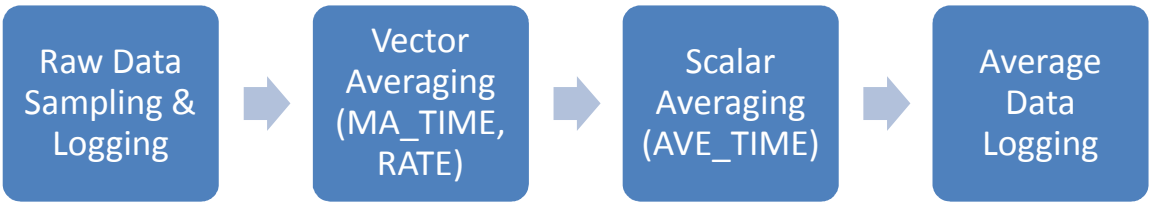

Figure 5: Vector Averaging Data Flow

To configure vector averaging, the AVE_TIME, AV_MODE, MA_TIME and RATE parameters must be configured appropriately. Thus if the length of the vector based moving average filter parameter is set to 10 and the RATE parameter is set to 4 (i.e. 4 sentences per seconds), the length of the vector based moving average filter will be set to 40.

The output from the vector based moving average filter is used as the input for scalar averaging. Note that the output rate of the vector based moving average filter is the same as the input rate. When in vector mode, the AVE_TIME parameter specifies the averaging interval in seconds.

When vector averaging, it is essential that the WMU is directly connected to the sensor rather than via an intervening radio link. This is to ensure that the WMU receives a regular stream of sensor sentences without any dropout.

5.4.1 Notifications

The WMU may have up to two notifications configured as explained below, using the NOTIFY configuration command.

NOTFIY={number},{enable},{parameter},{sector limit 1},{sector limit 2}, {sector in time},{sector out time},{sector in assert level}

e.g. NOTIFY=1,Y,WSI,0,5.5,10,15,L
Essentially, the first and second sector limits define a specific range for the specified parameter, in the example above 0 mps to 5.5mps. If the parameter stays between (inside) these limits for the sector in time, then a notification will be generated using the sector in assert level specified. Similarly, if the parameter stays outside these limits for the sector out time, then a notification will be generated using the inverse of the sector in assert level specified.
When using a polar parameter (wind direction), then the inside sector is defined in clockwise direction from the sector limit 1 to the sector limit 2.
When using a linear parameter (wind speed, temperature etc), the inside sector is defined as being between sector limit 1 and sector limit 2, where sector limit 1 **must be** less than sector limit 2.
Note that all parameter values are specified using the SpaceLoggers representation to the database, which for wind speed means meters per second and not the units specified by the WSUNITS configuration parameter.
If a notification is enabled, when a notification event occurs a message will be sent to the database with the state of all currently enabled notifications.
When configuring wind speed and direction notifications, then input to the notification will depend upon the AV_MODE setting. When AV_MODE=SCALAR the raw wind data will be used. When AV_MODE=VECTOR then the output from moving average filter is used as the input for the notification.

5.4.2 Configuration using Telnet

The WMU provides a Telnet command line interface that is primarily intended for use during production test. However, (re-)configuration of the WMU is possible via the Telnet command line interface which may be preferable in situations where physical access to the WMU is difficult. The Telnet command line interface is accessed using the SpaceLogger's IP address on the default Telnet port (23).

Important Note: Sending configuration commands to the WMU which impact the IP or WiFi settings can result in it becoming impossible for the WMU to connect to the WiFi AP or communicate via the network resulting in loss of communication with the WMU. It is not recommended to change any such settings via Telnet.

Once connected to the WMU the following screen will be observed.

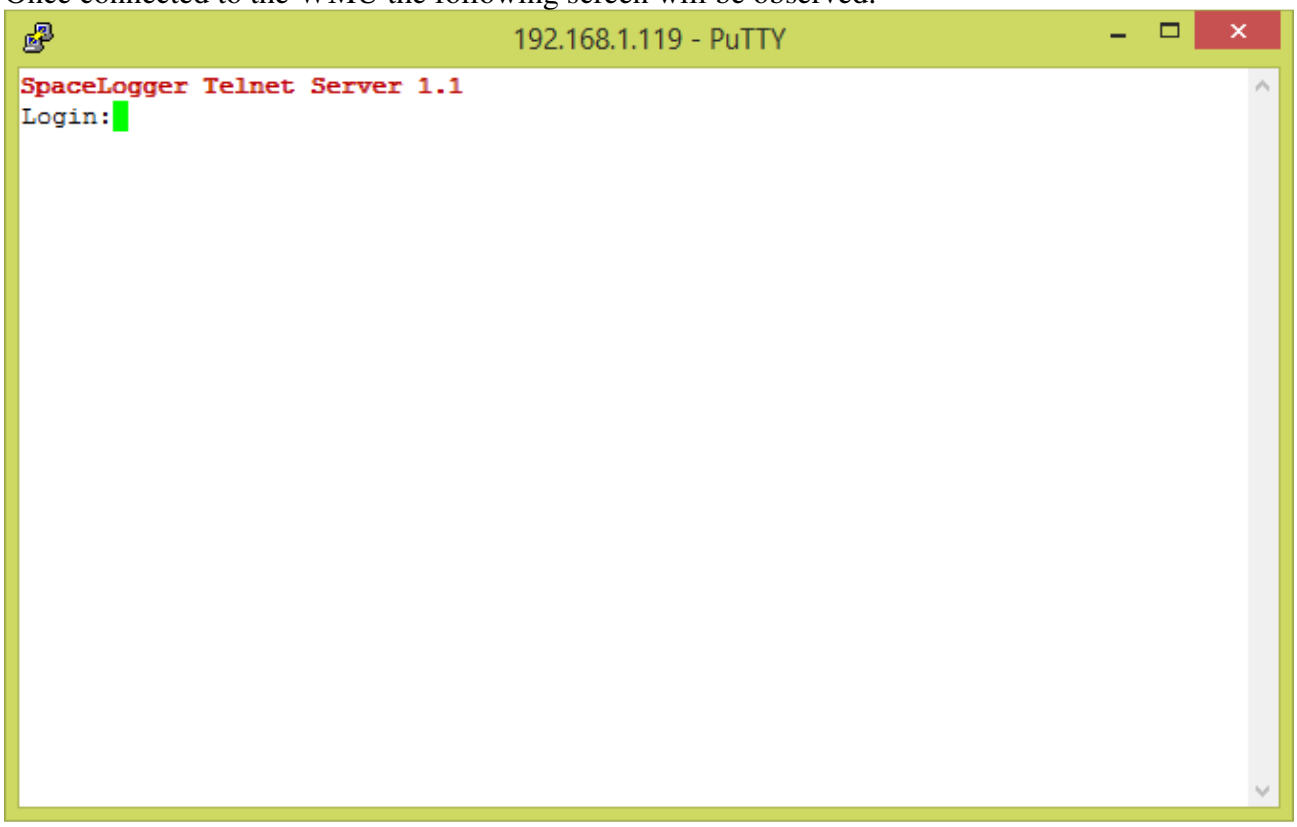

Figure 6: Telnet Login

The login name is "admin" with a password of "spacelogger", both of which are case sensitive. Once successfully logged in, the command line interface will become available, which will display the date and time of the last command that was processed.

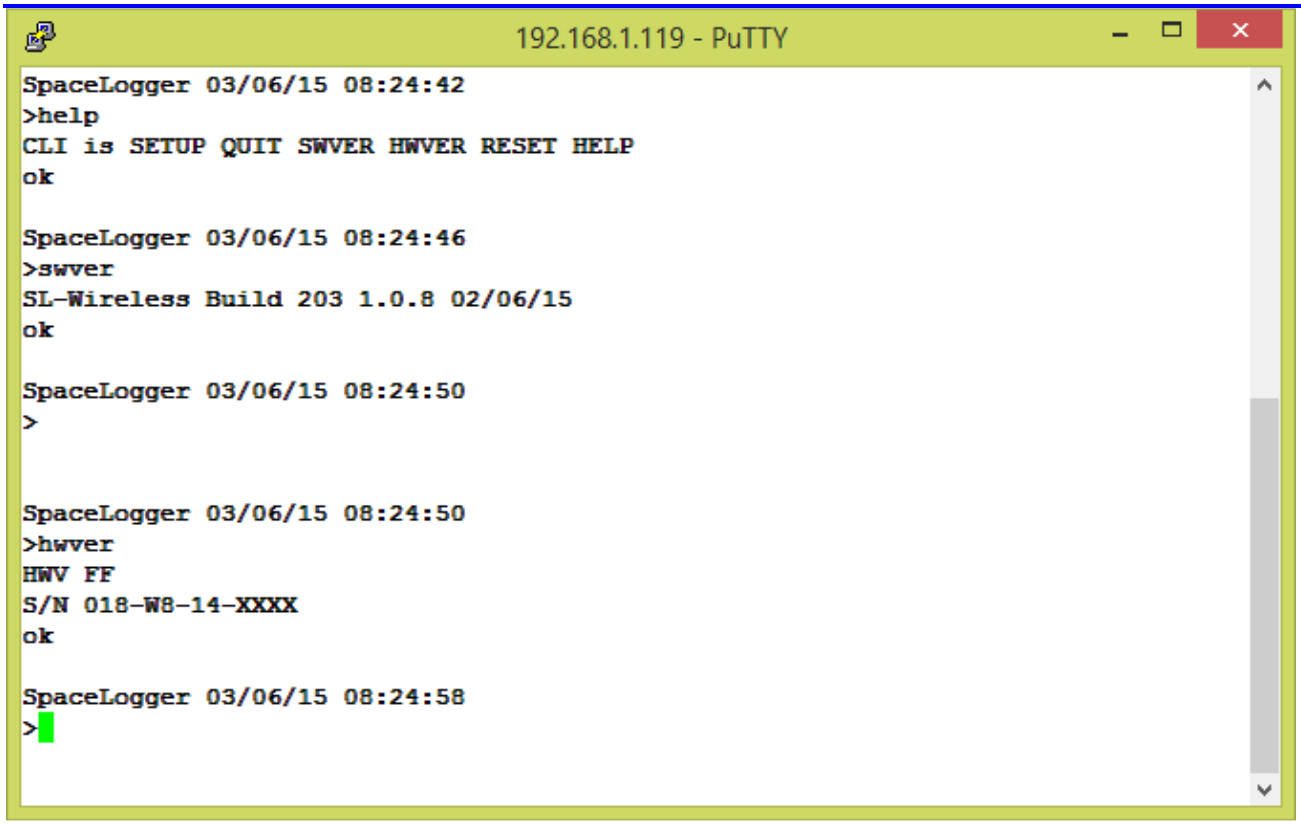

Figure 7: Telnet Command Line Interface

The following commands may be executed from the command line interface. Note that the commands are not case sensitive, but that the additional parameters to the commands may be.

Telnet Command	Description
SETUP	Execute the setup command e.g. SETUP AVE_TIME=5
SWVER	Displays the units software version
HWVER	Displays the units hardware version and serial number
RESET	Resets the unit – required for some commands to take effect (e.g. name)
HELP	Displays the list of available commands
QUERY	Query a configuration parameter from eeprom e.g. query AVE_TIME
IPCFG	Display the IP configuration parameters that are currently in use. Note: this may differ from the IP configuration in the SETUP is FIXED_IP=N
SENTENCE	Display the sentence specification in use for the current sensor configuration
STATS	Display stats for various interfaces. HTTP – number of HTTP tranmissions that have been attempted/failed RTB – number of retransmissions that have been attempted/failed LOG – number of sentences that have been decoded/failed
RUNTIME	Displays the time since the last reset in seconds and hh:mm:ss formats
CLRSYSLOG	Deletes the WDOG.TXT file and clears the SYSLOG.TXT file
CFGDUMP	Prints the majority of setup parameters to the SYSLOG.TXT file. Excludes security parameters e.g. wifi configuration details.
QUIT	Exits the command line interface and disconnects the Telnet session

Table 5: Telnet CLI Commands

5.4.1 USRDEF configuration parameters

The USRDEF sensor parameter allows an arbitrary sentence to be defined in terms of the sensor type and the input parameters.

SENSOR=USRDEF,{GILL/NMEA/URF},{P1, P2, P3…Pn}

e.g.
SENSOR=USRDEF,GILL,NL,WDI,WSI,HPA,RH,TA,TD,VLT,STS

Three basic sensor types are currently supported

Sensor Type	Description
GILL	Used for Windsonic, MetPak and Maximet sensors. Characterized as starting with a node letter (Q), including a status field and terminated by a checksum
NMEA	Used for NMEA sentences. Characterized as starting with the $ character and terminated by a checksum
URF	Characterized as not using a status field or checksum.

Table 6: USRDEF Sensor Types

Note that the SENSOR specification is affected by the STX, LOGSTX, ETX, LOGETX parameter. Typicaly it is only necessary to define up to and including the required parameters, but this must include the STS parameter (except for URF sensor types) though is not necessary for the STS parameter to be the final parameter in the sequence. It is not necessary to define ETX and CSM parameters these are implicit in the definition of the sentence for GILL and NMEA sensors.

Sensor Parameter	Mnemonic	Use
STX	"STX"	Start of sentence delimiter
Node Letter	"NL"	Node Letter/NMEA Sentence
Wind Direction Indicated	"WDI"	Wind Direction in degrees to 1 decimal place
Wind Speed Indicated	“WSI”	Windspeed in mps, to 2 decimal places e.g. 3.55
Wind Speed Units	“WSU”	Windspeed Units
Status Field	“STS”	Status Field. Normally “00” or “0000”
ETX	"ETX"	End of sentence delimiter
Checksum	"CSM"	Checksum Field
Pressure	"HPA"	Pressure in HectoPascals / millibar
Relative Humidity	"RH"	Relative Humidity, percentage to 1 decimal place
Ambient Temperature	"TA"	Temperature to 1 decimal place
Dewpoint Temerature	"TD"	Temperature to 1 decimal place
Platinum Resistive Thermistor	"PRT"	Temperature to 1 decimal place
Solar	“SOL”	Solar Radiation, in W/m^2
Precipitation total	“PT”	Total precipitation within the averaging interval
Analog Input 1	"A1"	
Analog Input 2	"A2"	
Digital Input 1	"D1"	Typically used for tipping bucket applications
Sensor Voltage	"VLT"	Sensor voltage to 1 decimal place
Sensor Date	"DATE"	Do not use
Sensor Time	"TIME"	Do not use
Heading Magnetic	"HDM"	Magnetic heading, degrees to 1 decimal place

Heading True	"HDT"	True heading, degrees to 1 decimal place
Latitude	"LAT"	NMEA GPS latitude
Longitude	"LNG"	NMEA GPS longitude
North/South	"NS"	NMEA GPS latitude North or South
East/West	"EW"	NMEA GPS longitude East or West
LAT/LNG	“LATLNG”	GPS position in “Google” format as ±DD.DDDDDD:±DD.DDDDDD:HH.HH Note: Height information is ignored
GPS Date	"GPSDT"	GPS date in DDMMYY format
GPS Time	"GPSTM"	GPS time in HHMMSS format
/GPS Date and Time	“GPSDTTM”	Maximet GPS date and time in the format YYYY-MM-DDTHH:MM:SS.SSS
Not Applicable	"NA"	Used for a parameter to be ignored

Table 7 Sensor Parameters

5.5 Resetting the WMU to Default Settings

To reset the WMU to its default settings :: SETUP RESET=Y

5.6 Sensor Configuration

The pre- defined sensor types are configured to operate with the default RPR configuration for the specific sensor. In particular, the WMU is designed to operate with sensor wind speed units configured for meters per second only.
The pre-defined sensor types are primarily for: MaxiMet, WindSonic and MetPak sensors.

6 LOGGING

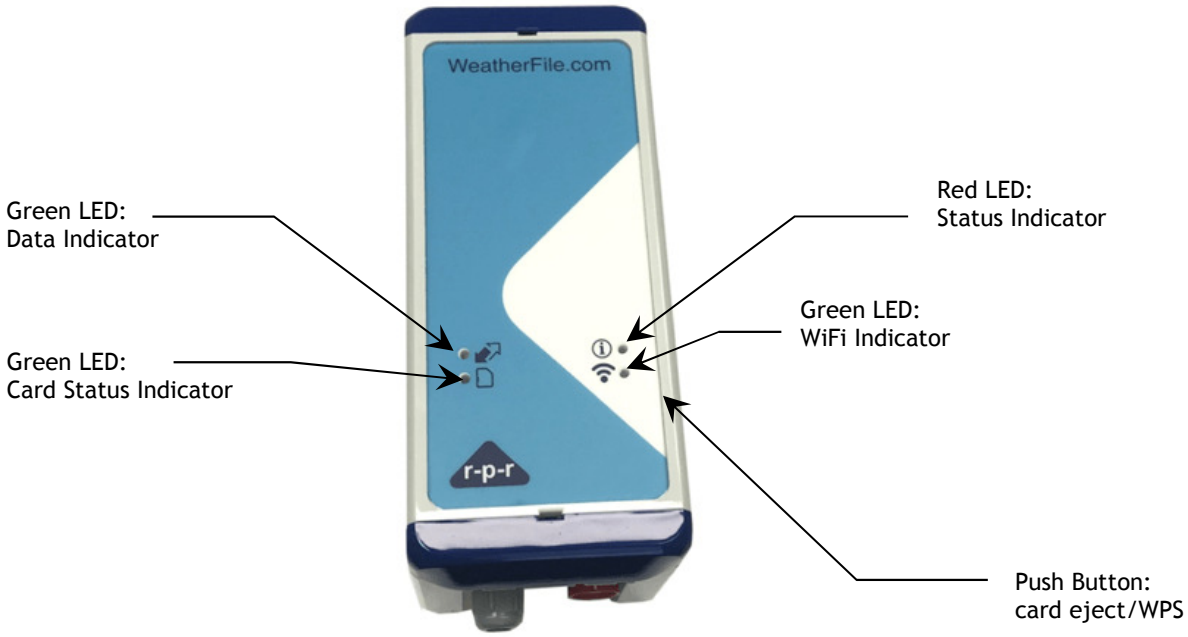

Figure 8: WMU Indicators

6.1 MicroSD card

When a MicroSD card is inserted into the WMU the Card Status Indicator will switch on indicating that the unit is 'Ready to Record Data'. This indicator will remain on while the unit is in this state.

The MicroSD card is designed to fit easily into the card slot one way only. Do not bend the card or force it into the slot. To remove the MicroSD card, press it in and release; the card will eject. Note that the MicroSD card should not be removed while the Data Indicator LED is illuminated.

Only microSD cards should be used in the WMU with a minimum storage capacity of 4GB.

6.2 Data Transfer

Received data is stored temporarily in a buffer. The WMU inserts the time and date at the start of each data record. Data is transferred from the buffer to the MicroSD card in 512 byte packages. If no data has been received from the data source for a set time period (approximately 11 seconds) any remaining data in the buffer is written to the MicroSD card. The Data Indicator LED will be on whilst the WMU is receiving data on its RS232 input.

The data on the microSD card may be viewed/downloaded by browsing to the WMU (via SpaceLogger Launcher or directly via its IP address). It is not necessary in normal operation to remove the card.

CAUTION
If the microSD card does need to be removed, then the RS232 data input should be disconnected first. After a short interval (~11 secs) the Data LED will switch off indicating that all remaining data has been purged to the microSD card. The microSD card can now be safely ejected after which the green Card Status LED will switch off to indicate that the unit is no longer enabled to record further data.
To recommence data logging the MicroSD card should be re-inserted and the RS232 data input reconnected, in that order. The Card Status LED will again indicate the unit as 'Ready to Record Data' the Data Indicator LED will indicate that data is being received and a short two tone beep will sound.

To avoid losing data or corrupting the card, never remove the card or disconnect the power supply when the Data Indicator LED is flashing or blinking.

6.3 Data Storage and Format

WMU creates a folder WWW/DATA on the MicroSD card into which raw and average data will be stored in their respective directories.

Averaged data files are written to a subfolder AVERAGED/YYYY where YYYY is the current year. A new file is generated each day. The file name takes the default format 20YYMMDD.CSV where YYMMDD is that day's date.

Raw data files are written to a subfolder RAW/YYYY where YYYY is the current year. A new file is generated each day. The file name takes the default format 20YYMMDD.CSV where YYMMDD is that day's date. Saving of raw data files is optional, to activate this functionality refer to section 9.1 LOGRAW command.

Data is stored in comma separated variable format files (.CSV) which may be opened in MS Excel and other spreadsheet programs. These files are also readable in notepad or a similar text editor.

The time noted in either the raw or average file is GMT, offset by the SNTP_TIMEZONE parameter. Thus if SNTP_TIMEZONE=60, the time of the recorded sample in the raw or average file will be GMT+1hr. This can be used for daylight saving time adjustments e.g. British Summer Time.

6.3.1 Raw Data Files

The format of the raw data is dependent upon the type of sensor connected to the WMU.
The general format is:

{Prefix}DD/MM/YY,HH:MM:SS,{Sensor Sentence}

When the WMU is used with WindSonic sensors, data is stored in the raw log files in following format:

{Prefix}DD/MM/YY,hh:mm:ss,Q,ddd,SSS.SS,U,AA, CC

Where:

Prefix is string configured in the Sensor Setting, or blank. This field is optional.
DD/MM/YY is the date
hh:mm:ss is the time that the sample was received by the WMU
Q is the WindSonic sensor identifier
ddd is the is the wind direction from the sensor
SSS.SS is the wind speed
U is the wind speed units M=m/s, N=knots, P=mph, K=km per hour, F=feet per min
AA is the sensor status 00 = OK, 01 = axis failed, 02 = axis 2 failed, 04 = axis 1 and 2 failed, 08 = NVM error, 09 = ROM error
CC is the checksum EXCLUSIVE-OR of the bytes between (and not including) the time and the space character before CC as a two character hexadecimal value

6.3.2 Average Data Files

When the WMU is used with WindSonic sensors, data is stored in the average log files in following format:

date,time,back_twd,avg_twd,veer_twd,min_tws,avg_tws,max_tws,sampleSize
2015/06/02,00:00.00,194,202,210,25.02,31.80,39.77,34
…

Each file contains a header line that indicates the contents of the comma separated fields in the succeeding lines. If a different sensor is used e.g. MetPak, then additional fields will be produced for the additional capabilities of the sensor. If GPS information is available, this can also be output to the average file. The time and date recorded in the file is the end time of the period. Table 8 lists the parameters that can be included in the average file.
Note that the order of columns is not pre-determined; it will be effected by the sensor definition.

Heading	Description	Units
Date	Date	DD/MM/YY
Time	Time	HH:MM:SS
back_twd	Backed wind direction (anti-clockwise)	Degrees
avg_twd	Average wind direction	Degrees
veer_twd	Veered Wind direction (clockwise)	Degrees
min_tws	Minimum wind speed	As per WSUNITS
avg_tws	Average wind speed	As per WSUNITS
max_tws	Maximum wind speed	As per WSUNITS
avg_Pressure	Average pressure	HPa
avg_humidity	Average relative humidity	%
avg_temperature	Average ambient temperature	ºC
avg_dewpoint	Average dewpoint temperature	ºC
avg_prt	Average Platinum Resistive Thermistor temperature	ºC
avg_alg1	Analog Input 1	n/a
avg_alg2	Analog Input 2	n/a
Rain	Rainfall (Digital input 1)	As per TBSF
Sol	Average solar radiation	W/m^2
tot_precip	Rainfall, total within averaging interval	mm

Heading	Description	Units
avg_volt	Average sensor voltage	Volts
sampleSize	Number of samples in the average interval	Samples
Lat	Latitude	DDMM.MMM
N/S	North or South	N or S
Long	Longitude	DDDMM.MMM
E/W	East or West	E or W

Table 8: Average Data Fields

6.3.3 microSD Capacity

The approximate capacity of the MicroSD card used in the WMU may be calculated as follows:

$$\frac{\text{Card size (GBytes)} * 12427}{\text{(Sample Rate Hz)} * \text{(Bytes per sample)}} = \text{approx. capacity in days when logging raw data}$$

The WindSonic sensor produces a data sample every second of 41 bytes, so a 4Gbyte MicroSD card will fill up in approximately 1212 days

The MetPack weather station produces a sample of at least 75 bytes every second, so an 8Gbyte MicroSD card will fill up in approximately 1325 days, or approx. 3.5yrs

If logging of raw data is disabled, then the capacity of the MicroSD card (in days) is extended by a factor of at least 10, since only the average data is then stored. By default, average data is stored every ten minutes, and this may only be reduced to every 60 seconds, compared to a raw logging rate of every second. Although more data is stored for each average sample, the overall reduction in data stored results in greatly extended MicroSD card capacity in terms of days of storage.

6.4 Viewing Log Files

Using the SpaceLogger Launcher software it is possible to easily connect to a WMU and view both the average and raw data files stored on it MicroSD card without needing physical access to the unit. When the SpaceLogger Launcher is run it will display a list of all the WMU's found on the local wireless network (that the PC is connected to).

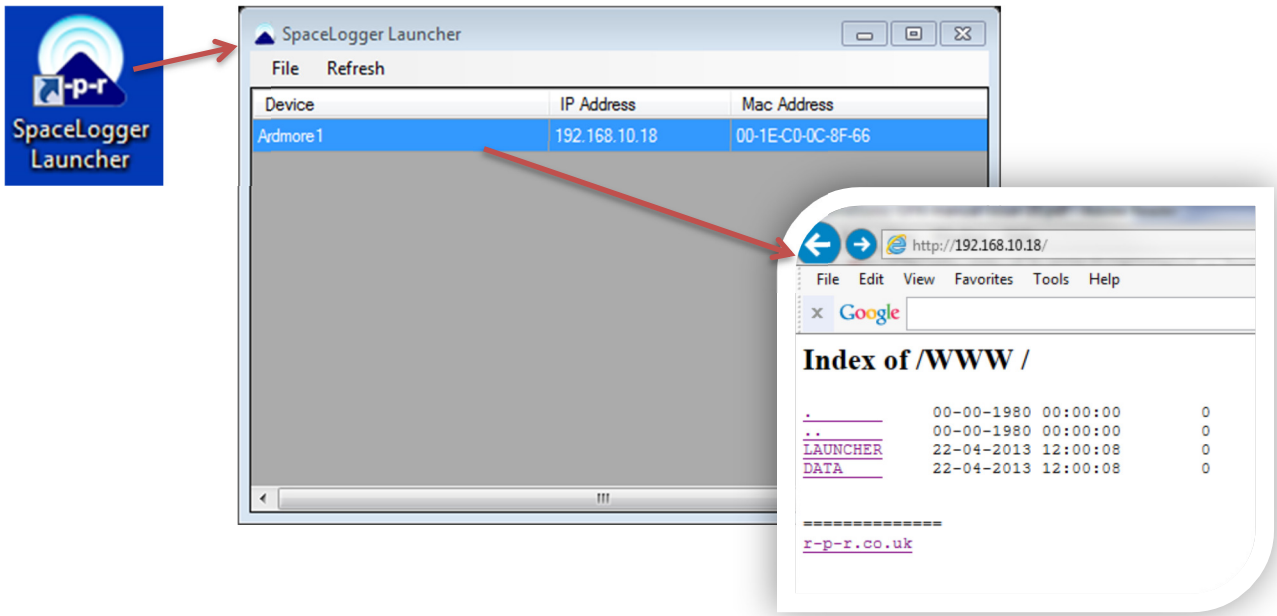

Figure 9: SpaceLogger Launcher

Double click or right click on a listed device to view the recorded data. The PC's default web browser will be opened. Click on the link 'index' to view the directory structure of the card. All log files are stored in the relevant subdirectories of the DATA directory.

Alternatively, if the IP address of the WMU is already known, this may be directly typed into a web browsers address bar. Finally, if only a single WMU is present on the wireless network, type http://spacelogger (or the netbios name configured using the NETBIOS setup command) into the browser's address bar.

7 Local Display

7.1 Local Display home page

The Local Display feature is available to show the current and latest average wind data via a web browser connected to the WMU's IP address as illustrated below.

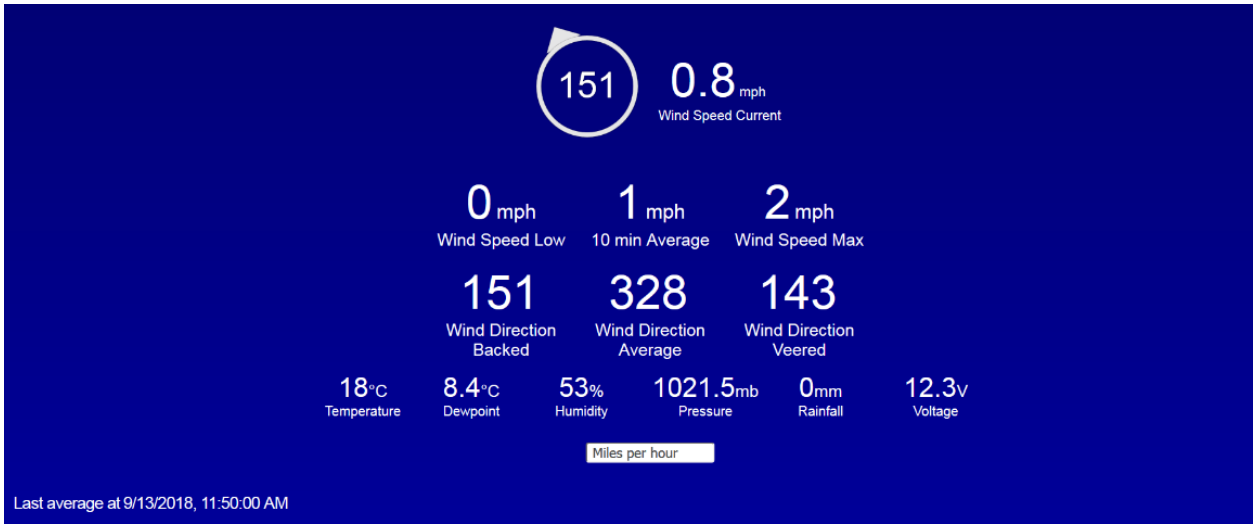

Figure 10: Local Display

Alternatively, connect to the WMU using its NETBIOS name and click on the link to the Local Display.

Note that the sensor heading and voltage field will not display unless a suitable sensor is connected.

7.2 Web Server Local Display API

To minimize the load on the SpaceLogger's web server, the SpaceLogger provides an API through which the browser may obtain the necessary information to display the current and average data. All such API features start with http://<IP>/TIME.htm?vars
The API enables the majority of the page to be defined in a static manner so that it is served only once, while the data it is displaying can be updated with minimal dynamic load on the SpaceLoggers web server.

7.2.1 Device Information

http://<IP Address>/TIME.htm?vars=w8 yeilds a json structured object as shown below

```
{"status":"ok","w8":{"name":"Local
Display","avgint":300,"sn":"unprogrammed","swv":"1.1.1.302"}}
```

"name" is the string programmed into the SpaceLogger using the NAME setup command, and will display as the title of the page.
"avgint" is the interval in seconds between average readings. Where avgint is a divisor of a 1hour period, it will be naturally aligned.
"sn" is the serial number of the SpaceLogger.
"swv" is the software version of the spacelogger.

7.2.1 Device Data

http://<IP Address>/TIME.htm?vars yields the json structured object as shown below


```
{"status":"ok","data":{"utc":1461337982,"utca":1461337800,"wdc":28,"wdb":17,"wda
":33,"wdv":46,"wsc":4.35,"wsl":3.62,"wsa":4.59,"wsh":5.82,"tries":363,"fails":0}
}
```


All wind speeds are in meters per seconds, and all wind directions are in degrees.
"utc" is the time in seconds since Jan 01 1970 for the current reading
"wsc" is the current wind speed
"wdc" is the current wind direction
"utca" is the time in seconds since Jan 01 1970 for the current average reading
"wsa" is the average wind speed during the average interval
"wsl" is the minimum recorded wind speed during the average interval
"wsh" is the maximum recorded wind speed during the average interval
"wda" is the average wind direction during the average interval
"wdb" is the maximum backed direction during the average interval (anti-clockwise)
"wdv" is the maximum veered direction during the average interval (clockwise)
"tries" is the number of packets that have been attempted to be sent to the database
"fails" is the number of packets that have failed in transmission to the database.

7.2.1 Average Device Data

http://<IP Address>/TIME.htm?vars=avg yeilds a json structured object as shown below, for the average data.


```
{"status":"ok","avg":{"utca":1461243900,"wdb":339,"wda":23,"wdv":102,"wsl":0.00,
"wsa":0.06,"wsh":0.28}}
```


In the current software release, only wind specific data is returned using the avg resource. Future releases may extend this to other datasets.

7.2.2 Current Device Data

http://<IP Address>/TIME.htm?vars=curr yeilds a json structured object as shown below, for the current data.


```
{"status":"ok","curr":{"utc":1461244185,"wdc":18,"wsc":0.14}}
```


In the current software release, only wind specific data is returned using the curr resource. As the majority of other datasets change relatively slowly (e.g. temp, pressure, humidity) it is unlikely that these datasets will be added to the curr resource.

7.3 Homepage setup commands

7.3.1 HOMEPAGE

The Homepage command allows the homepage encoding to be specified as either zipped or unzipped. Typically, whilst developing a page it would be left unzipped in order to facilitate making changes. Once the page is completed, it can be zipped un gzip format to minimize bandwidth and reduce load on the SpaceLoggers web server.

HOMEPAGE = {**U**NZIPPED, **Z**IPPED}

7.3.2 HOMEPAGERL

Executing this command reloads the local display homepage stored in the SpaceLoggers FLASH memory, and sets the encoding of the page appropriately.

7.4 Web Server Capacity

The SpaceLogger can serve a maximum of three concurrent sessions due to internal memory constraints. Thus it would be inadvisable to make the SpaceLogger's web server publically accessible.

8 Maintenance

The WMU does not require any routine maintenance in normal use.

8.1 Software upgrade procedure

From time to time, new features may be added to the WMU software. To take advantage of these features the new software will need to be installed. RPR will provide the new software (image001.hex) either directly or on http://www.r-p-r.co.uk/spacelogger/w8wireless.htm

8.1.1 Automatic Software Updates

If the WMU is connected to the public internet, then it may be upgraded remotely provided Maintenance Messages are enabled. Please contact RPR.

8.1.2 Manual Software Updates

To update the software on the WMU manually, a new software image is put onto the MicroSD card and this is then uploaded to the unit. The following process should be followed to accomplish this.

Remove the SD card from the WMU

- Disconnect the sensor from the WMU serial connector
- Wait for the top left hand Data Indicator LED to go out. This indicates that all data has been flushed to the MicroSD card.
- Disconnect the USB PSU from the WMU
- Remove the microSD card from the WMU

Put the new software onto the SD card

- Insert the MicroSD card into the PC
- Copy the image001.hex file provided to the MicroSD card's top level directory. For confirmation purposes, this directory should also contain a file named SETUPOLD.TXT
- If a new SETUP.TXT file has been provided, copy this file to the same directory once any required changes have been made e.g. WiFi configuration parameters
- Remove the microSD card from the PC.

Update the WMU software

- Put the microSD card back into the WMU
- Reconnect the USB PSU to the WMU
- BOTH the Data and Statsus indicators will come on (top row of LED's)

- The bottom left hand GREEN indicator will initially flash quickly for ~5sec and then slowly for ~ 15 sec
- All the indicator will then go out briefly – this indicates the end of the programming cycle.
- The WMU will then continue to boot as normal and after ~10sec will emit a short two tone beep indicating that it is ready to log data
- Reconnect the wind sensor to the WMU serial connector.

9 WMU Command Reference

9.1 Sensor Settings

Command	Default Value	Description & Parameters
BAUD	9600	Sets the Baud rate for the primary serial interface e.g. BAUD=19200 Typical settings are 2400,4800,9600,19200,38400,57600.
BAUD2	0	Sets the Baud rate for the second serial interface e.g. BAUD=4800 valid values are 2400, 4800 and 9600. Any other value will disable the second serial interface. Typically used to access an RMC sentence from a GPS receiver
FLOW	H	Flow control for serial interface Valid values are H, N Note – when using the second serial port, flow control must be disabled e.g. FLOW=N
STX	Q	Start of string delimiter string of up to 30 quoted characters e.g. STQ=”Q”
ETX	<NewLine>	end of string delimiter string of up to 30 quoted characters e.g. ETX=”\n”
TIMESTAMP	Y	When enabled, prepends the logged raw data with a date and timestamp in MM/DD/YY, HH:MM:SS format valid values are Y,y,N,n
LOGSTX	Y	When enabled, the STX field will be logged within the raw data, otherwise the STX field will be discarded valid values are Y,y,N,n
LOGETX	Y	When enabled, the ETX field will be logged within the raw data, otherwise the ETX field will be discarded valid values are Y,y,N,n
NEWLINE	N	When enabled, a carriage return and new line will be added after the ETX field within the raw data. valid values are Y,y,N,n
PREFIX	N/A	A string of up to 30 characters that will be pre-pended to the logged data. Typically this would end with the expected field separator, such as a comma PREFIX=”Logger1,”
LATEST	N	When enabled, causes the SpaceLogger to output a value every 10 seconds via FTP

LOGRAW	N	If enabled, the raw data will be logged onto the microSD card. **Note: This can cause a 4GB microSD card to fill up in ~ 3 yrs for a WS1 sensor.**
WSUNITS	MPS	Wind Speed Units valid parameters are: MPS, MPH, KPH, KTS and FPM e.g. WSUNITS=KTS
AVE_TIME	10	The time in minutes (default) or seconds over which average readings are calculated valid values: 1 to 60 minutes (AV_MODE=SCALAR, default setting) 1 to 600 seconds (AV_MODE = VECTOR)
SENSOR	WS1	The sensor type connected to the SpaceLogger valid parameters are: WS1, WS2, WS3, WSN, METPAK, METPAKRG, METPAKPRO,USRDEF e.g. SENSOR=METPAKRG Note: WSN indicates that the WindSonic is outputting in NMEA format See Table 7 for the USRDEF parameter definitions
TBSF	0	Tipping Bucket Scale Factor If the dig1 field in the data is a simple count of the number of tips in the last period, this value should be set to the number of tips that represent 1mm of rain. If the dig1 field in the data is the level of rain in millimeters during the last period, then this value should be set to 1 e.g. TBSF=1
HPA_OFFSET	0	Pressure offset, to 1 decimal place in hPa (or millibars) This value is added to the pressure reported by the sensor, and can be used as an altitude offset from sea level HPA_OFFSET=100.5
DIR_OFFSET	0	Direction offset. This can be used to adjust for the wind sensor direction once the sensor has been mounted valid values are between -360 and 360 e.g. DIR_OFFSET=27
DIR_DISABLE	N	Wind Direction Disable. This can be used to disable the output of latest wind direction to the database in instances where the sensor may be rotating. Logging of raw and average data is unaffected. Valid values are Y,y,N,n DIR_DISABLE=Y
AVERAGE	N	When enabled, the SpaceLogger will send and average csv file by FTP at the specified interval

AV_MODE	S	Averaging Mode Valid values are S,s,V,v Sets averaging to either scalar or vector mode
MA_TIME	10	Moving average time Valid values are between 1 and 40 (inclusive) Time (in terms of samples) over which the moving average should be calculated
RATE	1	Sensor rate Valid values are between 1 and 4 (inclusive) The sample rate at which samples are provided to the SpaceLogger
NOTIFY	N/A	Notification configuration NOTFIY={number},{enable},{parameter},{sector limit 1},{sector limit 2}, {sector in time},{sector out time},{sector in assert level} e.g. NOTIFY=1,Y,WSI,0,5.1,10,10,L Number, 1 or 2 Enable, Y or N Parameter, sensor parameter as listed in Table 7 Sector Limit 1, parameter value Sector Limit 2, parameter value Sector in time, time in seconds Sector out time, time in seconds Sector in assert level, H or L

9.1.1 STX and ETX Escape Codes

The start (STX) and end (ETX) identifiers may be defined in one of two ways; either a single ASCII character specified by its decimal value (0-255) or by a string of up to 31 characters contained by quote marks.
The WMU's default start character is <STX> (2) and end character is <LF> (10).
The WMU may be set to recognise any other start and end characters using the following SETUP.TXT command lines:
`STX=x` or `STX="cc..."`
`ETX=x` or `ETX="cc..."`
Where:

- x is the decimal value (0-255) of the ASCII character that indicates the start (STX) or end (ETX) of the data string that is to be stored.
- "cc…" is a string of up to 31 ASCII characters enclosed by double quotes

Note:

- The string is case sensitive.
- Question marks (?) may be used to denote any character i.e. as wildcards.
- The following escape codes may be included in the STX and ETX strings:

Escape Code	Hex Value	Meaning
\n	0x0A	Line Feed
\r	0x0D	Carriage Return
\"	0x22	Double quotes
\'	0x27	Single quote

\\	0x5C	Backslash
\1	0x01	SOH
\2	0x02	STX
\3	0x03	ETX
\4	0x04	EOT
\5	0x05	ENQ
\6	0x06	ACK
\7	0x07	BEL
\a	0x07	BEL
\b	0x08	BS
\f	0x0C	FF
\t	0x09	HT
\v	0x0B	VT

See http://www.ascii-code.com/ for further information regarding ascii codes.

9.2 Wireless Setting

Command	Default Value	Description & Parameters
NETWORK_TYPE	I	Sets the wireless network infrastucture type NETWORK_TYPE=I, infrastructure NETWORK_TYPE=A, adhoc NETWORK_TYPE=P, peer-to-perr

SECURITY	WPA2_WITH_PASS_PHRASE	SECURITY = OPEN // N/A
		SECURITY = WEP_40 // hex 4, 5 byte keys
		SECURITY = WEP_104 // hex 4, 13 byte keys
		SECURITY = WPA_WITH_KEY // hex 32 bytes
		SECURITY = WPA_WITH_PASS_PHRASE // 8-63 ascii
		SECURITY = WPA2_WITH_KEY // hex 32 bytes
		SECURITY = WPA2_WITH_PASS_PHRASE // 8-63 ascii
		SECURITY = WPA_AUTO_WITH_KEY // 32 hex bytes
		SECURITY = WPA_AUTO_WITH_PASS_PHRASE // 8-63 ascii

WIFI_KEY	N/A	WiFi key (pass phrase) quoted phrase of up to 63 characters WIFI_KEY=”roundtree897”
WIFI_TOUT	N	WiFi timeout. Valid values are N,n,Y,y When enabled, causes the SpaceLogger to reset after 60 minutes without a wifi connection, or after 60 minutes with no connection to the database. Where the SpaceLogger is installed permanently it is recommended this parameter is set to Y

REGION	2	Wifi region setting, which determines the available channels Valid values are 1,2,3,4,5,6 0, Channels 1-11, FCC 1, Channels 1-11, IC 2, Channels 1-13, ETSI 3, Channels 10-11, SPAIN 4, Channels 10-13, FRANCE 5, Channels 14, JAPAN 6, Channels 1-13, JAPAN
SSID	DemoWiFi	WiFi Service Set Identifier – the "name" of the access point to connect to e.g. SSID="My WiFi AccessPoint"

CHANNEL_LIST		List of WiFi channels to use in a comma separated list
		CHANNEL_LIST= //use all available channels (typical)
		CHANNEL_LIST=1,6,11 // only use channels 1,6 or 11

NAME	"name"	The user defined name for the SpaceLogger, a string of up to 30 quoted characters e.g. NAME="MySpaceLogger"
FIXED_IP	N	Defines if the logger should have a fixed IP address, or if the IP address should be obtained by DHCP NOTE: If a fixed IP address is configured, then IP_ADDRESS, IP_MASK, IP_GATEWAY and (at least) IP_DNS1 must also be configured for correct operation valid values are Y,y,N,n
IP_ADDRESS		IP address for the unit in dot decimal notation e.g. IP_ADDRESS=192.168.27.137
IP_MASK		IP mask for the unit in dot decimal notation e.g. IP_MASK=255.255.255.0
IP_GATEWAY		The IP address of the gateway to the internet in dot decimal notation. This must be on the same subnet as the IP_ADDRESS e.g. IP_GATEWAY=192.168.27.1
IP_DNS1		IP address of the domain name server. Typically the same as the IP_GATEWAY e.g. IP_DNS1=192.168.27.1
IP_DNS2		Optional second DNS server IP address

9.3 Internet Settings

Command	Default Value	Description & Parameters
LOCATION	"location"	The location of the SpaceLogger, and ascii string of up to 30 characters. LOCATION="Hurst"

SNTP_ENABLED	Y	If enabled, the SpaceLogger will use the SNTP protocol to set its time from the internet. valid values are Y,y,N,n Note: SNTP **must** be disabled if a GPS input is configured using the GPS configuration command.
SNTP_SERVER	Pool.ntp.org	The domain name or ip address of the SNTP (or NTP) server. SNTP_SERVER=”pool.ntp.org”
SNTP_TIMEZONE	0	The time in minutes to add or subtract from the SNTP time. This is used when time stamping the data being logged
SNTP_UPDATE	60	The time in minutes between updates from the SNTP server.
DB_SECRET	N/A	This is the shared secret between the RPR database and the customer. It can be different for every logger if required DB_SECRET=”my secret key”
DB_SERVER		The domain name or ip address of the RPR server, as assigned by RPR e.g. DB_SERVER=”data.weather-file.com”
DB_SERVICE		The path to the database service from the server domain name e.g. DB_SERVICE=”met”
DB_MAINT	Y	Enables or disables maintenance messages to the RPR database. valid values are Y,y,N,n
DB_LATEST	Y	When enabled, the SpaceLogger will transmit the latest data logged every 10 seconds to the RPR database valid values are Y,y,N,n
DB_AVERAGE	Y	When enabled, the SpaceLogger will transmit the average data logged over the last averaging interval to the RPR database. valid values are Y,y,N,n
DB_RTBDIS	N	When DB_RTBDIS=Y, disables the retransmission buffer to the database. This should be used in instances where the W8.SpaceLogger is not connected to the internet. Valid values are Y,y,N,n
DB_MAINT_INT	1	Configures the default interval in minutes between maintenance messages to the RPR database e.g. DB_MAINT_INT=60
DB_DISCON	N	When DB_DISCON=Y the WMU will not reset after 60 minutes with no connection to the database.

9.4 Other Settings

Command	Default Value	Description & Parameters
RESET	N/A	Reset to default values. No parameters If used, this should be the first command in SETUP.TXT
HWVER	N/A	Used to program the Hardware version of the equipment. Production use only, not applicable for use in service

Command	Default Value	Description & Parameters
HWSER	N/A	Used to program the serial number of the equipment. Production use only, not applicable for use in service
CLRSYSLOG	N/A	Deletes the current SYSLOG.TXT and WDOG.TXT files
HOMEPAGE	U	Sets the fileformat of HOME.HTM to unzipped or zipped Valid values are {U,Z}
HOMEPAGERL	N/A	Reloads HOME.HTM to the microSD card from FLASH
NETBIOS	SPACELOGGER	Sets the netbios name of the spacelogger e.g. NETBIOS=”MYDEVICE” Netbios names are limited to 15 characters. Names greater than 15 characters will be rejected. All netbios names are converted to upper case internally.

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10 WMU WIRELESS SPECIFICATION

Physical	
Enclosure dimensions excluding mast mount but including connectors	80mm x 90mm x 180 mm
Mounting plate x 2 (SS 316)	2 x m6 holes (4 of 5 m6 dia) 30 mm x 75 mm (45mm 'V' Bolt)
Enclosure material	Polycarbonate UL94V0
Connectors	Binder 720 series
Weight	0.78kg
Sensor input	
Sensor types	Gill Instruments: WindSonic & WindObserver series MetPak & MaxiMet series NMEA compatible wind sensors with RS232 output. Please contact RPR Ltd. if you wish to use other sensors.
Other Sensor types	Rain gauge, CO_2, Moisture etc.
Transmission standard	RS232 compatible, 8 bits and no parity
Wireless/network Connectivity	
Hotspot transmission standard	Wi-Fi Certified 2.4GHz IEEE 802.11b/g 802.11i Security WPA2-PSK, WPA, WEP
3G / 4G / GPRS	Internal aerial, 800/1900 MHz
Router	3G, GPRS via mobile network
Data Storage	
Data storage card	Removable SDHC card
Data capacity	8 GB (standard) or as per memory card capacity
File system	FAT16 or FAT32 with 8.3 file names
	Sector size 512 Bytes
Remote Cloud Storage	Data stored on the WeatherFile.com server (1)
Audible / Visual Indicators	
LED indicators	SD card status
	Data input status
	Wireless connection status
Power	Status alert
Audio bleeper	Status alert
Real Time Clock	
Accuracy	±40 ppm at 25°C
Synchronisation	SNTP - Simple Network Time Protocol (1)

Power	
Power requirement	12 V DC ±10%
Current at 12 VDC	300 mA typical
Environmental	
Temperature range	Operating: -25°C to +70°C
	Storage: -40°C to +70°C
Enclosure protection	IP67
Notes	
(1) internet connection required	

The manufacturer reserves the right to amend the specification and therefore the information in this document may be subject to change.

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APPENDICES

A1 ASCII – American Standard Code for Information Interchange

Value	Hex	Character	Value	Hex	Character	Value	Hex	Character	Value	Hex	Character
0	00H	NUL	16	10H	DLE	32	20H	SP	48	30H	0
1	01H	SOH	17	11H	DC1	33	21H	!	49	31H	1
2	02H	STX	18	12H	DC2	34	22H	"	50	32H	2
3	03H	ETX	19	13H	DC3	35	23H	#	51	33H	3
4	04H	EOT	20	14H	DC4	36	24H	$	52	34H	4
5	05H	ENQ	21	15H	NAK	37	25H	%	53	35H	5
6	06H	ACK	22	16H	SYN	38	26H	&	54	36H	6
7	07H	BEL	23	17H	ETB	39	27H	'	55	37H	7
8	08H	BS	24	18H	CAN	40	28H	(	56	38H	8
9	09H	HT	25	19H	EM	41	29H	)	57	39H	9
10	0AH	LF	26	1AH	SUB	42	2AH	*	58	3AH	:
11	0BH	VT	27	1BH	ESC	43	2BH	+	59	3BH	;
12	0CH	FF	28	1CH	FS	44	2CH	,	60	3CH	<
13	0DH	CR	29	1DH	GS	45	2DH	-	61	3DH	=
14	0EH	SO	30	1EH	RS	46	2EH	.	62	3EH	>
15	0FH	SI	31	1FH	US	47	2FH	/	63	3FH	?

Value	Hex	Character	Value	Hex	Character	Value	Hex	Character	Value	Hex	Character
64	40H	@	80	50H	P	96	60H	`	112	70H	p
65	41H	A	81	51H	Q	97	61H	a	113	71H	q
66	42H	B	82	52H	R	98	62H	b	114	72H	r
67	43H	C	83	53H	S	99	63H	c	115	73H	s
68	44H	D	84	54H	T	100	64H	d	116	74H	t
69	45H	E	85	55H	U	101	65H	e	117	75H	u
70	46H	F	86	56H	V	102	66H	f	118	76H	v
71	47H	G	87	57H	W	103	67H	g	119	77H	w
72	48H	H	88	58H	X	104	68H	h	120	78H	x
73	49H	I	89	59H	Y	105	69H	i	121	79H	y
74	4AH	J	90	5AH	Z	106	6AH	j	122	7AH	z
75	4BH	K	91	5BH	[	107	6BH	k	123	7BH	{
76	4CH	L	92	5CH	\	108	6CH	l	124	7CH	|
77	4DH	M	93	5DH	]	109	6DH	m	125	7DH	}
78	4EH	N	94	5EH	^	110	6EH	n	126	7EH	~
79	4FH	O	95	5FH	_	111	6FH	o	127	7FH	DEL

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A2 Guarantee

System components are warranted for a period of twelve (12) months from the original date of purchase, against defective materials and workmanship. In the event that warranty service is required, please contact Richard Paul Russell Ltd.

This warranty is only valid if, when warranty service is required, a full description of the fault is provided and presented with the original invoice, and the serial number(s) on the component has not been defaced.

Richard Paul Russell Ltd's liability is limited to items of its own manufacture, and it does not accept liability for any loss resulting from the operation or interpretation of the results from this equipment.

This warranty covers none of the following:

- Periodic check ups, maintenance and repair or replacement of parts due to normal wear and tear.
- Cost relating to transport, removal, or installation of the component.
- Misuse, including failure to use the component for its normal purpose or incorrect installation.
- Damage caused by Lightning, Water, Fire, Acts of God, War, Public Disturbances, incorrect supply voltage or any other cause beyond the control of Richard Paul Russell Ltd.
- Units which have been repaired or units altered by a party other than Richard Paul Russell Ltd's employees or agents without prior written consent from Richard Paul Russell Ltd.

In no event shall Richard Paul Russell Ltd be liable under any circumstances for any direct, indirect or consequential damages, any financial loss or any lost data contained in any product (including any returned product), regardless of the cause of loss. Richard Paul Russell Ltd products are not warranted to operate without failure. Richard Paul Russell Ltd's products must not be used in life support systems or other application where failure could threaten injury or life.

The Customers statutory rights are not affected by this warranty. Unless there is national legislation to the contrary, the rights under this warranty are the customer's sole rights and Richard Paul Russell Ltd shall not be liable for indirect or consequential loss or damage to any other related equipment or material.

Tel +44 (0) 1590 641223 e-mail sales@r-p-r.co.uk web www.r-p-r.co.uk

A3 Declaration of Conformity

EC DECLARATION OF CONFORMITY ACCORDING TO COUNCIL DIRECTIVE 2004/108/EC

We, Richard Paul Russell Limited of

The Lodge
Unit 1 Barnes Farm Business Park
Barnes Lane
Milford-on-Sea
Hampshire SO41 0AP
United Kingdom

Declare under our sole responsibility that the product:

WMU

Manufactured by: Richard Paul Russell Limited

to which this declaration relates, is in conformity with the protection requirements of Council Directive 2014/30/EU on the approximation of the laws relating to electromagnetic compatibility.

This Declaration of Conformity is based upon compliance of the product with the following harmonised standards:

Emissions	EN61326-1:2013, EN 301 489-1:V1.9.2 EN55032:2012
Immunity	EN61326-1:2013, EN 61000-4-2:2009, EN 61000-4-3:2006 incl A2:2010
WEEE Directive	2012/19/EU
RoHS Directive	2011/65/EU

Signed by: R.P.Russell

Richard Paul Russell – Director

Date of Issue: XXXX 2018

Place of Issue The Lodge
Unit 1 Barnes Farm Business Park
Barnes Lane
Milford-on-Sea
Hampshire SO41 0AP
United Kingdom

WMU has been tested for compliance with FCC standards FCC/CFR 47: Part 15. This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
The user is cautioned that changes or modifications not approved by the responsible party could void the user's authority to operate the equipment, in line with the FCC guidelines.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

To satisfy FCC RF Exposure requirements for mobile and base station transmission devices, a separation distance of 20 cm or more should be maintained between the antenna of this device and persons during operation. To ensure compliance, operation at closer than this distance is not recommended.

The antenna(s) used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

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A4 WEEE (Waste, Electrical and Electronic Equipment) Statement

The WEEE directive places an obligation on all EU-based manufacturers and importers to take-back electronic products at the end of their useful life. Richard Paul Russell Ltd accepts its responsibility to finance the cost of treatment and recovery of redundant WEEE in accordance with the specific WEEE recycling requirements.

This symbol on the product or on its packaging indicates that, within the EU, the product must NOT be disposed of with normal household waste. Instead, it is the end user's responsibility to dispose of their waste equipment by arranging to return it to a designated collection point for the recycling of WEEE. By separating and recycling waste equipment at the time of disposal, natural resources will be conserved and it will be ensured that the equipment is recycled in a manner that protects human health and the environment. For more information about where you can send your waste equipment for recycling, please contact your local council office or visit our website www.r-p-r.co.uk.

A5 RoHS Statement (The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2006)

WMU has been designed to comply with EU Directive 2011/65/EU on RoHS regulations. The unit is assembled from compliant components.

RoHS is often referred to as the lead-free directive, but it restricts the use of the following six substances:

- Lead (Pb)
- Mercury (Hg)
- Cadmium (Cd)
- Hexavalent chromium (Cr6+)
- Polybrominated biphenyls (PBB)
- Polybrominated diphenyl ether (PBDE)

PBB and PBDE are flame retardants used in some plastics.