



WS-15A Display Unit for Wind Speed and Direction System User Handbook



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Document revision summary

Issue	Date	Description
1	March 2005	Original document for use with WS-15A software version 1.1a
2	April 2005	Detail added
3	May 2005	Detail added
4	September 2005	Connection correction
5	January 2006	Audible Alarm connections
6	May 2006	Add WEEE directive caution and Audible Alarm tone settings
7a	March 2007	Add feature to switch off wind compass point display. Add caution for wiring prior to power application & installation in high winds/lightning.
8	April 2007	Add 24V DC Alarm Sounder connections
9	September 2008	Update software version to 2.2a (see Issue 1 above). Adjust orientation of Menu Flowchart
10	March 2009	Software updated to version 2.3c. Compatibility with WindObserver and NMEA sensors added. Radio modem functionality added. Menu structure revised. Modified wind alarm silencing.
11	August 2009	Detail added
12	September 2010	Updated for software version 2.4a. Compatibility with MetPak II sensor added.
13	December 2016	Reflect change to terminal blocks and terminal identification (colours) Various typographical corrections, Address Introduce WiFi datalogger option wiring

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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1 INTRODUCTION

The WS-15A display is designed to provide wind speed and direction data display, alarm annunciation and RS232/485 conversion for a range of ultrasonic anemometer sensors. It is compatible with the following sensors:

- WindSonic option 1, 2 or 3 when set to output via RS232 or RS422/485 or NMEA 0183
- WindObserver II when set to output RS422/485 or NMEA 0183
- Other Wind Sensors generating NMEA 0183 sentences of type MWV
- MetPak II configured to output wind direction, wind speed, pressure, humidity, temperature, dew point and supply voltage at 9600 baud.

WindSonic Sensors



WindSonic Option 1:

WindSonic 1 sensors transmit using RS232 standard communications and are suitable when the connection distance between the sensor and the WS-15A Display is less than 20 metres and the electrical environment is benign.

WindSonic option 2:

For connection distances which are in excess of 20 metres, or where there may be heavy duty electrical equipment being switched or in operation in the vicinity, the WindSonic 2 sensor is appropriate, which uses the more robust RS422/RS485 communication standard.

WindSonic Option 3:

The WindSonic 3 sensor is also compatible with the WS-15A display if it is set to output using RS422/485.

To be compatible with the WS-15A Display, the data format of the WindSonic sensor should be set to the default ASCII polar continuous (not polled) or to NMEA.

WindObserver II sensors



WindObserver II sensors should be set to transmit using the RS422/485 communication standard.

To be compatible with the WS-15A Display, the data format of the sensor should be set to the default ASCII polar continuous (not polled) or to NMEA.

MetPak II multi sensor



The MetPak II consists of a single instrument combining wind speed and direction, pressure, temperature, and relative humidity sensors. To be compatible with the WS-15A display the MetPak II must be set up to output data in the order and measurement units given in section 4.2.4 Data format from MetPak II on page 33 of this handbook.



The WS-15A Display is housed in a robust IP65 standard case with three cable glands as standard providing access for wiring to power supply, sensor and audible alarm. As an option, an additional cable gland can be fitted for an RS232 connection to other devices such as another WS-15A display, computer, radio modem or data logger.

A typical system configuration is shown below in Figure 1 comprising an ultrasonic wind speed and direction sensor connected to and powered by the WS-15A display connected to an audible alarm and also a data logger (WindLogger) unit.

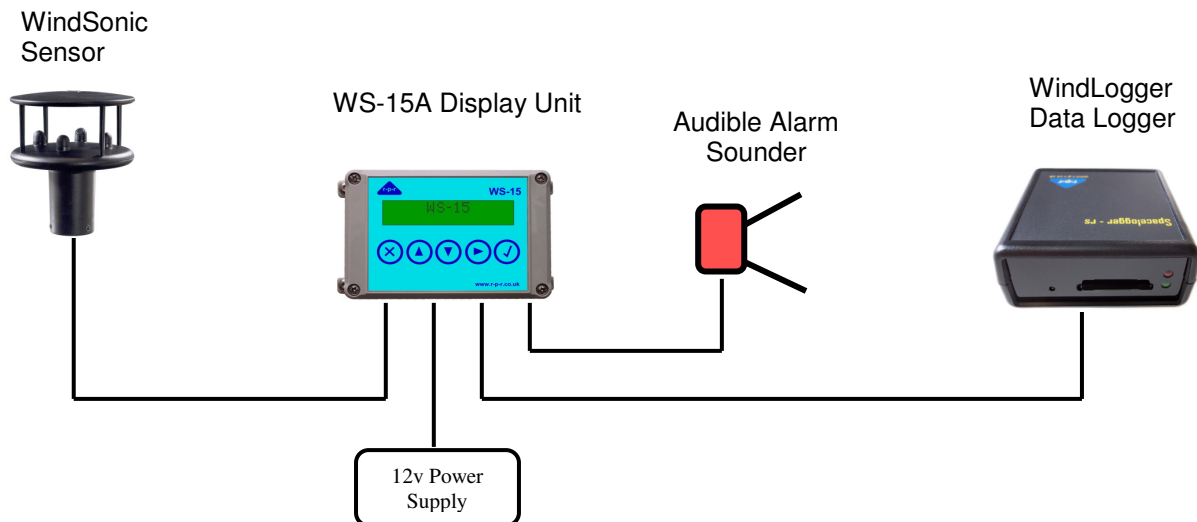


Figure 1: Typical wind speed and direction system using the WS-15A display

The system requires a 9 volt to 30 volt DC supply which can be provided by a 12 or 24 volt battery or a small plug-in mains power unit.



2 INSTALLATION

This section of the document describes the installation requirements of the display unit and audible alarm sounder.

Installation instructions for the sensor are found in the WindSonic or WindObserver user manual supplied with the sensor. In order to ensure accurate and consistent wind data, please address particular attention to the installation guidelines section.

Installation instructions for the SpaceLogger – WindLogger, are to be found in the user manual supplied with the unit or by visiting www.spacelogger.com.

NB. Please note that interconnection of all components should be completed prior to applying power, and that installation of the WindSonic sensor and associated cabling should not be undertaken in conditions of high wind strength or risk of lightning.

2.1 WS-15A Location

The WS-15A Display is housed in an IP65 protected case designed to withstand moderate exterior weather conditions and is classed as shower proof. However, it is recommended that the unit should be installed either indoors or in a sheltered area. Note that if a mains plug-in power unit is being used, it is unlikely to be suitable for an exterior location. Check the power unit's instructions.

The display should be mounted at eye height or angled so the user is looking directly at the display to obtain best visibility of the data display. See Figure 2 below.

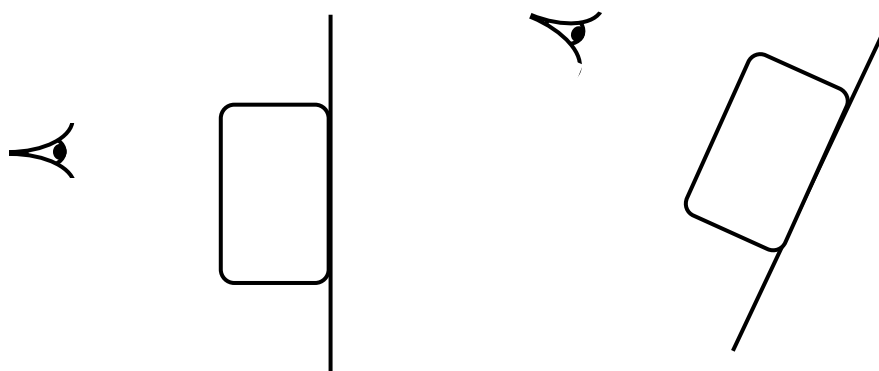


Figure 2: WS-15A Display Mounting



The WS-15A can be surface mounted using 4mm fixing holes in the rear of the unit or using the four mounting brackets supplied. Mounting brackets and fixing centres and are indicated in Figure 3 and Figure 4 below.



Figure 3: Mounting brackets

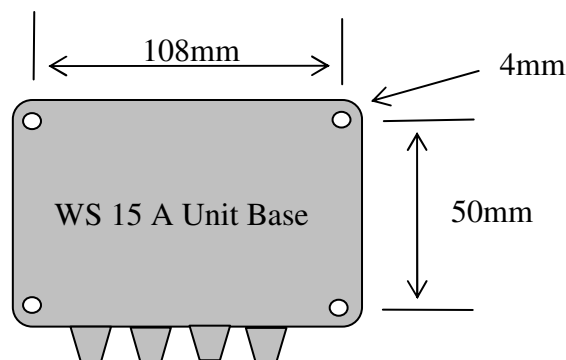


Figure 4: Fixing Centres (without mounting brackets)

When the mounting brackets are used, the 108mm and 50mm fixing centres are increased to 130mm and 68mm respectively.

2.2 Wiring

2.2.1 Cables

Users should ensure that, where necessary, all cables are suitable for outside installations. Cables should be adequately protected from potential damage from physical vibration or abrasion, excessive temperatures and aggressive atmospheric conditions.

Either solid or stranded cable is acceptable, in the range 0.32 to 0.65 mm diameter (AWG 28 to 22) with gauge 24 being ideal.

Signal cables should be routed as far as possible away from any adjacent cables or equipment which might be carrying high current or switching loads.



2.2.2 Termination Preparation

WS-15A terminals are located on the rear of the unit printed circuit board. These are convenient lever action terminal that are colour coded and numbered for ease of identification.

3 Terminal	Terminals 1 – 3	Power input connections
9 Terminal	Terminals 4 – 12	Sensor power and signal connections
7 Terminal	Terminals 13 – 19	Radio modem connections
4 Terminal	Terminals 20 – 23	Alarm annunciator (volt free) connections
6 Terminal	Terminals 24 – 29	Data logger – W8 or W10 WindLogger connections External equipment +5 and +12VDC power source



Figure 5: Terminal Strip Arrangement

When the unit base has been mounted, ready for wiring, the two temporary support rods supplied should be fitted to the front panel using the front panel fixing screws as shown in Figure 6.

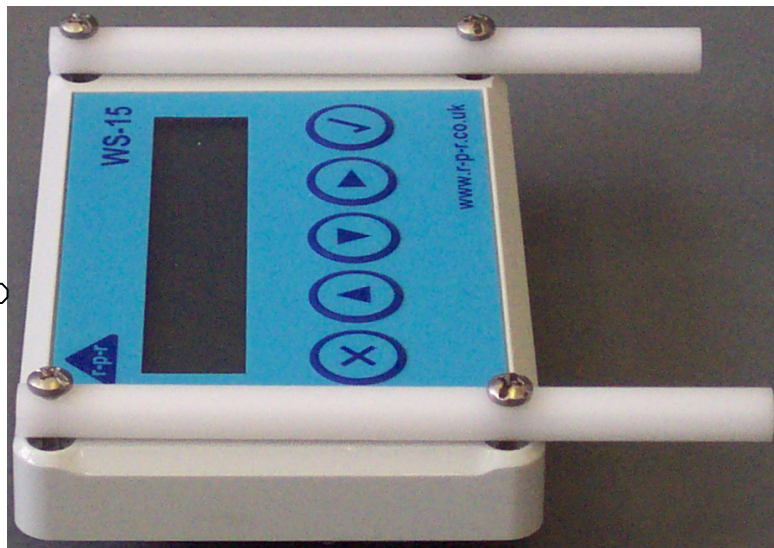


Figure 6: Front panel support rods

These rods enable the front panel to be 'slotted' into channels in the base unit with the circuit board terminals upwards. With the front panel supported, the terminal strip is accessible for easy wiring.

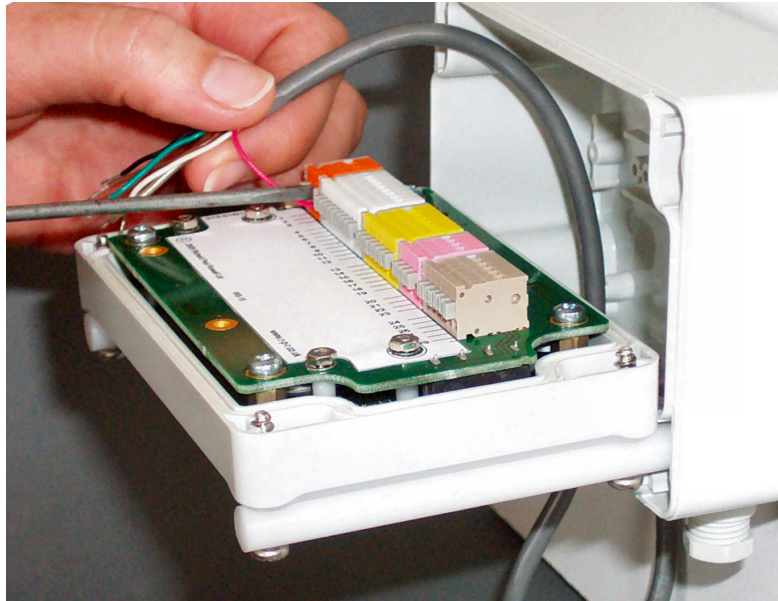


Figure 7: Supported terminal strip ready for wiring

Wiring should be in accordance the following tables (Table 1 to Table 14). These tables should be read in conjunction with Figure 5.



To ease connection, the cores should be prepared as follows:-

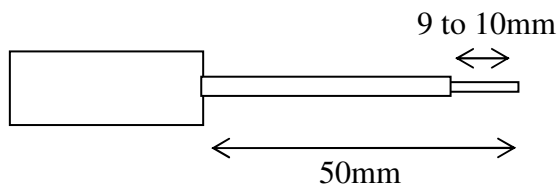


Figure 8: Cable Preparation

It is important that the stripped ends be accurately 9-10mm long to ensure good connections in the terminals. There is a 10mm gauge on the terminal block label.
All screens and drain wires should be sheathed.

To insert a wire into a spring terminal, first strip the insulation leaving 9 to 10 mm of bare wire exposed as indicated in Figure 8

Using a small flat headed screw-driver fully depress the coloured plunger for the required terminal (see Figure 7) and insert the wire as far as it will go, into the hole below the plunger. Release the plunger and the wire is held captive by the connector.
A gentle tug on the wire will confirm that it is held firmly.

If the wire in question is multi-strand, ensure that all strands are inserted in the terminal hole.

When all cores have been fitted, carefully unscrew and remove the temporary rods and fit the front panel to the base unit.



Warning: All GNDs and Screen terminals in the WS-15A Display are common and so damage to the unit may result if they are connected to different voltages.



2.2.3 Generic Terminal Allocations

Table 1

Terminal Block plunger	Signal description	Use
1	Screen	Power
2	Power GND	
3	Supply +V (+9 to 30V DC)	
4	NMEA/Optical Rx input	Wind Sensor See tables in section 2.2.4 for specific RS232/RS485/NMEA connections
5	NMEA/Optical signal GRD	
6	Screen	
7	Power GND	
8	+V supply output	
9	Signal GND	
10	RS232 Rx	
11	RS485A	
12	RS485B	Radio Modem
13	Drain wire	
14	Power GND	
15	+V supply	
16	RS232 Tx output (serial out)	
17	RS232 Rx input (serial in)	
18	CMD output	
19	Reserved for future use	Alarm
20	GND	
21	+ V supply output	
22	Relay A	
23	Relay B	SpaceLogger (W8 or W10) External equipment power
24	Screen	
25	Power GND	
26	+12VDC supply output (W10)	
27	RS232 Rx input	
28	RS232 Tx output	
29	+5VDC supply output (W8)	



2.2.4 Wind Sensor Connections

The WS-15A Display is compatible with a number of wind speed and direction sensors. These comprise the WindSonic range (options 1 to 3), WindObserver range and generic NMEA 0183 version 3 devices outputting the MWV sentence.

Note that WindSonic and WindObserver sensors can be configured to transmit NMEA sentences, but their default transmission rate of 9600 baud is non compliant with the standard NMEA rate of 4800 baud.

The WS-15A is also compatible with sensors communicating via radio modems and in this mode, in conjunction with the WindSonic/Observer ranges, has a facility to display signal strength to aid link set up and fault finding.

The following Table 2 indicates the most common connection configurations which will be encountered.

Sensor Model	WS-15A Sensor Type	Input	I/O Switch setting	Connection Table applicable
WindSonic 1	WindSonic	RS232	Either position	Table 3
WindSonic 2 or 3	WindSonic	RS485	'I' position	Table 5
WindSonic 2 or 3	WindSonic	RS232	Either position	Table 3
WindObserver II	WindObserver	RS485	'I' position	Table 7
NMEA (9600 baud)*	NMEA	OPTICAL	'O' position	Windsonic 1, 2 or 3(RS232) - Table 4 Windsonic 2 or 3(RS485) - Table 6 WindObserver - Table 8
NMEA (4800 baud)	NMEA	NMEA	'O' position	Table 9
WindSonic via Radio modem	WindSonic	RADIO	Either position	Table 12
WindObserver via Radio modem	WindObserver	RADIO	Either position	Table 12
NMEA (9600 baud) via Radio modem	NMEA	RADIO	Either position	Table 12
MetPak II	MetPak II	RS232	Either position	Table 10
MetPak II	MetPak II	RS485	'I' position	Table 11

Table 2

* - When any of the WindSonic or WindObserver ranges are configured to transmit NMEA, they are considered by the WS-15A to be NMEA type.



2.2.4.1 Connection Table for WindSonic sensors 1, 2 and 3 using RS232

Table 3

Terminal Plunger colour	Description	WindSonic 1	WindSonic 2 or 3
4	Not used		
5	Not used		
6	Screen	Cable screen	Cable screen
7	Power GND	WindSonic pin 2	WindSonic pin 3
8	+V supply output	WindSonic pin 3	WindSonic pin 2
9	Signal GND	WindSonic pin 1	WindSonic pin 1
10	RS232 Rx	WindSonic pin 5	WindSonic pin 5
11	Not used		
12	Not used		

Note: Power connections are reversed between Option 1 sensor and Option 2 or 3 sensors

2.2.4.2 Connection Table for WindSonic sensor (with RS232 output) using NMEA or Optical

Table 4

Terminal Plunger colour	Description	WindSonic 1	WindSonic 2 or 3 (output via RS232)
4	NMEA/Optical Rx input	WindSonic pin 5	WindSonic pin 5
5	NMEA/Optical signal GRD	WindSonic pin 1	WindSonic pin 1
6	Not used		
7	Power GND	WindSonic pin 2	WindSonic pin 3
8	+V supply output	WindSonic pin 3	WindSonic pin 2
9	Not used		
10	Not used		
11	Not used		
12	Not used		

Notes:

1. When the NMEA or Optical input is used the small slide switch near these 9 way sensor terminals must be in the **○** position. (See Figure 5).
2. Power connections are reversed between Option 1 sensor and Option 2 or 3 sensors.



2.2.4.3 Connection Table for WindSonic sensor 2 or 3 using RS422/485

Table 5

Terminal Plunger colour	Description	WindSonic 2 or 3
4	Not used	
5	Not used	
6	Screen	Cable screen
7	Power GND	WindSonic pin 3
8	+V supply output	WindSonic pin 2
9	Not used	
10	Not used	
11	RS485A	WindSonic Pin 5
12	RS485B	WindSonic Pin 4

Note: When the RS485 input is used the small slide switch near the 9 way sensor terminals must be in the **I** position. (See Figure 5). When the RS232 input is used, the position of this switch has no significance and may be in either position.

2.2.4.4 Connection Table for WindSonic sensor 2/3 (with RS422/485 output) using NMEA or Optical

Table 6

Terminal Plunger colour	Description	WindSonic 2 or 3 (output via RS422/485)
4	NMEA/Optical Rx input	WindSonic pin 5
5	NMEA/Optical signal GRD	WindSonic pin 4
6	Not used	
7	Power GND	WindSonic pin 3
8	+V supply output	WindSonic pin 2
9	Not used	
10	Not used	
11	Not used	
12	Not used	

Note: When the NMEA or Optical input is used the small slide switch near the 9 way sensor terminals must be in the **O** position. (See Figure 5).



2.2.4.5 Connection Table for WindObserver II using RS422/485

Table 7

Terminal Plunger colour	Description	WindObserver II conductor
4	Not used	
5	Not used	
6	Screen	Cable screen
7	Power GND	Pair 3 – black
8	+V supply output	Pair 3 – red
9	Signal GND	Pair 4 – blue
10	Not used	
11	RS485A	Pair 1 – black
12	RS485B	Pair 1 - green

Note: When the RS485 input is used the small slide switch near the 9 way sensor terminals must be in the **I** position. (See Figure 5).

2.2.4.6 Connection Table for WindObserver II using NMEA or Optical

Table 8

Terminal Plunger colour	Description	WindObserver II conductor
4	NMEA/Optical Rx input	Pair 1 – black
5	NMEA/Optical signal GRD	Pair 1 - green
6	Not used	
7	Power GND	Pair 3 – black
8	+V supply output	Pair 3 – red
9	Not used	
10	Not used	
11	Not used	
12	Not used	

Note: When the Optical input is used the small slide switch near the 9 way sensor terminals must be in the **O** position. (See Figure 5).



2.2.4.7 Connection Table for other NMEA type sensors

Table 9

Terminal Plunger colour	Description	NMEA wind sensor
4	NMEA/Optical Rx input	Dependent on sensor model
5	NMEA/Optical signal GRD	
6	Not used	
7	Power GND	
8	+V supply output	
9	Not used	
10	Not used	
11	Not used	
12	Not used	

Note: When the NMEA or Optical input is used the small slide switch near the 9 way sensor terminals must be in the **O** position. (See Figure 5).

When using the NMEA terminals for connection and selecting Sensor input as NMEA, the baud rate is automatically switched to 4800 baud.

2.2.4.8 Connection Table for MetPak II using RS232

Table 10

Terminal Colour plunger	Description	MetPak II J5 Terminal block
4	Not used	
5	Not used	
6	Screen	Cable screen n/c
7	Power GND	J5 pin 7
8	+V supply output	J5 pin 8
9	Signal GND	J5 pin 2
10	RS232 Rx	J5 pin 3
11	Not used	
12	Not used	



2.2.4.5 Connection Table for MetPak II using RS422/485

Table 11

Terminal Plunger colour	Description	MetPak II J5 Terminal block
4	Not used	
5	Not used	
6	Screen	Cable screen n/c
7	Power GND	J5 pin 7
8	+V supply output	J5 pin 8
9	Not used	
10	Not used	
11	RS422 TX -	J5 pin 3
12	RS422 TX +	J5 pin 6

Note: When the RS422/RS485 input is used the small slide switch near the 9 way sensor terminals must be in the I position. (See Figure 5).

2.2.5 Radio Modem Connections

Table 12

Terminal Plunger colour	Description	Radio Modem Terminal
13	Drain wire	
14	Power GND	5
15	+V supply	9
16	RS232 Tx output (serial out)	3
17	RS232 Rx input (serial in)	2
18	CMD output	7
19	Not used	

The WS-15A Display is suitable for connecting a compatible wind sensor via a Digi® XStream RF 2.4GHz Modem, as supplied by R-P-R Ltd. Connecting the modem via the Radio Modem Terminals allows the signal strength of the radio link to be monitored via the WS-15A Display.

See section 3.1.1 for details on viewing the report of signal strength on the WS-15A Display.

The XStream modem should be set with RT equal to 1.



2.2.6 Volt Free or Audible Alarm Sounder Connections

The 4 way terminal block enables either a volt free relay (control) output, or, a rated +VDC (supply) switched output that is controlled by the WS-15A alarm settings, section 3.1.5 explains alarm set up in detail.

The circuit schematic is shown in Figure 9 below

Terminal Plunger colour	Description	Alarm Sounder (12V operation)	Alarm Sounder (24V operation)
20	Ground	Sounder terminal 3	Sounder terminal 1
21	+VDC supply output (linked to terminal 22 for power option)	n/c	n/c
22	Volt Free : Relay A contact	n/c	n/c
23	Volt Free : Relay B contact	Sounder terminal 4	Sounder terminal 2

Table 13

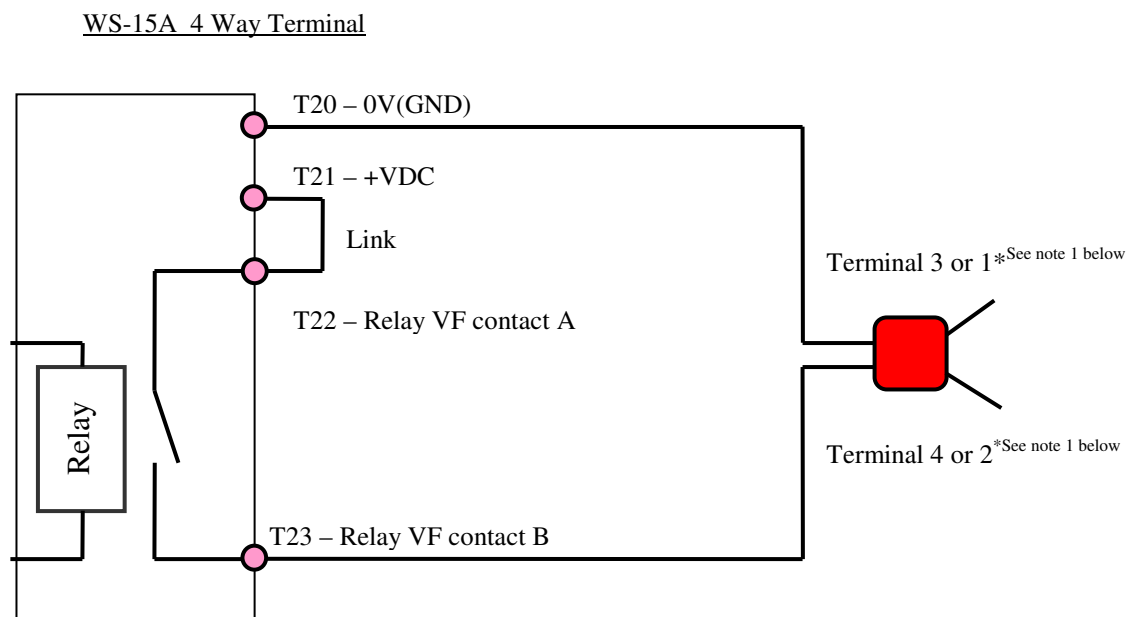


Figure 9: Audible Alarm Wiring Diagram

- * Note 1: Sounder (r-p-r supplied) internal terminal connections are:
3 and 4 for 12VDC operation
1 and 2 for 24VDC operation

Note 2: Terminals 21 and 22 of the WS-15A should be linked for powered switching .



2.2.7 Alarm Sounder - Set-up Options

The optional Alarm Sounder (WSALARM) supplied is prewired with a three metre lead and has adjustments for volume and tone/sequence. The pre-wired lead is set for 12VDC operation as default. If the system is to be powered using a DC source greater than 15V, the internal connections in the sounder should be changed to the 24 VDC arrangement indicated above.

By default, volume is set at the 'mid-way' position of a small potentiometer mounted on an internal printed circuit board and the tone/sequence is set up as single stage alarm producing an alternating tone of 1000hz and 800 hz every 250 msec, selected by a small switch panel similarly mounted.

Access to terminals, the potentiometer and switches can be obtained by carefully separating the two parts (front and rear) of the casing. This is best done by simultaneously squeezing the sides of the rear part, and the top and bottom of the front part. The two parts should then separate.

Note that trying to separate the parts by pulling on the sounder output orifice should not be attempted as this could damage the unit. Take care to retain the sealing rubber washer as the parts are separated.

The printed circuit board is mounted on the front part of the unit. (See Figure 10 opposite).

The unit has the capability of 32 different sets of alarm tone frequencies and intervals and also 2-stage alarming. WS-15A systems are single stage alarming only, but the alternative tone frequencies and intervals can be selected by these are listed in Appendix A2, and are selected using a set of 5 switches mounted on the internal printed circuit board.

When reassembling the unit, take care to correctly locate the sealing rubber washer to ensure a watertight fit, align the two parts, then gently but firmly push them together until the restraining tabs click into their slots.

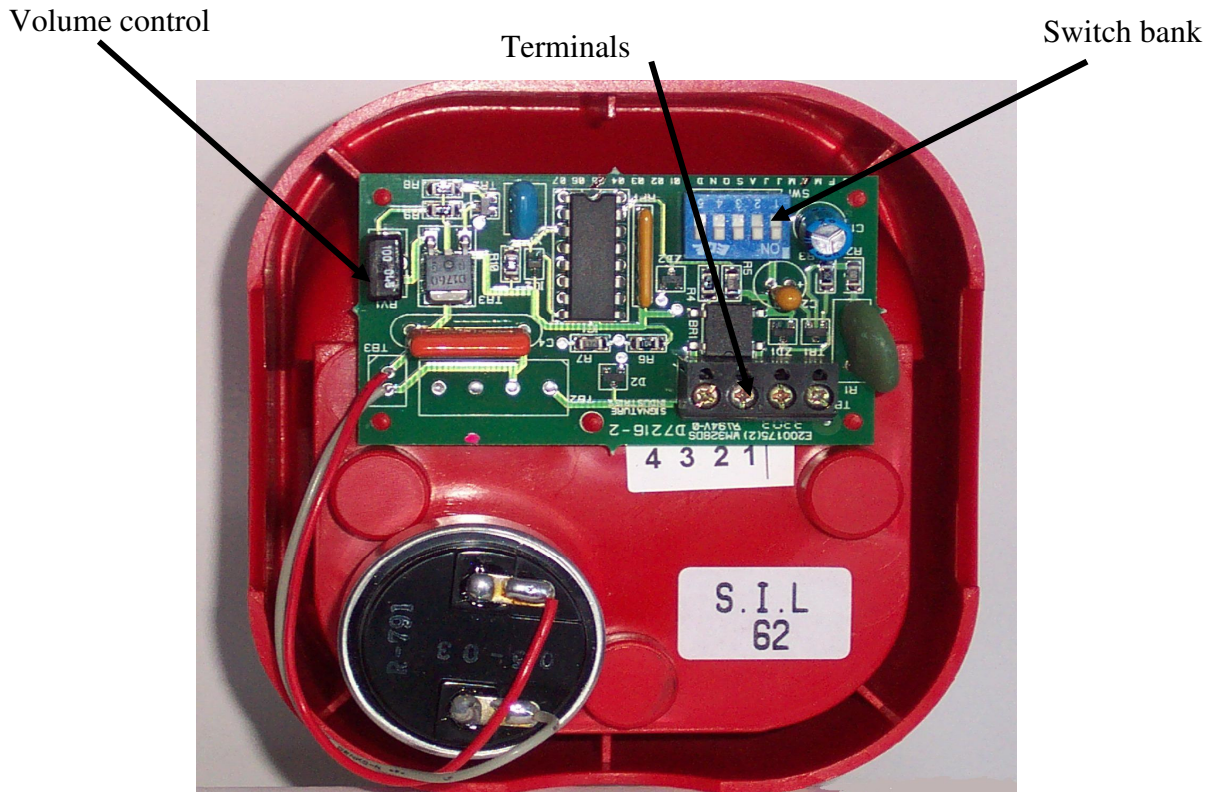


Figure 10: Internal view of WSALARM

2.2.8 W8 or W10 SpaceLogger - WindLogger Connections

WS-15A Terminal	Description	WindLogger Terminal
24	Screen	Not connected
25	Power GND	1
26	+12V supply output (W10)	2
27	Not used	
28	RS232 Tx output Cable core - White	15 (W10) Pin 3 - D9 (W8)
29	+5VDC supply output (W8)	Pin9 – D9 (W8)

Table 14

Data output is at a baud rate of 9600 (even if NMEA data is input to the WS-15A at 4800 baud).

When a WindLogger is connected for wind speed and direction data logging, the start & end characters for sampling are by default that of the WindSonic and WindObserver sensors sending polar continuous message format, i.e. <STX> and <LF>.

If the NMEA data is used, the WindLoggers must be configured to change the start and end characters. Please refer to the W8 WiFi or W10 WindLogger user manual for more detail.



3 OPERATIONAL PROCEDURES

Operator interaction with the WS-15A is through a simple hierarchical menu system, using the 5 membrane switches on the front panel. This section should read in conjunction with the flowchart (see Figure 11)



Figure 11: WS-15A Front panel

From the wind display the ▲ ▼ keys are used to select display settings, sensor settings, data output or wind speed alarm and then the ▶ key is used to display the individual settings. On power up a screen giving the model and software version is displayed. After 2 minutes or pressing any key the display will switch to the main wind information display.

From the main wind information display the ▶ key will scroll to speed of sound and sonic temperature displays (when a WindObserver is selected as sensor type), to signal strength (when input is set to radio) and to the banner screen giving the WS-15A model and software version.

When there is an adjustable value or setting on the display this is indicated by a ⬆ symbol at the bottom right hand corner of the display. The ▲ (up) or ▼ (down) keys can then be used to make a change if required. Settings like on/off or high/low take effect as soon as they are changed.

Multi digit values like the alarm threshold or sensor alignment are adjusted a digit at a time and the ▶ key advances to the next digit. When the required value is obtained pressing the ✓ key will enter the new value or pressing the X key will cancel the change.

3.1 Detailed Operation

This section describes in detail each menu item.

Settings marked Ⓐ are lockable – see section 0 for details.



3.1.1 Entry at Switch On – Banner Display

WS-15A v=2.nn
www.r-p-r.co.uk

When switched on, the WS-15A displays an introduction banner, listing the model and software version. By waiting 2 minutes or by pressing any key enters the wind data display.

Note that whenever displaying Wind Data, pressing the **X** key toggles between it and the Banner.

3.1.2 Wind Data Display

This is the main wind information display:

WindSonic Error= 33
0.0 m/s 000° ↓ N

- | | |
|-------|--|
| Row 1 | Sensor type or 'Wind', Error code number |
| Row 2 | Wind Speed, Wind direction (Numeric degrees), Wind Direction (Cardinals) |

The error code number is displayed if an error condition persists continuously for 5 seconds. A list of error code numbers and their meanings is included as Appendix 5

When displaying Wind Data, pressing the **X** key toggles between it and the model version number screen.

If no keys are pressed for 2 minutes the unit will return to the wind data display.

3.1.1 Other Data Displays

Starting from the Wind Data Display, the other data screens that are available can be viewed by pressing either the **▶** key or the **X** key. These are:

Speed of sound m/s
+000.00

This screen is only displayed when the Sensor Type is set to WindObserver

Sonic temperature C
+000.00

This screen is only displayed when the Sensor Type is set to WindObserver



Signal Strength = 30

>>>>>>>>-----

This screen is only displayed when the Sensor Input is set to RADIO.
The signal strength is represented by a number from 0 to 60 and by a graphical chevron display below.

Pressure

1014.7 hPa

This screen is only displayed when the sensor type is set to MetPak II.

The MetPak II outputs the station pressure measured at the sensor. If a display of barometric pressure (pressure corrected to sea level) is required then a calibration value must be entered. The calibration setting is accessed using the ▲ ▼ keys from the pressure screen and the value is added to the pressure output from the sensor.

Relative humidity

50.9 %

This screen is only displayed when the sensor type is set to MetPak II

Air temperature

+24.1 °C

This screen is only displayed when the sensor type is set to MetPak II

Dew point

+13.3 °C

This screen is only displayed when the sensor type is set to MetPak II

Sensor supply volts

12.8 V

This screen is only displayed when the sensor type is set to MetPak II

WS-15A v=2.nn

www.r-p-r.co.uk

Banner: the introduction banner showing model and software version number





3.1.3 Sensor Settings

This is where information relating to the connected sensor is set up.

Sensor settings ►

Type WindObserver
WindSonic
NMEA
MetPak II

▲ ▼ keys

This defines the format of the data expected by the WS-15A display. For WindSonic, WindObserver and MetPak II refer to section 4.2 for compatible sensor output data formats.

Input RS485
RS232
RADIO
NMEA
OPTICAL

▲ ▼ keys

When NMEA Input option is selected, and Type option NMEA is selected, the baud rate is switched from the default 9600 baud to 4800.

Sensor alignment A correction factor (0 – 359) in degrees may be set to correct for inaccurate sensor installation. Note that if a value >359° is entered, the correction factor is set to 000°. Confirm with ✓ key

▲ ▼ keys

Sensor status ID and Status
These are not user adjustable.
The ID is the ID letter output by the sensor, usually 'Q' for a WindSonic sensor, 'A' for a WindObserver.
For Status or Error messages, refer to Appendix A1

Display sensor data Start with the ✓ key.
This toggles to a screen where the message, as received from the sensor will display.
To exit the screen, press any key.

✓ key

Note when using the MetPak II sensor the calibration for Barometric pressure is accessed using the ▲ ▼ keys from the pressure display screen.



Sensor set up

First select the **type** of wind sensor connected to the WS-15A display. The WS-15A expects the format of the data output by each type of sensor to be as described in section 4.2. In the case of the WindSonic and WindObserver sensors the compatible format is the default option. If a WindSonic or WindObserver is configured to output via NMEA then NMEA must be set as sensor type.

The **input** selection is then determined as follows:

- For any remote sensor communicating to a receiver connected via the modem/radio terminal block, select RADIO as input.
- Where the sensor and WS-15A display do not share a common power source, select OPTICAL as input. This optically isolates the two devices.
- For a sensor wired directly to the WS-15A, select either RS232 or RS485 as appropriate for the sensor output; this assumes a baud rate of 9600. If the sensor outputs via NMEA at 4800 baud then set input to NMEA.

3.1.4 Barometric Pressure Calibration

The pressure settings screen is only available when the sensor type is set to MetPak II . It is accessed using the ▲ ▼ keys from the pressure display.

Pressure settings ►

Calibration

▲ ▼ keys

If a display of barometric pressure (pressure corrected to sea level) is required then a calibration value must be entered. The value is added to the pressure output from the sensor.

3.1.5 Wind Speed Alarm

Wind speed alarm ►

Alarm status	On Off	▲ ▼ keys
Alarm Type	High Low	▲ ▼ keys
Alarm Value	Adjust value and confirm with ✓	▲ ▼ keys
Hold Off time	Adjust value and confirm with ✓	▲ ▼ keys
Hold On time	Adjust value and confirm with ✓	▲ ▼ keys

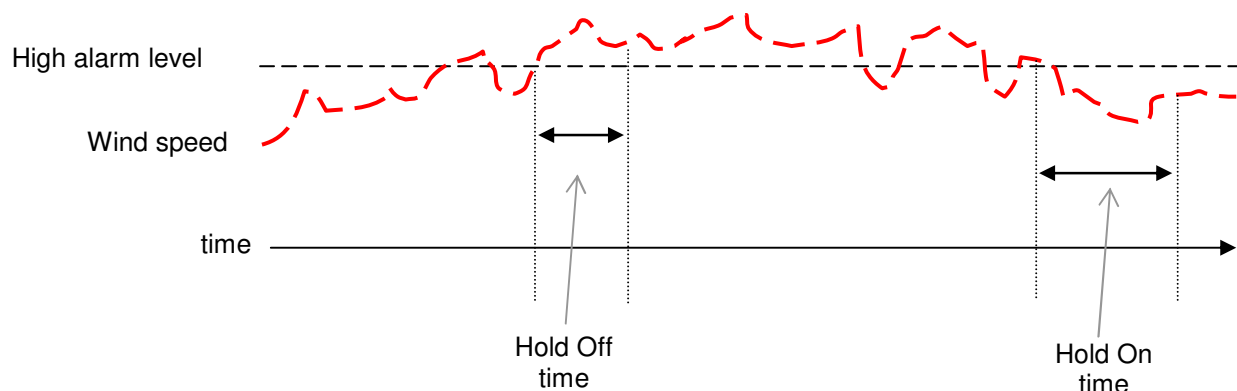


Alarm Operation

The display unit features a wind speed alarm output configurable as either a high or a low alarm. To avoid false alarm events, it also has adjustable hold off and hold on timers.

Hold off time is the time that wind speed is in the alarm state, before the alarm output is triggered, and the Hold on time is the time that the wind speed is out of the alarm state, before the alarm state is considered to be cleared.

Example of high alarm operation:



The display also has a facility to silence the alarm output once it has been triggered.

Wind speed alarm ►
Press ✓ to silence

When the alarm is activated the display will automatically switch to the wind speed alarm screen and show: Press ✓ to silence.

Wind speed alarm ►
Alarm silenced

When the ✓ key is pressed the display will show: Alarm silenced

After 2 minutes, whether the alarm is silenced or not, the display will return to the wind data display. From the wind data display, press the ▲ key to navigate to the wind speed alarm screen and then the ✓ key to silence the alarm.

When in the alarm state the wind speed value on the wind data display will flash.



3.1.6 Data Output

This is where the format of the data to be output to a SpaceLogger, WindLogger or other connected device may be set.

Data output ►	Wind data	On Off	▲▼ keys	🔑
	Rx SS output	On Off <i>Radio signal strength information may be added to the data stream for output to a logger</i>	▲▼ keys	🔑
	New line	On Off <i>When set to 'on' the Rx SS data will be output on a separate line to the wind data</i>	▲▼ keys	🔑

Data output operation:

With the above functions it is possible to select whether wind data, signal strength (applicable only when sensor input is set to RADIO) or both are output to the data logger connections.

If both Rx SS output (radio signal strength) and wind data are output, selecting New Line = on will format the data such that the signal strength is displayed on a separate line, preceded by a # sign. When New Line = off, the signal strength data follows the wind data on the same line with a separating comma.

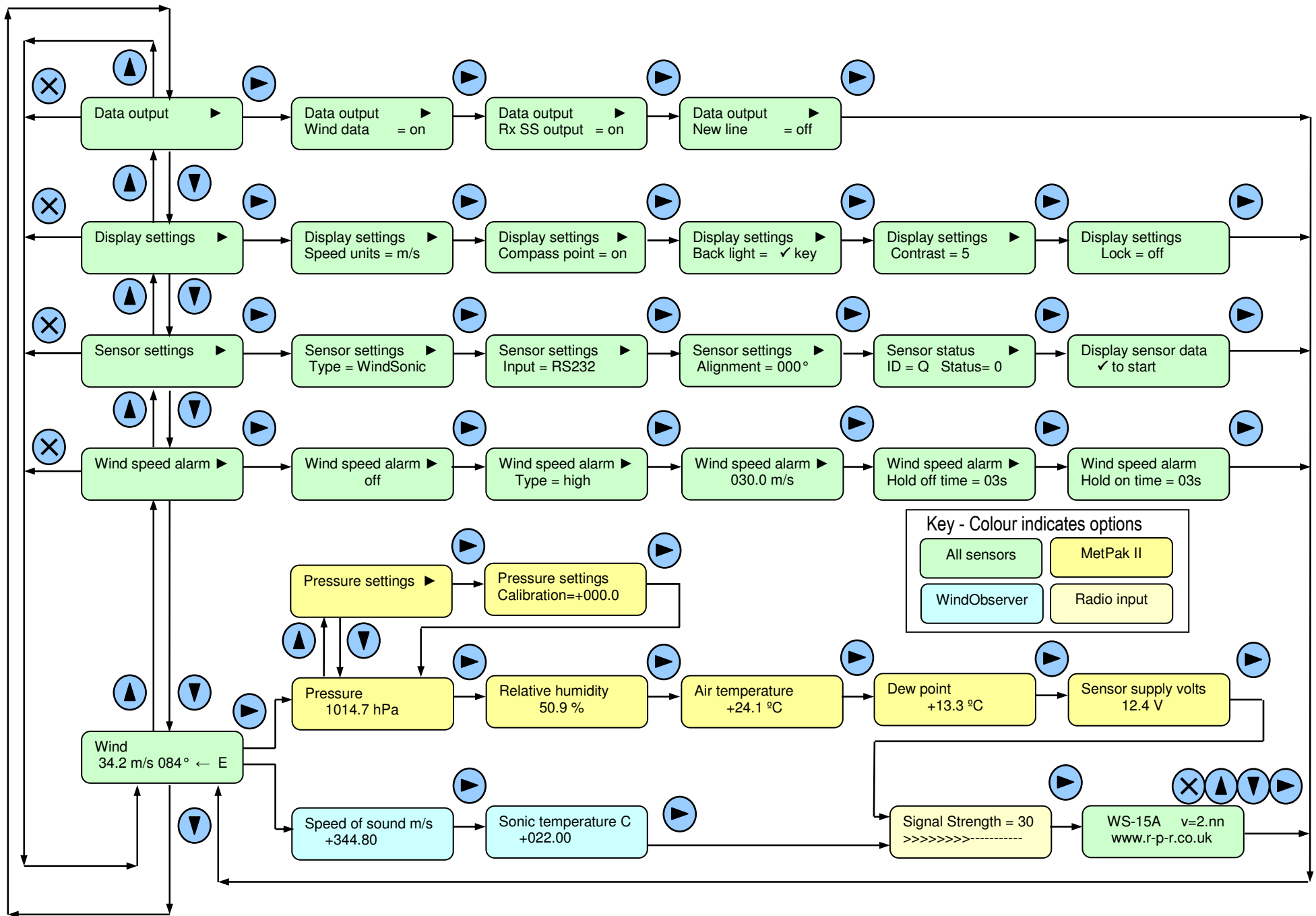


Figure 12: Operational flow diagram



4 WS-15A DISPLAY UNIT SPECIFICATION

4.1 Specification

Physical	Mounting	Surface mounted.	
	Dimensions	Width: 140mm (including mounting feet) Depth: 100mm (including cable glands) Height: 65mm (including mounting feet) Panel Dimensions: 120mm x 80mm	
	Cable Access	Four waterproof glands.	
	Weight	0.35kg	
	Material	ABS Polycarbonate Blend	
Display	Display Type	Two line 20 character dot matrix super-twist LCD with backlight.	
	Operation	5 keys on front of unit for menu navigation, data entry and control functions.	
	Functions (availability depends on connected sensor)	Wind speed, Wind direction Wind speed high/low alarm with hold on and hold off period Sensor alignment adjustment Wind speed units selection Contrast, Backlight, Sensor selection Data output configuration Radio signal strength	Speed of sound Sonic temperature Pressure, Pressure calibration, Relative humidity, Air temperature, Dew point, Sensor supply volts
	Wind direction display	Digital 3 digits with wind arrow and cardinal points.	
	Wind speed display	Digital display with units selection from kts, mph, km/h, fpm, m/s	
Connectivity	Wind Sensor	WindSonic, WindObserver II or MetPak II in factory default format outputting RS232, RS422/RS485 at 9600 baud or other sensors outputting NMEA 0183 MWV sentence at 4800 baud.	
	Sensor Status	Error code displayed for sensor and communications diagnostics.	
	Alarm Output	Volt free relay output. Max 24Vdc at switching current of 0.5A. Contact resistance 0.150 ohm maximum.	
	Data output	RS232 for connection to a W8 WiFi or W10 SpaceLogger, WindLogger or other data logger, computer, communications equipment or additional WS-15A display units.	
Power	Power requirement	9-30Vdc	
	Radio Modem	Digi Xstream-PKG Radio modem as supplied by R-P-R.	
	Current at 12Vdc	20mA – 35mA (backlight on)	
	Supply Input protection	Polarity reversal protected. Internal fuse 500mA slo-blo [®] (Littelfuse type 0454500 or equivalent.)	
Environmental	Operating Temperature	-10°C to +70°C	
	Connection	Internal lever action terminals for AWG 28 to 22 conductors. (0.32 to 0.65mm diameter)	
	Sealing	IP65	
	EMC	EN61326:1977, EN60945:2002 (emissions) EN61326:1997 (immunity)	
Guarantee	Period	1 year. Refer to section 5.3 for terms of guarantee	



4.2 I/O Capability

4.2.1 Data format from WindSonic sensor

Message Format: GILL proprietary Polar, Continuous (default)

<STX>Q,DDD,SSS.SS,U,AA,<ETX>CC<CR><LF>

Where

- Q anemometer identifier. Can be set to any character Q to Z
DDD wind direction in degrees relative to sensor axis
SSS.SS wind speed
U Units M m/s, N knots, P mph, K km per hour, F ft per min.
AA status code: 00 OK, 01 axis 1 failed, 02 axis 2 failed, 04 axis 1 & 2 failed, 08 NVM error, 09 ROM error
CC checksum Exclusive OR of all characters between <STX> and <ETX> as a two character hexadecimal value.
<STX> the ASCII character with a value of 2
<ETX> the ASCII character with a value of 3
<CR> the ASCII carriage return character with a value of 13
<LF> the ASCII line feed character with a value of 10

Transmission speed: 9600 baud

Transmission standard: RS232 or RS485 (dependant on Sensor Model/connection distance)

4.2.2 Data format from WindObserver sensor

Message Format: GILL proprietary Polar, Continuous (default)

<STX>A,DDD,SSS.SS,U,+ZZZ.ZZ,+TTT.TT,AA,<ETX>CC<CR><LF>

Where

- A anemometer identifier. Can be set to any character Q to Z
DDD wind direction in degrees relative to sensor axis
SSS.SS wind speed
U Units M m/s, N knots, P mph, K km per hour, F ft per min
ZZZ.ZZ speed of sound in m/s (if enabled)
+TTT.TT sonic temperature in degrees C (if enabled)



- AA status code: 01 axis 1 failed, 02 axis 2 failed, 04 axis 1 & 2 failed, 08 NVM error, 09 ROM error, 10 system gain at max, inaccurate data likely, 50 marginal system gain - data valid, but marginal operation 51 measurement average building, data valid but warns that average period not reached when averaging used, 60 OK and heating enabled, 62 heating current tripped or electronic failure - valid data still output, 63 heater thermistor open circuit - valid data still output, 65 heating element open circuit - valid data still output, heater element or heater PSU has dropped out/failed
- CC checksum Exclusive OR of all characters between <STX> and <ETX> as a two character hexadecimal value
- <STX> the ASCII character with a value of 2
- <ETX> the ASCII character with a value of 3
- <CR> the ASCII carriage return character with a value of 13
- <LF> the ASCII line feed character with a value of 10

Transmission speed: 9600 baud
Transmission standard: RS422/485

4.2.3 Data format from NMEA sensor

Message Format: NMEA

\$ IIMWV, DDD, R, SSS.SS, U, A*CC

Where

- \$ start of string
- IIMWV instrument identifier and type
- DDD wind direction in degrees relative to sensor axis
- R relative wind measurement
- SSS.SS wind speed
- U Units M m/s, N knots, P mph, K km per hour, F ft per min.
- A status code: A = acceptable measurement, V = void measurement
- * checksum delimiter
- CC checksum Exclusive OR of all characters between \$ and * reported as a two character ASCII hexadecimal value

Transmission speed: 9600 or 4800 baud, dependent on connection terminals used

Transmission standard: RS232, RS422/485 or NMEA



4.2.4 Data format from MetPak II

The MetPak must be set to output as follows at 9600 baud.

<STX>Q,DDD,SSS.SS,PPPP.P,HHH.H,+TTT.T,+ddd.d,+vv.v,AA,<ETX>CC<CR><LF>

where

Q is the MetPak identifier. Can be set to any character A to Z

DDD wind direction in degrees relative to sensor axis

SSS.SS wind speed in m/s

PPPP.P is the pressure in hPa

HH.H is the relative humidity in %

TTT.T is the temperature in degrees C

ddd.d is the dew point in degrees C

vv.v is the MetPak II supply voltage

AA status 00 ok, 01 axis 1 failed, 02 axis 2 failed, 04 axis 1 & 2 failed,

08 NVM error, 09 ROM error, 10 system gain at maximum

CC checksum Exclusive OR of all characters between <STX> and <ETX> as a two character hexadecimal value.

<STX> is the ASCII character with a value of 2

<ETX> is the ASCII character with a value of 3

<CR> is the ASCII carriage return character with a value of 13

<LF> is the ASCII line feed character with a value of 10

4.2.5 To WindLogger or Other Device:

An RS232 output is provided for connecting to a W8 or W10 SpaceLogger - WindLogger or other data logger or computer. It provides a copy of the received data stream from the sensor. This can be particularly useful in some applications when the sensor is connected using RS485 as it can eliminate the need for a separate RS485 to RS232 converter when connecting to a computer.

Transmission speed: 9600 baud

Transmission standard: RS232

To Audio Sounder:

Volt free relay contacts to drive an audio alarm.



5 APPENDICES

5.1 A1. Error Codes

The Wind Display screen may show an error code. These codes are listed below:-

Error Code	Meaning	Cause	Suggested Action
00	Sensor OK NMEA status A		None
01	Axis 1 failed	Insufficient samples in average period on U axis	Check for possible blockage of sensor pathway.
02	Axis 2 failed	Insufficient samples in average period on V axis	Check for possible blockage of sensor pathway.
04	Axes 1 and 2 failed	As above	Check for possible blockage of sensor pathway.
05	NMEA status V	NMEA Void Measurement	Check sensor and connections
06	NMEA error	NMEA reported status is neither A or V	Check sensor and connections
08	NVM error	NVM checksum failed	Refer to R-P-R
09	ROM error	ROM checksum failed	Refer to R-P-R
10	System gain at maximum	Possible partial blockage of sensor pathway	Check for possible blockage of sensor pathway.
32	WS15A detected input checksum error	Poor communications	Check WindSonic plug and terminations in WS15A enclosure. Check routing of connection cable for potential interference. If using radio link, check radio operation
33	No sensor signal	No signal being received by WS-15A	Check that the sensor settings input is set to the correct value for your sensor. If using the RS485 or optical input check the position of the switch above the white terminals. • = optical, I = RS485. Check WindSonic plug and terminations in WS15A enclosure.
50	Marginal system gain	Data valid, but marginal operation	
51	Measurement average building	Data valid but warns that average period not reached when averaging used	
60	Sensor OK and heating enabled		None
62	Heating current tripped or electronic failure	Valid data still output	
63	Heater Thermistor open circuit	Valid data still output	
65	Heating element open circuit	Valid data still output, Heater Element or Heater PSU has dropped out/failed	



5.2 A2. Audible Alarm Tone settings

Switch settings are shown as '1' = ON

Tone/Frequency set	Switches 1 to 5					Tone Description
	S1	S2	S3	S4	S5	
1	1	1	1	1	1	Alternate 1000Hz and 800Hz 250msec
2	0	1	1	1	1	Alternate 3100Hz and 2500Hz 250msec
3	1	0	1	1	1	Alternate 1000Hz and 800Hz 125msec
4	0	0	1	1	1	Alternate 3100Hz and 2500Hz 125msec
5	1	1	0	1	1	Alternate 554Hz 100 msec with 440Hz 400msec
6	0	1	0	1	1	Alternate 470Hz and 430 Hz 500msec
7	1	0	0	1	1	Alternate 1000Hz and 800Hz 62.5msec
8	0	0	0	1	1	Alternate 3200Hz and 2500Hz 31.25msec
9	1	1	1	0	1	Alternate 554Hz and 440Hz 1 sec
10	0	1	1	0	1	700hz continuous
11	1	0	1	0	1	1000hz continuous
12	0	0	1	0	1	1000hz continuous
13	1	1	0	0	1	2300hz continuous
14	0	1	0	0	1	440hz continuous
15	1	0	0	0	1	Alternate 1000Hz and silence 1 second
16	0	0	0	0	1	Alternate 420Hz and silence 625msec
17	1	1	1	1	0	Alternate 1000Hz and silence 250msec
18	0	1	1	1	0	Alternate 2500Hz and silence 125msec
19	1	0	1	1	0	Alternate 2500Hz and silence 250msec
20	0	0	1	1	0	700Hz 6 secs followed by silence 12 secs
21	1	1	0	1	0	Alternate 1000Hz and silence 500 msec
22	0	1	0	1	0	Alternate 700Hz and silence 2 seconds
23	1	0	0	1	0	Alternate 700Hz and silence 125msec
24	0	0	0	1	0	720Hz for 700msec followed by silence 300msec
25	1	1	1	0	0	Alternate 1400Hz and silence 100msec increasing volume over 13secs
26	0	1	1	0	0	Ramping from 250Hz to 1200Hz and back to 250Hz over 85msec
27	1	0	1	0	0	Ramping from 250Hz to 1000Hz over 10sec , steady for 40 secs, then ramp down to 250Hz over 10 secs
28	0	0	1	0	0	Three alternates of 800Hz and 1000Hz each of 500msec followed by silence 1.5 secs
29	1	1	0	0	0	Ramping from 420Hz to 1000Hz over 167msec
30	0	1	0	0	0	Ramping from 500Hz to 1200Hz over 4.5secs
31	1	0	0	0	0	Ramping from 2500Hz to 500Hz over 1 sec
32	0	0	0	0	0	Ramping from 250Hz to 1200Hz and back to 250Hz over 800msec



5.3 A3. 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.

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.

This system and its documentation have been designed to measure, display and annunciate wind speed and direction information only, in order to assist individuals who require such data. Displayed information should not be used in isolation to make safety related decisions of any nature.



3.1 A4. Electromagnetic Conformity

EC DECLARATION OF CONFORMITY ACCORDING TO COUNCIL DIRECTIVE 89/336/EEC

We, Richard Paul Russell Limited of
New Harbour Building
Bath Road
Lymington
Hampshire SO41 3SE
United Kingdom

Declare under our sole responsibility that the product:

WS-15A Display

Manufactured by: Richard Paul Russell Limited

To which this declaration relates, is in conformity with the protection requirements of Council Directive 89/336/EEC 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 EN 61326:1977
EN60945:2002

Immunity EN61326:1997

Signed by:

R.P.Russell

Richard Paul Russell – Director

Date of Issue: 18 April 2007

Place of Issue Richard Paul Russell Limited
New Harbour Building, Bath Road
Lymington SO41 3SE, UK



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.

