**VALEPORT LIMITED**

**Radio Telemetry**

**Operating Manual**

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# 1 INTRODUCTION

The addition of the radio option allows real time data telemetry from remote sites. All set up functions and data extraction may also be performed over the link via TideMaster Express or Hyperterminal.

Site ID and transmit skew options for multi-gauge networks are available via the TideMaster setup.

## 1.1 RADIO (SITE TRANSCEIVER)

| | |
|---|---|
| Housing: | IP67 Moulded ABS box with o-ring seals, and separate battery & electronics compartments. |
| Power input: | Requires 9 – 29 vDC. |
| Backup Battery: | The telemetry unit is fitted with 4 Alkaline D-Cell batteries to provide back-up power during long term deployments or power for short term deployments. Internal battery Capacity is 13,000mAH @ 6vDC(based on 75% efficiency). |
| Antenna: | Standard 0dB whip antenna, plugged directly onto housing. Optional 3dB omnidirectional antenna with 10m cable. |
| Frequency: | 458.5 to 458.95 MHz |
| Channels: | 10 @ 0.05 MHz spacing |
| Channel select: | Push button switches inside housing |
| License: | Conforms to EN 300 220, EN 300 133 approvals. |
| Power output: | 500mW maximum, to comply with UK MPT1329 regulations. |
| Dimensions: | 260 x 160 x 55mm |
| Weight: | 2kg |

## 1.2 RADIO (BASE TRANSCEIVER)

| | |
|---|---|
| Housing: | Desktop style painted aluminium housing, with connections for antenna, PC interface and external DC power. |
| Power input: | 12vDC, via cable supplied. |
| Antenna: | 3dB omnidirectional antenna with 10m cable. |
| Frequency: | 458.5 to 458.95 MHz |
| Channels: | 10 @ 0.05 MHz spacing |
| Channel select: | Push button switches on front panel |
| License: | Conforms to EN 300 220, EN 300 133 approvals. |
| Power output: | 500mW maximum, to comply with UK MPT1329 regulations. |
| PC Interface: | 9 pin Dtype connector with RS232 output to PC. 9 pin to 9 pin interface cable supplied. |
| Dimensions: | 200 x 180 x 90mm |
| Weight: | 2kg |

## 1.3 OPTIONAL RADIO TELEMETRY EQUIPMENT:

Radio transceiver unit in IP68 Housing
50cm communications lead
0dB whip antenna
External power supply cable
Radio transceiver and desktop housing
1 metre RS232 communication lead to PC
External DC power lead
3db omni-directional antenna with 20 metre cable and 2 x 8-nut clamp

# 2 INSTALLATION

## 2.1 SITE RADIO UNIT

The radio unit should also be fixed above the water line, away from dripping water. It should be positioned close enough to the TideMaster to ensure that the comms cable is not under any tension when fitted. Connect to an external 9-29 vDc power supply using the cable supplied.

**Before applying power, ensure that the antenna is connected.**
**Failure to do so may result in damage.**

Try to ensure that the line of sight from the whip antenna to the base station is impeded as little as possible. If the optional 3dB antenna is being used, it should be sited as high as possible to minimise ground reflections, and the 10m cable should be clipped or tied along the route to the radio unit itself. See Section 2.5 for further information on antenna siting.

## 2.2 BASE STATION RADIO UNIT

The base station radio unit should be positioned adjacent to the PC, which will be receiving the data. Connect the radio unit to a spare 9pin comm port (or via a USB port using the supplied adaptor) on the PC, using the interface lead provided, and connect the radio unit to a DC power supply using the lead provided. The unit will accept a power input of 10 – 28vDC. The red pin should be connected to the +ve DC supply, the black pin to the 0v supply, and the green pin to a separate earth connection if required. If a separate earth connection is not required or unavailable, leave this pin disconnected.

**Before applying power, ensure that the antenna is connected.**
**Failure to do so may result in damage.**

Site the antenna as high as possible, and with as clear line of sight to the gauge as possible. See Section 2.5 below for hints on antenna positioning. Clip or tie the antenna cable along its route to the radio unit.

## 2.3 SELECTING RADIO CHANNEL

The radio system is fitted with a selectable frequency transceiver at each end, with 10 channels in the range 458.5 to 458.95 MHz. A guide to the channel numbering is given in Appendix 3. The channel selector switch is located on the front panel of the Base Station Unit, and under the top cover of the Site Unit. To select a channel, simply use the +/- switches to select the required channel number.

**Ensure that both units are set to the same channel.**

Note that the system does not need to be turned off to perform this change. Avoid selecting channel numbers outside the range of 0 to 9.

## 2.4 HINTS ON SITING ANTENNAE

UHF radio propagation is essentially line of sight.

The maximum operating range is determined by obstructions to the line of sight, reflections from objects near the radio path and reflections from the ground.

Locations producing reflections will produce large amounts of position dependent signal fading.

The antennae should generally be as high as possible to reduce ground reflections. The final height and position of the antennae may need to be found by trial and error in highly reflective environments.

In practice there will always be a certain amount of signal fading due to changing conditions, so it is usual to allow a fade margin in determining path performance. The amount depends primarily on the susceptibility of the path to fading and the acceptability of data corruption's to the system. Fade margins of between 10dB and 30dB are common.

Co-siting the receiving antenna with another UHF transmitting antenna may cause the receiver to be desensitised. In this situation the antenna should be sited as far away as possible from, and with its most insensitive axis towards, the interfering antenna.

# 3 RADIO & ANTENNA SPECIFICATIONS

The standard radio transceivers used with the radio telemetry option are of Kestrel G450-470/3EA, manufactured by Wood & Douglas Ltd.

The transceivers feature selectable frequency transmission, in the UK licence exempt band of 458.5 to 458.95MHz. The channel is selected by means of push button switches connected to a Valeport microprocessor.

Valeport accept no liability for transmission failure due to interference on any specific frequency. Any necessary fees and licences are the sole responsibility of the end user.

| Channel | Frequency/MHz |
|---|---|
| 00 | 458.50 |
| 01 | 458.55 |
| 02 | 458.60 |
| 03 | 458.65 |
| 04 | 458.70 |
| 05 | 458.75 |
| 06 | 458.80 |
| 07 | 458.85 |
| 08 | 458.90 |
| 09 | 458.95 |

As standard, the site radio unit is supplied with a 0dB whip antenna. The base station radio unit is supplied with a 3dB omnidirectional colinear antenna, which is also optionally available for the site radio. Both antennae have an impedance of at least 50ohm, and it is essential that they are connected to the radio before power is applied

Specification of Radio Structures FUC-3 Antenna

| | |
|---|---|
| Gain over ½ wave dipole | 3dB |
| VSWR | Better than 1.5:1 over the operating band |
| Maximum Input Power Rating | 150W |
| Input Impedance | 50Ω |
| Bandwidth | ±2% of centre frequency |
| Polarisation | Vertical |
| Half Power Beamwidth | 32º |
| Connection | 10m length of RG213 terminated N type socket and PVC sleeve |
| Radiating Elements | Brass rod plasfilm coated |
| Encapsulation | Reinforced glass fibre tube |
| Length | 1.160m @ 460MHz |
| Weight | 1.1kg |
| Wind Loading | 6.4kgf @ wind velocity of 160kph |

# 4 INSTRUMENT AND RADIO SETUP INFORMATION

The following table outlines the set up of the main gauge and any radio configuration as set before leaving Valeport Ltd.

| **Contract Number** | **9253** | **Date** | **05/03/2012** |
|---|---|---|---|
| | | | |
| **Main Gauge (Type)** | TideMaster Tide Gauge (Display Version) | | |
| **Serial Number** | 38194 | | |
| **Local output baud rate (Baud rate to PC)** | 115200 | | |
| **Data Output format** | TideMaster NMEA | | |
| **Software version supplied** | 0741705A1 | | |
| **Is a radio supplied?** | Yes | | |
| **Radio Transmitter Serial Number** | 38603 (Channel 1) | | |
| **Type of radio installed** | Kestrel G450-470/3EA | | |
| **Radio (serial number)** | 337289 | | |
| **Transmission baud rate** | 19200 | | |
| | | | |
| **Receiver (Type)** | Non-Display receiver (04000569) | | |
| **Serial Number** | 38604 | | |
| **Type of radio installed** | Kestrel G450-470/3EA | | |
| **Radio (serial number)**<br>**Transceiver baud rate** | 339006<br>19200 | | |
| **Local output baud rate (Baud rate to PC)** | 19200 | | |
| **Local output format** | TideMaster NMEA | | |
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| **ADDITIONAL NOTES** | | | |
| 3dB Antenna Serial Number: 2683 & 92071<br>458.5-458.95MHz Frequency Radios | | | |

## 5 WIRING DIAGRAM

| | | | END 1: 7 Way Souriau UTS Connector **GSM/Radio** | | END 2: 7 Way Souriau UTS Connector **TIDEMASTER** | | FUNCTION |
|---|---|---|---|---|---|---|---|
| WIRE TYPE | WIRE COLOUR | WIRE LENGTH | CONNECTOR | PIN | CONNECTOR | PIN | |
| Blue 8Way 600 | RED | 0.5Mt | 7 way size 10 Male | A | 7 way size 10 Female | A | POWER IN to Tidemaster from GSM/Radio unit |
| | BLACK | | | B | | B | POWER GND |
| | BLUE | | | C | | D | RS232 GSM OUT |
| | YELLOW | | | D | | C | RS232 INTO GSM |
| | GREEN | | | E | | E | RS232 GND |
| | BROWN | | | n/c | | F | COMMS_SEL |
| | WHITE | | | G | | G | RADIO ON |
| | SCREEN | | | F | | E | SCREEN |

**Note:** Put red coding ring on tidemaster end