

VALEPORT LIMITED
SoundBar 2 Digital Bar Checker
Operation Manual

Reference: 0652801

Date: June 2003

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1 **INTRODUCTION**

This manual covers the operation of the Valeport SoundBar 2 Digital Bar Checker. The SoundBar 2 is a specific configuration of Valeport's proprietary "time of flight" sound velocity sensor, which utilises advanced Digital Signal Processing techniques to give high resolution, high accuracy sound speed data. It has been designed to provide hydrographic surveyors with a quick, safe and highly accurate method of calibrating acoustic surveying equipment.

Features of the SoundBar 2 system covered in this manual include:

- Choice of operating modes; continuous, depth profiling or "Bar Check" mode.
- Real time data display
- Logging of real time data
- Data output in a selection of standard formats

2 HARDWARE & SPECIFICATION

The SoundBar 2 system consists of the following items, supplied with an operating manual in a transit case:

2.1 UNDERWATER INSTRUMENT

Housing:

Titanium, 6000m rated

Invar / titanium / polycarbonate transducer assembly

Sound Speed:

Digital time of flight sound velocity sensor

Sensor materials: Titanium
Invar (steel type alloy) pillars
Polycarbonate window
Zinc anode

Accuracy $\pm 0.05\text{m/s}$ ($\pm 0.03\text{m/s}$ rms)

Resolution 0.001m/s

Range 1400 – 1600m/s (standard), options available.

Response time Single pulse takes between 110 μs and 140 μs

Pressure:

Strain gauge pressure sensor

Accuracy $\pm 0.05\%$ range

Resolution 0.005% range

Range SoundBar 2 standard is 100dBar. Options available to 600Bar

Response Time 20ms

2.2 CABLE

The SoundBar 2 system is supplied with a 20m signal cable (optionally up to 100m), fitted with a subsea line connector for mating to the underwater instrument.

The cable used is a Valeport's 8 core polyurethane signal cable. This cable also has a central kevlar strain member, giving the cable a maximum working load of 100kg.

The cable is fitted with an eye, close to the subsea line connector. This eye should be fixed to the suspension strop on the stainless steel deployment cage to prevent excessive force being applied through the line connector itself.

The wiring of the cable is given in Section 6.

2.3 DISPLAY UNIT

Construction ABS plastic, with o-ring sealed acetal battery cover. Waterproof to IP67 (10 secs at 0.3m).

Batteries 8 x 1.5v alkaline "C" cells, providing approximately 36 hours continuous use.

Logging 128kbyte RAM memory stores over 16,000 records.

Connectors 10 way Mil-spec to instrument.


4 way Mil-spec provides RS232 comms to PC for real time data and logged data output.

3way Mil-spec for external 12vDC power input via optional lead

Dimensions 244 x 163 x 94mm, 2kg.

3 OPERATION

Once the underwater sensor unit has been connected to the display unit using the 20m cable, the unit can be switched on. The following pages describe the screens viewed, and the detailed functions available.

Switch unit On using  button. This is acknowledged by a beep from the unit. This key is also used to switch the unit Off at any point during operation. Switching the unit On reveals the following display:

```

      8 0 0 8   D i s p l a y   U n i t
S o u n d B a r   I I   V e r s i o n   1 . 0 0   2 0 0 3
      V a l e p o r t   L t d .
P r e s s   K e y   T o   C o n t i n u e
  
```

As instructed, press any key to continue. The following display appears.

```

< < R U N                               T O G G L E   B ' L I G H T > >
< < S E T U P                           S E T   T I M E / D A T E > >
< < S E T   O U T P U T                   C D U   M E M O R Y > >
  
```

This screen is the main navigation screen for setting up and operating the SoundBar 2. The functions of each key are described briefly below, with further detail in subsequent sections where necessary.

- RUN** Places the unit in Run Mode using the current sampling regime. See Section 3.5.
- SETUP** This key gives access to the overall sampling setup menu, where users may set the sample mode and related parameters. See Section 3.1 for further details.
- SET OUTPUT** A key feature of the SoundBar 2 is its ability to output data in a variety of widely accepted formats, for easy interface to existing systems. This key allows the required data format to be selected, and also allows units conversion between metres and feet – see Section 3.4
- TOGGLE B'LIGHT** The LCD screen is fitted with an integral backlight facility, to aid viewing in low light. Pressing this key toggles the backlight on and off. Since the backlight is hard to see under good lighting, an asterisk (*) will flash in the top left hand corner of the display while the backlight is on.
- SET TIME/DATE** The display unit has its own internal clock, with Lithium battery back-up. Real time data, logged data and some output formats carry reference to the time at which data was acquired, so it is important that this is correctly set. Refer to Section 3.2
- CDU MEMORY** This button accesses the units internal memory, allowing data upload, data viewing, and turning logging on and off. Refer to Section 3.3

3.1 SETUP

Pressing the SETUP key on the main display reveals the following screen:

```

                S A M P L I N G   S E T U P
< < <  O P E R A T I N G   M O D E   =   F R E E   R U N N I N G
< < <  S E T U P                                     T A R E   > > >
< < <  S A L T   W A T E R                             E X I T   > > >

```

The following Sections describe the functions of each button on this screen.

3.1.1 OPERATING MODE

The **OPERATING MODE** key toggles through the two available operating modes of the SoundBar 2:

FREE RUNNING The instrument will measure and log continuous data samples at a defined rate.

PRESSURE TRIP The instrument will take sound velocity and pressure readings at defined depth increments through the water column.

3.1.2 SETUP

The SETUP key allows the required parameters for each sampling mode to be set:

FREE RUNNING mode

```

                                R A T E   S E T U P
                                O . K   > > >
1   H z   [   ]
2   H z   [   ]
4   H z   [ * ]
8   H z   [   ]
                                N E X T > > >

```

In Free Running mode, the user may set the update rate of the sensor output. Choose between 1, 2, 4 or 8Hz (each sample is a single reading). Use the NEXT key to move through the available sampling rates, and the OK key to confirm selection.

PRESSURE TRIP mode

```

< < < F A S T                               I N C R E A S E > > >
T R I P   P O I N T   =       : 0 0 0 1 . 5   M
D E P T H   I N C R E M E N T   =       : 0 0 0 . 1   M           E X I T > > >
< < < N E X T                               D E C R E A S E > > >

```

In Pressure trip mode, the user sets the depth at which the first measurement should be taken (**TRIP POINT**), and the subsequent change in pressure before each of the following readings are taken (**DEPTH INCREMENT**). When the sensor returns to the TRIP POINT, readings will stop.

When operating in this mode, the sensor is actually sampling continuously at 8Hz, but discarding data that does not fulfil the trip point or increment requirements. In the example shown, it may be that the sensor is being dropped at a rate of 1m/s (12.5cm/s), and that a reading is made at exactly 1.4m. The next reading will be at 1.525m, and will be kept as the first reading past the trip point, even though it does not match exactly.

To change the TRIP POINT, use the **INCREASE** and **DECREASE** keys to change the displayed value. The top left button toggles between **FAST** and **SLOW** scrolling through the available range.

Use the **NEXT** button to move to the DPETH INCREMENT value, and again use the INCREASE, DECREASE and FAST/SLOW buttons to set the required value.

Once the values have been set as required, press the **EXIT** button.

3.1.3 SALT / FRESH WATER

The sound velocity sensor fitted to the SoundBar will measure in both Fresh & Salt Water, giving accurate readings right through the sensor range. However, the conversion of pressure readings into accurate depth values is dependent on knowing the type of water in which the system is being used. For this reason, the user should use this button to toggle between **SALT** and **FRESH** water.

3.1.4 **TARE**

The pressure sensor fitted to the SoundBar 2 is an absolute pressure sensor – that is to say, it measures the total pressure acting on it, including atmospheric pressure. To allow this pressure data to be converted into accurate readings of water depth, the atmospheric pressure value needs to be removed from each reading. Before deployment, the sensor should be positioned at the water surface (in practical terms, within a few metres of the surface is acceptable, e.g. on the deck of the vessel), and the pressure TARE value set.

Press the **TARE** button to display the following:

```
P R E S S   A N Y   K E Y   W H E N   T R A N S D U C E R
I S   A T   S U R F A C E   L E V E L .
```

Follow the on screen instructions:

```
T A R E   V A L U E   H A S   N O W   B E E N   S E T .
P R E S S   A N Y   K E Y   T O   C O N T I N U E .
```

When all the system settings have been adjusted, press the **EXIT** key to return to the main menu.

3.2 **SET TIME/DATE**

All real time and logged data carries reference to the time at which it was acquired. The display unit contains its own real time clock, which should be set by pressing the **SET TIME/DATE** key in the main navigation screen:

```
< < < N E X T                               I N C R E A S E > > >
T I M E :   1 0 : 4 7                           E X I T > > >
D A T E :   2 6 / 0 6 / 2 0 0 3
                                               D E C R E A S E > > >
```

NEXT Toggles through hours, minutes, day, month, century, year.

INCREASE This key increases the selected parameter

DECREASE This key decreases the selected parameter

EXIT Press this key to confirm changes and return to previous screen

3.3 CDU MEMORY

The Control Display Unit (CDU) is fitted with a 128kbyte, solid state, battery backed RAM memory. Depending on which mode is used, this can store up to 16,000 records, which may then be downloaded in a variety of formats via the RS232 port on the side of the box.

Each time the instrument is set into RUN mode, a new file is created, and each data point measured is appended to the current file. The maximum number of files is 999, but each of these files may contain as many records as remaining memory allows.

Pressing **CDU MEMORY** key in the main navigation screen reveals the following display:

```

          C D U   L O G G I N G   M E N U
< < < F I L E   T A B L E           E X T R A C T   C D U   M E M O R Y > > >
< < < L O G G I N G   O N           E R A S E   M E M O R Y > > >
< < < M E M O R Y   F R E E           E X I T > > >

```

FILE TABLE Displays a summary of the sampling information for each file stored. See Section 3.3.1

LOGGING ON Toggles the memory function on and off.

MEMORY FREE Displays information about the available memory. See Section 3.3.2

EXTRACT CDU MEMORY Uploads stored data to PC via RS232 port. See Section 3.3.3

ERASE MEMORY Initiates memory deletion process. See Section 3.3.4

EXIT Returns to previous screen.

3.3.1 FILE TABLE

Pressing the **FILE TABLE** key commands the system to display a summary of each data file stored. The format of the display will vary according to the sampling mode, as shown:

FREE RUNNING

```

          C D U   L O G G E D   D A T A
1   O F   0 0 3   F I L E ( S )           1 1 8   B y t e s   N E X T > > >
   D A T E       2 4 / 0 6 / 2 0 0 3       1 4 : 1 0 : 2 5
   S A M P L I N G   M O D E   =   F R E E   R U N N I N G   L A S T > > >
   S A M P L E   R A T E       =   8 H z
                                          E X I T > > >

```

PRESSURE TRIP

```
          C D U   L O G G E D   D A T A
3   O F   0 0 3   F I L E ( S )           1 7 8   B y t e s   N E X T > > >

S A M P L I N G   M O D E   =   P R E S S U R E   T R I P   L A S T > > >
D E P T H   T R I P           =   0 . 3   M
D E P T H   I N C             =   0 . 1   M
                                     E X I T > > >
```

To cycle through the files use the **NEXT** and **LAST** keys on the right hand side of the screen. **EXIT** returns to the previous screen.

3.3.2 MEMORY FREE

The memory free button reveals the following display:

```
          N o   o f   B y t e s   F r e e   =   1 2 1 2 5 0
          0 0 7   E X I S T I N G   F I L E ( S )
                                     E X I T > > >
```

The 128kbyte memory offers a total of 2^{17} (131072) bytes. In the above example, 121250 bytes remain. The 9822 bytes used are stored in 7 separate data files.

EXIT returns to the previous screen.

3.3.3 EXTRACT CDU MEMORY

Stored data may be uploaded to PC as ASCII text via the 4 pin RS232 port on the side of the display unit, using the interface lead provided.

Pressing the **EXTRACT CDU MEMORY**. Reveals the following display:

```

                E X T R A C T   D A T A
                                     U P L O A D > > >

                C O N N E C T   P C
                                     E X I T > > >

```

The user will need to run a Terminal Emulation program on the PC, such as HyperTerminal or ProComm, in order to capture the text data as it is output. Set the port communications to the correct baud rate, 8 data bits, 1 stop bit and no parity. Flow control should be set to NONE. The correct baud rate is the same as that set under the **SET OUTPUT** menu, see Section 3.4

In HyperTerminal, the Capture Text function should be activated by selecting Capture Text from the Transfer menu. Name a text file in a suitable directory (if the file does not exist it will be created), and press OK. As data is received from the display unit, it will now be saved to this file.

When the terminal program is ready to receive data, press the **UPLOAD** key on the display. The display will indicate that data is being uploaded, and when uploading is complete. The user should see the data being output on the PC screen.

To view the data, the user will need to view the text file in a word processor or spreadsheet package.

Note that all data will be output in the format that is selected under Section 3.4. Data logged in Bar Check mode will be output in the standard Bar Check format.

3.3.4 ERASE MEMORY

To erase the memory in the display unit, and return the file pointer to File 0, use the **ERASE MEMORY** key. The following will be displayed:

```

                M E M O R Y   E R A S E
                                     Y E S > > >

                C O N F I R M   M E M O R Y   E R A S E
                                     E X I T > > >

```

The user is asked to confirm that memory will be deleted, with the **YES** key. To leave this function without deleting memory, press **EXIT** now. **Once memory is erased, it cannot be recovered.**

3.4 SET OUTPUT

The SoundBar 2 display unit can be set to output real time data and logged data in a selection of widely used formats, as well as Valeport' s own standard format. Pressing the **SET OUTPUT** button on the main navigation screen reveals the following display:

```

                O U T P U T   M E N U
< < <   4 8 0 0   B A U D
                V A L E P O R T   O U T P U T                N E X T > > >
< < < T O G G L E   U N I T S   =   M E T R E S                E X I T > > >

```

Use the **BAUD** button to toggle through the available baud rates for the data output. These are currently 4800, 9600 or 19200. This baud rate will also apply when uploading logged data.

To switch the output units from metres to feet, use the **TOGGLE UNITS** button. These units will be used in logged data, on-screen real time data, and real time data output via the RS232 port.

The currently selected output format is shown in the centre of the screen. Use the **NEXT** key to toggle through the available outputs. Use the **EXIT** key to confirm and return to previous screen.

3.4.1 AVAILABLE OUTPUTS

The output formats currently available are:

VALEPORT

This is the default Valeport mode. Logged data is in Valeport format and includes header information for each file. Real time data is output with no header information.

Logged Data Output Sample:

```

SAMPLING·MODE·:=·FREE RUNNING
SAMPLE·RATE·:=·1Hz
S/N·:=·12345
DATE·:=·01/07/2003 → ·13:13:35
1496.725 → 1496.725 → 0000.55
1496.756 → 1496.741 → 0001.07
1496.761 → 1496.747 → 0001.64
1496.778 → 1496.755 → 0002.02

```

where *italicised* parameters are variables, “ ” signifies a space, and “→” signifies a tab. The data is Sound Velocity, then mean Sound Velocity, then Depth.

Real Time Data Output Sample:

```

1496.725 → 1496.725 → 0000.55
1496.756 → 1496.741 → 0001.07
1496.761 → 1496.747 → 0001.64
1496.778 → 1496.755 → 0002.02

```

where “→” signifies a tab. The data is Sound Velocity, then mean Sound Velocity, then Depth.

CSV

CSV output (Comma Separated Variable) is:

```
# CAST X UNITS Records Y
mm/dd/yy, hh:mm:ss, VVVV.V,D.D,TT.T
```

where X is the number of the cast (or file), UNITS is the measurement units of the cast/file (either Meters or Feet), and Y is the number of records in the cast/file.

VVVV.V is the sound velocity data, D.D is the measurement depth for each record, and TT.T is the unit temperature. Since this format is a simulation of a standard output, temperature must be included in the string. However, the SoundBar 2 system contains no temperature sensor, so this value is fixed at 00.0.

A typical file would therefore read:

```
# CAST 1 Meters Records 4
04/20/00, 15:36:20, 1506.2,2.0,00.0
04/20/00, 15:36:20, 1506.3,2.5,00.0
04/20/00, 15:36:21, 1506.2,3.0,00.0
04/20/00, 15:36:21, 1506.1,3.5,00.0
```

This output format is available for both real time use and for uploading logged data, but note that the in real time use, the first line gives the number of records as zero.

SVP16

This configuration outputs the data in the same format as the Applied Microsystems Ltd SVP16 Sound Velocity Profiler.

```
"CALC, DBxxxx, 09/16/99, 1, Meters"
OHSI Sound Velocity Profiler S/N DBxxxx
Date: 99259 Time: 1133
Depth Offset (M): 0
Depth (M) Velocity (M/S) Temp (C)
1.5 1503.0 0.0
2.0 1504.2 0.0
2.5 1504.4 0.0
```

xxxx signifies the serial number of the instrument. The date format is yyddd, where ddd is the Julian day. The SoundBar 2 system contains no temperature sensor, so this value is fixed at 0.0. This output is available for both logged and real time data.

WESTGEO

This sentence complies with the requirements of the current WG-1100 velocimeter output string.

```
634 01503
635 01503
636 01504
```

The string is composed of a 3-digit sequential event number, followed by a space, and then 5 characters of velocity data. Each record is delimited by a <CR><LF>. This format is available for both logged and real time data.

NMEA

This output string complies with the sentence structure of the NMEA standard for manufacturers proprietary strings.

```
$PSSV, 1503.0, 1.5,M*54 (for Units = Meters)
$PSSV, 4860.0, 4.0,F*52 (for Units = feet)
```

The "\$" character denotes start of sentence.

"P" Proprietary sentence ID

"SSV" Manufacturer's mnemonic code

"," The comma delimiter character starts each field except address and checksum

<ccc> Velocity, Depth, Measurement units data fields

"*" Checksum delimiter

<Checksum field> The absolute value calculated by exclusive-OR'ing the 8 data bits of each character in the sentence between, but not including the "\$" and "*".

<CR><LF> End of sentence

This output is available for both logged and real time data.

SOUNDER

The Sounder output is a specific output to allow data to be uploaded into an Odom Echotrac MkII or Hydrotrac Echo Sounder. Note that this function causes the data to be annotated to the chart record, but does not alter the calibration of the sounder itself.

Connect the output lead from the SoundBar 2 to Com 1 on the sounder. With SOUNDER selected as the output type, proceed to upload the data as described in Section 3.3.3. The data will be annotated to the chart.

The output format is as follows:

```
<CTRL>A"Digibar Pro xxxx mm/dd/yy hh:mm:ss AvgVel vvv.v (m/s, f/s) MaxDepth ppp (m or ft.)
```

where xxxx is the serial number of the unit, vvv.v is the mean sound velocity and ppp is the maximum depth reached. The appropriate units are included in the string as shown.

This output is available for logged data only.

HYPACK

Selection of the Hypack SV Format causes the sensor to output a header: FTP New followed by the cast data in two columns (depth velocity). All readings are in meters.

```
FTP New
002.5 1500.0
003.0 1503.1
003.5 1503.2
```

This output is available for both real time and logged data.

SEABIRD

The SoundBar 2 can also output data in the format of a Seabird CTD probe. The data has no header information.

```
<LF><tab>TTT.TTTT,CC.CCCCC,PPPPP.PPP,SSSS.SSSS,VVVVV.VVV<CR>
```

where,

TTT.TTTT = Temperature in Celsius

CC.CCCCC = Conductivity Siemens per meter

PPPPP.PPP = Pressure in Decibars

SSSS.SSSS = Salinity in Parts per Thousand

VVVVV.VVV = Sound Velocity in Meter per second

Parameters which are not measured by the SoundBar 2 are output as zeros.

This format is available for both real time and logged data.

AML1

The data is output in the format of the Applied Microsystems Ltd "Smart Sensor", fitted with sound velocity and pressure sensors. The data is given as sound velocity then depth, separated by a space, and with a space before and immediately after the data.

```
1503.21 002.25  
1503.25 002.67  
1503.26 003.13
```

This output is available for both real time and logged data.

AML0

The data is output in the format of the Applied Microsystems Ltd "Smart Sensor", fitted with sound velocity sensor only. There is a space before and immediately after the data.

```
1503.21  
1503.25  
1503.26
```

This output is available for both real time and logged data.

3.5 RUN

When all the sampling parameters have been set as required, the unit should be set into RUN mode. All settings are retained in the unit's memory until they are changed, so if the unit is always used with the same set-up, RUN mode can be selected immediately from switch-on. The display will change slightly according to the sampling mode. Note that the mode and the set parameters are displayed at the bottom of the screen in each case.

FREE RUNNING

```

FILE No . 004 Rec . 0176          15 : 13 : 28
SOS   1505 . 134 M / s AVE SOS 1505 . 276
PR    + 17 . 123 M
FREE RUNNING 1 Hz
EXIT >>>

```

When the unit is running, the data will be displayed as above. At the top is the file number into which data is being logged (maximum 999), and the record number of the last data point within that file. Also shown is the current time.

Note that when running in air, the instrument will output zero for the sound velocity value.

PRESSURE TRIP

```

SOS   1505 . 134 M / s AVE SOS 1505 . 276
PR    + 17 . 123 M
PRESSURE TRIP Tp 0000 . 5M Inc 000 . 1M
EXIT >>>

```

Data will be displayed as above. *Note that no data will be displayed until the instrument has passed the Trip Point.*

EXIT will stop sampling and close the currently open File.

4 POWER SUPPLY

4.1 CHANGING BATTERIES

The 8 “C” cells are housed in the battery compartment in the bottom of the Display Unit. Access is gained by unscrewing the central retaining screw and pulling out the end cap and pcb assembly. The cells can then be removed. When putting in new cells, be careful to ensure they are inserted the correct way. Labels are located in the compartment to indicate the correct way [note the large springs touch the -ve end on each cell, small springs the +ve end].

4.2 BATTERY LIFE

The current consumption of the unit is as follows [all measured at 12vDC]:

	Backlight On	Backlight Off
Setup & Comms	92 mA	30 mA
Run	146 mA	82 mA

Good quality alkaline cells will have a useable capacity of approximately 6Ah. Assuming a typical operating cycle of 1 minute to setup, 5 minutes sampling and a further minute stopped after sampling, the battery life may be calculated as follows:

Equivalent constant current drain is:

$$\left(92\text{mA} * \frac{60\text{secs}}{420\text{secs}}\right) + \left(146\text{mA} * \frac{300\text{secs}}{420\text{secs}}\right) + \left(92\text{mA} * \frac{60\text{secs}}{420\text{secs}}\right) = 130\text{mA}$$

With backlight on, 6000mAh will therefore last for:

$$\frac{6000\text{mAh}}{130\text{mA}} = 46\text{h}$$

Similar calculations for backlight off give a battery life of **89h**

4.3 EXTERNAL POWER

The display unit is optionally fitted with a 3 pin Mil-Spec connector external DC power input. The appropriate lead is also supplied as an optional extra item (part number 0300013). The unit will operate on an input voltage range of 7 to 15 vDC. The optional External DC power cable has 4mm plugs [Red +ve, Black -ve]. If these are connected using the wrong polarity, an internal fuse will blow. Refer to factory for instructions for repair. Wiring details are given in Section 6.

5 MAINTENANCE

The SoundBar 2 is a solid state device, and as such requires very little in the way of maintenance. Batteries should be changed as required, following the procedure in Section 4.1.

Specific points to note are:

After each deployment, the sound velocity sensor should be rinsed in fresh water. Growth or debris on the reflector or window of the sensor may significantly alter the path length and thus the calibration of the sensor.

The construction of the sensor housing is titanium, thus affording excellent resistance to corrosion. However, the materials used in the sound velocity sensor itself are different:

<i>Reflector</i>	Titanium
<i>Window</i>	Polycarbonate
<i>Pillars</i>	Invar (steel type alloy)
<i>Anode</i>	Zinc

The use of Invar is necessary to maintain a constant path length across the full operating temperature of the instrument. A drawback of this material is lower corrosion resistance than the titanium and polycarbonate parts, but this is counteracted by the presence of a Zinc anode. The user may notice small amounts of pitting on the Invar rods, which will have no effect on the calibration of the instrument.

6 WIRING SCHEDULES

Signal Cable

END 1	CABLE	END 2	FUNCTION
Subconn MCIL6M & MCDLSF Locking	Valeport 8 core cable	Mil-Spec 10 way LMH 06F 1210PN	
4	BROWN	A	+V
4	RED	A	+V
4	ORANGE	A	+V
6	GREEN	C	-V
6	BLACK	C	-V
6	YELLOW	C	-V
2	BLUE	D	RS232 TX
3	WHITE	B	RS232 RX
1	SCREEN	H	RS232 GND

Data Output Cable

END 1	CABLE	END 2	FUNCTION
Mil-Spec 4 way	2m 4core screened cable	9 way D type Female	
A	Blue	7	RTS from PC
B	Red	3	RS232 from PC
C	Green & Screen	5 (Link to 1,6,8,9 in connector shroud)	RS232 Ground
D	Yellow	2	RS232 to PC

External DC Cable

END 1	CABLE	END 2	FUNCTION
Mil-Spec 3 way LMH06F 08 33 SN	2m 2 core cable	4mm "banana" plugs	
Pin A	Red or Brown	Red	Power +12vDC
Pin B	Black or Blue	Black	Power 0v

APPENDIX 1 CALIBRATION CERTIFICATE

The following pages contain the calibration information for this instrument.

APPENDIX 2 EQUIPMENT SUPPLIED

Serial No.		Model No.	SoundBar 2
Customer		Contract No.	
		Customer Ref.	
		Delivery Note	
		Calibration Certificate	

Item	Part No.	Items Req.		Serial No.
		Yes	No	
SoundBar 2 System, comprising the following items:				
Underwater Sensor (miniSVS)	0652004			
Pressure sensor (dBar)	0652013			
Stainless steel suspension spar	0651012			
()m Polyurethane cable on holder	0651011-			
()m Polyurethane cable on reel	0651009-			
3m Deck Lead (required for cable on reel)	0651010			
Display Unit c/w Term.exe Disk	06518008			
Set of 8 x 1.5v alkaline C cells	N/A			Supplied loose
Display Unit Interface Cable (SU to PC)	0300012			
External DC Power cable	0300013			
Toolkit for deployment spar	N/A			
Operating Manual	0651801			
Transit Case (for system with cable on holder)	0651013			
Transit Case (for system with cable on reel)	0651014			

Signed

Date.....

APPENDIX 3 GUARANTEE CERTIFICATE

All goods are subject to a 36 month guarantee against faulty materials and bad workmanship (except pressure sensors, which are only covered for 12 months). This guarantee does not apply to batteries and consumables.

Any faults are to be declared within 36 months from date of despatch (12 months for pressure sensors), in writing to Valeport Limited, who will replace or repair [at their option] any faulty items caused by bad workmanship or materials.

Valeport Limited shall be under no liability for:

- 1] Any consequential loss or damage of any kind whatsoever.
- 2] For any defect or deficiency judged by Valeport Limited to be caused by wear and tear or by improper or unskilled handling of the goods or by any repair or attempted repair or dismantling by any one other than Valeport Limited or persons authorised to do so by Valeport Limited.
- 3] Batteries and other consumables supplied with the equipment that are not covered by this guarantee.

Due to the specialised nature of the instrument it should, if possible, be returned to the factory for repair or servicing. The type and serial numbers of the instrument should always be quoted, together with full details of any fault or the service required.

Equipment returned to Valeport Limited for servicing must be adequately packed, preferably in the special box supplied and shipped with transportation charges prepaid. Return transport charges are also to the account of the customer.

Note: Any items supplied as part of a system which are not manufactured by Valeport Limited are covered by the individual manufacturer's guarantee of the equipment supplied.

MODEL NUMBERSoundBar 2

SERIAL NUMBER

DATE OF DESPATCH.....

SIGNATURE.....