

VALEPORT LIMITED
MIDAS Surveyor
Operation Manual

Document Ref: 0420805

Date: October 2013

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1 **INTRODUCTION**

This manual describes the operation of the Valeport MIDAS Surveyor GPS Echosounder, and its associated PC software SurveyLog.

The MIDAS Surveyor is a hydrographic survey system, logging a time series of position and depth data. Real time data is displayed on the integral graphics LCD screen and output in a variety of industry standard formats, and all logged data may subsequently be uploaded to PC. More advanced features of the MIDAS Surveyor include the ability to take corrective data from external instruments, including Valeport tide gauges & sound velocity sensors, together with heave sensors and gyrocompasses. Additionally, a second echosounder transducer may also be used.

The system logs data asynchronously. That is to say, it will log all incoming data regardless of the update rate or exact timing of each data channel, and will log each data input in sequence. The onboard microprocessor applies an accurate time stamp to each data point, ensuring that a complete time series record of each data input can be generated, together with interpolated position and depth information. Any corrective data received from a heave sensor or tide gauge can be applied in real time to the depth data, and the user may choose whether to log or output either the corrected or uncorrected data.

The instrument may be supplied with or without an integral GPS receiver. Valeport offer the Hemisphere Crescent SX2 GPS board. The 12-channel, L1 DGPS board features SBAS support, along with Hemisphere GPS' exclusive COAST™ and e-Dif® technologies, making it easy to get an accurate signal, anytime, anywhere. Accuracy and stability are excellent due to Crescent Receiver Technology's more accurate code phase measurements, multipath mitigation improvements, and fewer discrete receiver components.

The scope of this manual does not include a detailed discussion of the SBAS (Satellite Based Augmentation System) systems, but they can be simply described as a free differential GPS correction, transmitted from geostationary satellites. There are currently three SBAS systems active in different geographical areas: WAAS in North America, EGNOS in Europe and the Middle East, and MSAS in the Far East. The accuracy of the differential corrections obtained from the SBAS systems varies depending on the receiver's position within the footprint, but can typically be relied upon to give overall accuracy levels in the region of 1 – 5m, depending on receiver type.

Valeport has developed its own single beam echosounder system, which utilises advanced Digital Signal Processing techniques to give high levels of accuracy and consistent performance. The system is integral to the MIDAS Surveyor, which thus requires only a standard analogue transducer to be connected. The system has two channels as standard, optimised for 210kHz and 33kHz transducers respectively. The user may choose to use either or both of these channels, using Valeport's standard supply transducers or their own choice. Alternatively, the MIDAS Surveyor can accept digital transducer inputs, or single / dual channel data from any standard third party echosounder system.

2 SPECIFICATION

2.1 MIDAS SURVEYOR

Materials	Injection moulded ABS case, sealed to IP67, with automatic pressure balancing valve.
Dimensions	50 x 40 x 20cm
Weight	15kg
Display	240 x 128 pixel graphics LCD screen.
Power	Accepts 12 – 24vDC external input for running or charging. Draws approximately 200mA at 12v.
Batteries	Internal 8.4Ah sealed lead acid batteries, charging automatically when external power is applied.
Memory	16Mbyte FLASH memory (holds approximately 30 hours' data). Optional 32Mbyte FLASH memory.

2.2 TRANSDUCERS

2.2.1 HIGH FREQUENCY

Frequency	210kHz (200kHz option)
Accuracy	greater of $\pm 0.01\text{m}$ or $\pm 0.02\%$ reading.
Resolution	0.01m
Range	0.3 to 100m
Beam Width	7.5°
Sample Rate	6Hz
Dimensions	12cmØ
Cable Length	10m

2.2.2 LOW FREQUENCY

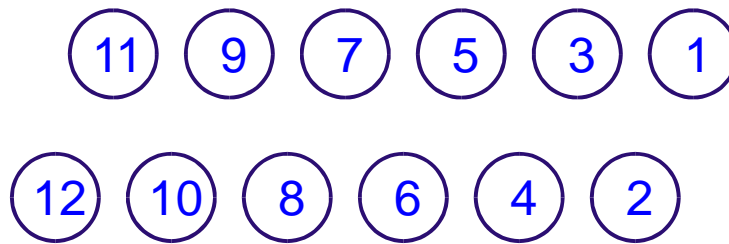
Frequency	33kHz (30kHz option)
Accuracy	greater of $\pm 0.01\text{m}$ or $\pm 0.02\%$ reading.
Resolution	0.01m
Range	0.3 to 100m
Beam Width	16.5°
Sample Rate	6Hz
Dimensions	25cmØ
Cable Length	10m

2.3 GPS

2.3.1 12 CHANNEL GPS

Type	Hemisphere Crescent SX2 DGPS receiver module.	
Differential	Onboard SBAS Correction	
Accuracy	Horizontal Accuracy:	<2.5 m 95% confidence (autonomous, no SA)
Update Rate	1Hz	
Antenna	Combined GPS / SBAS plane antenna (IP67), 5m cable	

2.4 CONNECTORS

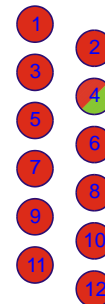


- | | | |
|----|---|--|
| 1 | GPS antenna | |
| 2 | LF Echosounder transducer | } Note: Dual frequency transducers with a single cable may use either port |
| 3 | HF Echosounder transducer | |
| 4 | External DC input (Red = Charging, Green = Full) | |
| 5 | Heave Sensor data Input (RS232) | |
| 6 | RS232 data output | |
| 7 | Tide Gauge data input (RS232) | |
| 8 | External Echosounder data input | |
| 9 | Sound Velocity data input (RS232) | |
| 10 | External GPS or external Differential input (RS232) | |
| 11 | Auxiliary / Gyrocompass data Input (RS232) | |
| 12 | Remote Fix Marker | |

The instrument display panel is fitted with 12 LED's that correspond to the above connectors.

The LED's will light when valid data (or power) is received / output on the relevant channel.

Note that External GPS/Diff LED (number 10) will also light when SBAS correction is acquired in the internal GPS receiver.



3 SYSTEM INSTALLATION

3.1 TRANSDUCERS

Valeport standard transducers are supplied with a mounting bracket and clamps to allow easy attachment to the operator's vessel. The system is designed to be used in an "over the side" configuration, and the transducer may be fitted to either the front or side of the vessel, away from sources of disturbance such as propellers.

210kHz Transducer:

- Feed the signal cable through the bracket, so that the transducer fits inside the cone.
- Fix the transducer to the bracket using the 6 x M6 screws provided.

33kHz Transducer

- Feed the signal cable through the bracket, and align the plate to the top of the transducer.
- Fix the transducer to the bracket using the 3 x M8 screws and nuts provided.

Combined Transducer

- Feed the signal cable through the bracket, and align the plate to the top of the transducer.
- Fix the transducer to the bracket using the 4 x M8 screws and nuts provided.

All Transducers

- Loosen the fixing clamp sufficiently to allow the loop end to be placed over the bracket. Tighten the nuts with a 13mm spanner until the bracket is securely held.
- The transducer may now be fitted to a suitable vertical pole on the vessel. The fixing clamp will accept a pole up to 50mm diameter.
- Loosen or remove the final four M6 nuts and the clamp plate, and place the clamp around the pole.
- Refit the clamp plate and tighten the nuts to hold the transducer securely in place. Ensure that the transducer is completely submerged, and is pointing as near as possible vertically downwards. If anything, the transducer should point a degree or two forward of vertical, to help eliminate any cavitation effects at higher speed. The combined transducer should be fitted with the sloped edge facing forwards.
- The distance of the transducer face below the water surface should be measured; this is applied to the echosounder data to give a true depth reading, rather than just the distance below the transducer (see Section 4.2.9.3).
- The signal cable from the transducer should be terminated in the connection box provided, according to the wiring information given in Section 6. The system is supplied in this manner to allow the cable to be easily routed around the boat, or to allow the user to operate the instrument with alternative, possibly permanently installed transducers.
- The transducer fixing pole may be stabilised with wires running fore and aft.
- Finally, connect the transducer cable to the main MIDAS Surveyor unit. There are two connectors for echosounder transducers – one for the high frequency (210kHz) transducer, and one for the low frequency (33kHz) transducer, but either port can be used. Note that the pins are connected in parallel within the unit, so that a dual frequency transducer with a single cable (if correctly wired as per Section 6) can be fitted to either connector.

Note that the instrument is initially nominally set up for a sound velocity of 1500m/s. The user may wish to alter this according to measured sound velocity data, or by using a bar check method. The Valeport SoundBar 2 Digital Bar Checker may be used to provide appropriate sound velocity and draft settings, or a more traditional bar check procedure may be carried out. Please refer to Sections 4.2.9.2 and 4.2.9.3 for details of how to alter these instrument settings.

3.2 ANTENNAE

The GPS antenna is supplied with a mounting spar.

- Pass the antenna cable through the spar, and screw the spar into the base of the antenna.
- Loosen the fixing clamp sufficiently to allow the loop end to be placed over the spar. Tighten the nuts with a 13mm spanner until the bracket is securely held.
- The antenna may now be fitted to a suitable vertical pole on the vessel. The fixing clamp will accept a pole up to 50mm diameter. This should be fitted vertically above the transducer, in an open area with as clear a view of the sky as possible.
- Connect the antenna cable to the GPS Antenna connector on the main MIDAS Surveyor unit.
- A similar spar and clamping method will be used as for the main GPS Antenna. Connect this cable to the External GPS / Differential input connector on the main MIDAS Surveyor unit.

3.3 BATTERIES

The system is fitted with 4 x 2.1Ah sealed lead acid batteries. These are shipped from Valeport fully charged, but the user would be wise to recharge them before relying on them in a field deployment.

The system is designed so that it will always draw its operating power from these internal batteries. The system is supplied with an external DC input lead, which should be used to charge the batteries. A DC input of 12 – 24vDC is acceptable. The batteries will be trickle charged whether the unit is turned on or off; when off, the batteries should fully recharge in approximately 8 hours.

If the system is not used for long period of time the batteries may be discharged to a point the internal charging circuit will not be able to recharge the batteries and the instrument will need to be returned to Valeport. It is recommended that if the system is left on trickle charge when not used, or a top up charge applied once a month.

Power consumption of the unit will depend on exact configuration, including the number of transducers used, and whether the LCD backlight is used. At worst, a fully charged set of batteries should last in excess of 24 hours without recharging.

Typical Power consumption is:

Main system, including GPS (12 channel) and LCD screen	90mA @ 12v
Single transducer	45mA @ 12v
Second transducer	15mA @ 12v
Backlight (user variable, but typically)	50mA @ 12v
Total	200mA @ 12v

8.4Ah / 0.2A continuous drain = 42 hours.

Assume 75% efficiency (worst case) = 25½ hours.

Note that certain system features such as the internal clock and data logging parameters depend on the batteries being connected. The instrument will automatically shut down with warning if the power drains too low, preserving enough life to maintain these functions. However, if the batteries are disconnected, or the instrument is left unused and discharged for a long time, the user may need to re-enter such setup functions before next use. Refer to the appropriate sections of the manual.

3.4 MEMORY

The unit is fitted with 16Mbyte FLASH memory (32Mbyte optional). The instrument will log data at up to 0.5Mbyte per hour, so the memory will last for a nominal 32 hours (or 64 hours). The FLASH memory is non-volatile, so no data will be lost even if the instrument batteries are completely run down.

3.5 OTHER INPUTS

3.5.1 REMOTE EVENT MARKER

The MIDAS Surveyor is fitted with a Marker button to allow the user to mark specific points during the survey. This cable should be fitted to the appropriate connector. The mark may be made either by pressing the button on the remote marker cable during operation, or by pressing the F3 key on the instrument panel. Note that the addition of a mark to the record is indicated by a beep from the instrument, and by the display of a vertical line on the graphical trace. Marking will only occur while the instrument logging function is turned ON.

3.5.2 DIFFERENTIAL GPS CORRECTION

The instrument is supplied with a 12 DGPS receiver. If the user has an alternative GPS or Differential receiver, it should be connected to the appropriate connector on the MIDAS Surveyor (wired as per Section 6). If an external differential source is used, the unit will automatically assume that it is better than the standard SBAS correction, and will use it instead. If a full external GPS input is used, the internal GPS receiver should be disabled, as described in Section 4.2.10.1.

3.5.3 TIDAL CORRECTION

The depth of water under the boat will naturally vary with the tide cycle. The MIDAS Surveyor has been designed to take in data from an external source, typically a Valeport Model 740 tide gauge radio receiver. This data is logged within the unit as it is received (typically at 1 or 5 minute intervals), and may be used to provide a real time correction of the water depth as measured by the echosounder.

The tide gauge receiver unit should be connected to the Surveyor using the standard RS232 input lead (wired as described in Section 6). The tidal data correction function should be enabled / disabled in the MIDAS Surveyor, as described in Section 4.2.11.2.

3.5.4 HEAVE CORRECTION

Wave activity and boat motion may cause the depth of water below the echosounder transducer to change rapidly. This effect may be eliminated by using a Heave sensor to measure the rapid changes in vertical position of the transducer. If the vessel is fitted with such a sensor, its output may be logged by the MIDAS Surveyor and used to correct the depth readings in real time.

The Heave Sensor should be connected to the Surveyor using the standard RS232 input lead (wired as described in Section 6). The heave correction function should be enabled / disabled in the MIDAS Surveyor, as described in Section 4.2.10.3.

3.5.5 SOUND VELOCITY

Variation of sound velocity is one of the most critical sources of error in the use of echosounders. The sound velocity may change significantly in both vertical and horizontal aspects of the survey area, and it is important that consideration is paid to this to give the best results possible.

The system is supplied setup to use a nominal sound velocity of 1500m/s. It is not possible to change this value whilst the system is running, but it may be changed when the unit is in standby mode. Details of how to do this are given in Section 4.2.9.3. It is possible however for the MIDAS Surveyor to log sound velocity data whilst a survey is in progress, and this may be used to provide data correction during post processing (the SurveyLog software makes no provision for this). The instrument will accept two types of Valeport sound velocity input – either a continuous input from a fixed miniSVS sensor that will measure sound velocity variations in a horizontal plane, or irregular input strings from a SoundBar digital bar checker that will give a summary of the mean sound velocity over a profile, performed at the user's discretion.

3.5.6 GYROCOMPASS / AUXILIARY

The MIDAS Surveyor does not currently feature a navigation, or tracking system. However, it is able to compensate for the GPS antenna being sited at a different location to the echosounder transducer. The user is invited to enter this offset value during the system setup (see Section 4.2.10.4), but this offset is naturally subject to variations in vessel heading. Whilst a heading value is generated by the GPS receiver system, this may be inaccurate at slow speeds, resulting in errors in the position / depth data. The user may decide that to minimise such errors, an independent vessel heading input is necessary; this would typically be supplied by a gyrocompass.

The Gyrocompass should be connected to the Surveyor using the standard RS232 input lead (wired as described in Section 6). The heading correction function should be enabled / disabled in the MIDAS Surveyor, as described in Section 4.2.11.4.

Alternatively, the gyro input port may be used to accept any unspecified auxiliary RS232 input that the user may wish to additionally record. Any such sensor should be connected to the Surveyor using the standard RS232 input lead (wired as described in Section 6). The data string will automatically be recorded as it comes into the unit.

3.5.7 DATA OUTPUT

The MIDAS Surveyor can output RS232 data from all input channels in real time in a variety of industry standard formats:

<u>POSITION</u>	<u>DEPTH</u>	<u>OTHER CHANNELS</u>
<i>ANY, ALL or NONE OF:</i>	<i>OFF</i>	<i>OFF</i>
GGA	ODOM ET	ECHO INPUT
VTG	ATLAS 25	
	DBS	
	DBT	

Full details of how to select the appropriate data output string and their formats are given in Section 4.2.6.

The RS232 output lead should be used. It is wired as described in Section 6.

4 OPERATION

The MIDAS Surveyor is operated by means of a 16 button membrane keypad, illustrated below:



The basic function of each key is as follows. More detailed descriptions are covered in subsequent sections of this manual:

On	Turns instrument on. Has no effect when instrument is already On.
Off	Press for 5 seconds to turn instrument off through a controlled shutdown. Press and hold for 10 seconds to force a hardware restart if instrument has locked up.
Backlight	Repeated pressing or pressing and holding darkens backlight. When minimum lighting is reached, the next press will revert to full brightness.
Contrast	Repeated pressing or pressing and holding darkens contrast. When maximum contrast is reached, the next press will revert to minimum contrast.
Help	Causes a text message to be displayed on screen, describing the function of the current menu choice. Disappears after approximately 20 seconds of inactivity.
Menu	Activates the on-screen setup menu. Disappears after approximately 3 minutes of inactivity.
Left	
Right	
Up	Navigate through the Menu setup screens
Down	
Enter	Confirm choice
Escape	Go back one menu level (note that changes might still have been made)
F1	Press to turn Logging On/Off. Enter key required for confirmation
F2	Echosounder Reset. Press to cycle power to sounder, and return to minimum gain settings.
F3	Fix Mark button (only active when logging is ON)
F4	Log Pause/Continue (only active when logging is ON)

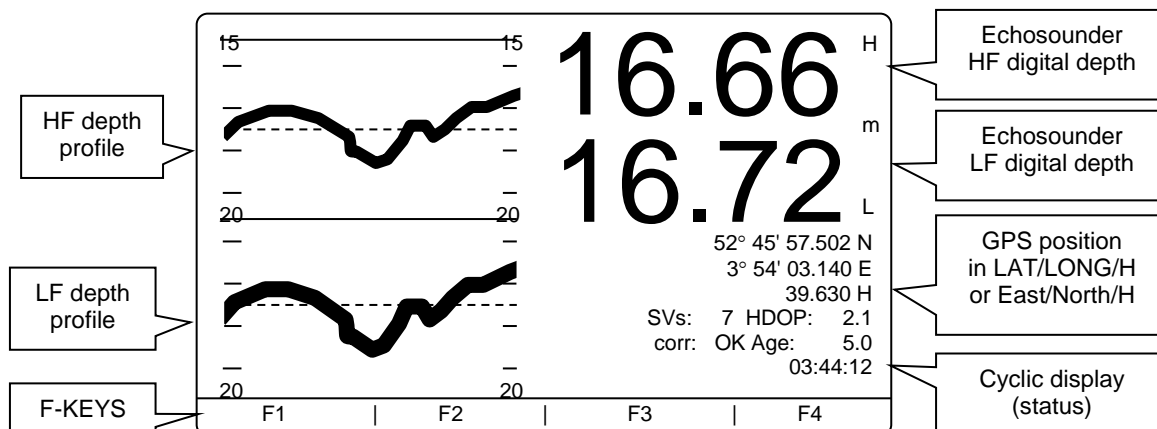
Once the system components have been connected together, the MIDAS Surveyor should be turned on by pressing the “On” button on the display panel. “On” status will be indicated by a blue LED behind the On button. The display will show an introduction screen giving the instrument serial number and version for about 10 seconds. The screen will then immediately show Run mode (illustrated below).

Note that incoming data will be displayed at all times – there is no stop/go function, simply a logging on/off function.

The operating status of the instrument at switch on will depend on how it was previously turned off:

- If a normal, controlled shutdown has been performed (by pressing the Off key), the MIDAS Surveyor will show data on screen, but it will not be immediately recorded until the user instructs the instrument to do so.
- If the instrument has had an uncontrolled shutdown (power failure, software or hardware reset), the instrument will automatically revert to the status it was in before the shutdown. That is to say, if the instrument was not logging data, then it will continue to not log the data. If the instrument was logging data, then it will continue to do so, although it will begin a new data file.

4.1 RUN MODE



The basic Run screen is indicated above, and may be described as follows:

Bottom line of text	Function keys and warning messages:	F1 Log On/Off
		F2 Echosounder Reset
		F3 Fix Mark
		F4 Pause/Continue Logging
Left side of screen	Graphical representation of bottom trace.	
Top right of screen	Large numerical display of last depth reading	
Bottom right of screen	Additional data input values	

If the instrument is in Single Frequency mode, the left side of the screen will be filled with a single graphical trace, and the top right of the screen will show a single large numerical depth figure.

If the instrument is in Dual Frequency mode (as above), the left side of the screen will show two graphical traces, and the top right of the screen will show two large numerical depth figures. Note that the graph should be viewed as two separate graphs, not as two traces on the same scale. In the above example, the top graph has a vertical scale from 15 to 20m, and stops halfway down the screen. The second graph begins halfway down the screen, also on a scale of 15 to 20m (15m point not labelled).

The additional data input values area will continually display the latest GPS position in either Latitude/Longitude or Eastings/Northings format (as selected by the user, Section 4.2.7.2) together with the current time, and will also cycle through the following parameters:

GPS	OK/timeout
GPS Quality Data	SVs (number of <u>S</u> pace <u>V</u> ehicles (satellites) fixed) HDOP (Horizontal Dilution of Precision) corr.OK (Signifies that differential correction from internal or external source is working) Age (Age in seconds of differential correction data)
Speed	Vessel speed in knots from GPS data
Direction	Direction of travel in degrees from GPS or external source
Heave Data Input	Updates as new heave data is received
Tidal Data Input	Updates as new tide data is received
Sound Velocity Input	Updates as new sound velocity data is received
Memory Status	%memory space free for logging
Bar Check Settings	Transducer draft and sound velocity setting used for measurement

All system setup functions are retained in memory until overwritten, so if the unit has been used before in a similar geodetic environment and configuration, the user may immediately begin to log data.

If this is the first time that the instrument has been used, or it is being used in a new location or configuration, it is strongly advised that each of the System Setup functions are viewed and changed as appropriate. This applies particularly to the Geodetic Setup functions, and the basic clock and memory functions.

4.2 **SYSTEM SETUP**

At any point in the instrument operation, the Menu button may be pressed to display the system setup menus. The available menus will be dependent on whether or not the system is currently logging; some major functions such as the GPS setup cannot be altered part way through a data file, but may be altered between data files.

4.2.1 **HELP**

When the on-screen menu is active, pressing the Help button will cause relevant instructions & explanations to be displayed at the top of the screen. Note that this display area will change as the user moves through the menu screens. Press Help again to remove the display.

4.2.2 **NAVIGATION**

There are a total of 13 functions listed in the Main Menu (detailed below) – some are sub-menus, and others are direct functions. A sub-menu is indicated by an arrow to the *right* of the item. The arrow to the *left* of the item indicates the current selection.

- Scroll up and down the menu list using the up and down arrow keys. To select the item, press the Enter key. This will access the sub-menu or function.
- Once a function has been accessed, the arrow and Enter keys will be used to make changes.
- The Escape key will move back up one menu level.

Menu structure:

Main Menu	Accessibility	Description
Logging Setup	Always	Turns Logging On/Off, and Sets Parameters to be Logged
RS232 Com Setup	Always	Sets Baud rates of data output and external inputs
Data Upload	Always	Stops sounding and forces unit into PC control mode (use for data upload)
Output Setup	Always	Sets the real time data output format
Display Setup	Always	Sets LCD on time, switches between Position display in Lat/Long or E/N. Also adjusts contrast / brightness
Geodetic Setup	Logging Off	Sets Spheroid and Grid Projection values.
Echosounder Setup	Logging Off	Selects single / dual external echosounder, units, draft and sound velocity settings, and graphical display setup.
GPS Setup	Logging Off	Sets GPS type, internal / external correction and antenna offset.
Sensor Setup	Logging Off	Sets format and logging frequency of external sensors (tide, heave, etc.)
Time Setup	Logging Off	Sets the instrument date and time
Beep, Relay, Power	Always	Sets Beeper duration, relay output & controls power output to external sensors.
Utilities	Logging Off	Selected additional test and setup functions.
Power Off	Always	Turns instrument off

4.2.3 LOGGING SETUP

The Logging Setup sub-menu includes the following features:

4.2.3.1 Log On/Off

This will allow the user to turn the data logging function on and off. Access to this function is shortcut by pressing the F1 key from the standard Run Screen. Use the up or down key to toggle logging on and off, followed by Enter to confirm.

If logging is turned ON, a new data file will then be created. While logging is turned on, the F3 key in the main run screen will allow Fix marks to be added to the data file, and the F4 key will toggle the Logging Pause function (see Section 4.2.3.2).

If logging is turned OFF, the data file will be closed. No more data may be added to this file. While logging is turned off, the main run screen will display a warning to this effect in the lower left corner of the screen.

4.2.3.2 Log Pause

The Log Pause function allows the user to temporarily suspend logging without closing the current data file. This is particularly useful for preventing collection of irrelevant data during manoeuvres or breaks in the survey. The Log Pause function is only accessible while logging is turned ON.

The Log Pause function may be accessed through the menu system; use up and down arrows to toggle logging ON or OFF, and Enter to confirm. Alternatively, the F4 key in the Run screen will allow the Pause function to be toggled on and off.

4.2.3.3 Set Ident No.

Each data file may be assigned an Identification Number to aid data interpretation. Use the up and down keys to scroll from 0 to 99, and Enter to confirm. The chosen Ident Number will be applied to all subsequent data files, until it is changed again.

4.2.3.4 Log Parameters

As well as the basic parameters of depth and position, the MIDAS Surveyor will also accept data inputs from other devices. In particular, Heave and Tide data inputs can be used to provide corrective information for the Depth data. The MIDAS Surveyor is capable of performing these corrections in real time, so that only true depth values are displayed and logged. This feature is actually turned on/off in the echosounder setup menu system (see Section 4.2.9.9). The Log Parameters feature simply allows the user to determine which of the Depth / Heave / Tide data inputs are to be recorded; for example, it may be decided that if corrected data is logged, there is no need to keep a record of what those corrective Heave and Tide values were. The following combinations are possible:

If Real Time correction is ON

CORR.ONLY	Corrected Depth value only
CORR+HEAVE	Corrected Depth value and Heave input
COR+HVE+TID	Corrected Depth value, together with Heave and Tide values.
CORR+TIDE	Corrected Depth value and Tide input

If Real Time correction is OFF

RAW ONLY	Uncorrected Depth value only
RAW+ HEAVE	Uncorrected Depth value and Heave input
RAW+HVE+TID	Uncorrected Depth value, together with Heave and Tide values.
RAW+ TIDE	Uncorrected Depth value and Tide input

In all cases, use up and down to scroll through the available options, and Enter to confirm.

The Log Parameters function may only be altered if Logging is OFF.

4.2.3.5 Sound Velocity Interval

The MIDAS Surveyor will accept a real time input from a Valeport Sound Velocity sensor. Whilst this input is not used to provide real time correction of the Depth data, it may be useful in post processing functions. Data from these sensors is at variable rates, from 16Hz to 1Hz; the user may decide that logging of all these data points is unnecessary. The "SVEL interval" function allows only selected data points from this sensor to be logged to memory.

Use up and down arrows to scroll through the logging interval in 1 second increments, from OFF through to 300 seconds (5 minutes), and Enter to confirm. Note that the instrument will log the last measured data point at the set interval. The display will continue to show data at the rate at which it is received.

4.2.3.6 Tide Interval

The MIDAS Surveyor will accept a real time tidal input from a choice of sources. Data from such sources may be available at variable rates from 1Hz downwards; the user may decide that logging of all these data points is unnecessary. The "TIDE interval" function allows only selected data points from this input to be logged to memory.

Use up and down arrows to scroll through the logging interval in 1 second increments, from OFF through to 300 seconds (5 minutes), and F3 to confirm. Note that the instrument will log the last measured data point at the set interval. The display will continue to show data at the rate at which it is received.

4.2.3.7 Auxiliary Interval

The MIDAS Surveyor will accept a real time auxiliary input from any CRLF terminated RS232 ASCII text source (of less than 256 characters) - typically this port may be used for Heading input from a Gyrocompass. Data from such sources may be available at variable rates from 1Hz downwards; the user may decide that logging of all these data points is unnecessary. The "AUX interval" function allows only selected data points from this input to be logged to memory.

Use up and down arrows to scroll through the logging interval in 1 second increments, from OFF through to 300 seconds (5 minutes), and F3 to confirm. Note that the instrument will log the last measured data point at the set interval. The display will continue to show data at the rate at which it is received.

4.2.4 RS232 COM PORTS

The MIDAS Surveyor is fitted with a total of 7 serial ports for data input / output. This sub-menu allows the baud rate of each port to be configured to suit.

Data output is only available on the Main Port - this should also be used for all PC communications. The remaining ports are numbered 1 to 6, and are configured for use with the following data input types. All ports are RS232 only, 8 data bits, 1 stop bit, No Parity.

Serial PC Com	Data output and PC communications.
Serial 1	External GPS or Differential Input
Serial 2	External digital echosounder input
Serial 3	Sound Velocity Input
Serial 4	Tide Input
Serial 5	Heave Input
Serial 6	Auxiliary (or Gyrocompass) Input

To change the baud rate of each port, select it from the sub-menu. Use up and down arrows to scroll through the available baud rates, and Enter to confirm:

2400	38400
4800	57600 (Main Port Only)
9600	76800 (Data Input Ports Only)
19200	115200

Note that for data upload to PC it is recommended that the highest possible baud rate is used.

4.2.5 OUTPUT SETUP

The MIDAS Surveyor will output data in real time. You may choose which parameters to output, and a selection of formats for each. For each parameter, use the up and down keys to scroll through the available formats detailed below (and OFF), and Enter to confirm the selection.

Output All GPS

This is a shortcut to output GPS data in all available formats (**currently GGA and VTG only**).

GGA Format

\$GPGGA,m1,m2,c1,m3,c2,d1,d2,f1,f2,M,f3,M,f4,d3*cc

where:

\$GPGGA	NMEA Identifier
m1	Current UTC time of position fix in hours, minutes and seconds (hhmmss.ss)
m2	Latitude component of position in degrees and decimal minutes (ddmm.mmmmmm)
c1	Direction of latitude N= North, S= South
m3	Longitudinal component of position in degrees and decimal minutes (dddmm.mmmmmm)
c2	Direction of longitude E = East, W= West
d1	Position type: 0. Invalid or not available 1. Autonomous (uncorrected) position 2. RTCM or SBAS differentially corrected
d2	Number of satellites used in position computation
f1	Horizontal dilution of precision (HDOP)
f2	Altitude in meters above the reference ellipsoid. For 2-D position computation, this item contains the user- entered altitude used to compute the position computation.
M	Altitude units M = meters
f3	Geoidal separation in meters
M	Geoidal separation units M = meters
d3	Age of differential corrections (seconds)
d4	Base station ID (RTCM only)
cc	checksum

Example:

\$GPGGA,015454.00,5233.9007,N,00358.7360,E,2,11,03.8,+70.000,M,-030.000,M,005,0000,*75

VTG Format

\$GPVTG,f1,T,f2,M,f3,N,f4,K,c5*cc

where:

f1	COG (Course Over Ground) true north
T	COG orientation (T = true north)
f2	COG magnetic north
M	COG orientation (M = magnetic north)
f3	SOG (Speed Over Ground)
N	SOG units (N = knots)
f4	SOG (Speed Over Ground)
K	SOG units (K = Km/hr)
c5	Mode indicator: A = autonomous D = differential E = estimated (dead reckoning) M = manual input S = simulator N = data not valid
*cc	checksum

Example:

\$GPVTG,300.00,T,300.00,M,004.50,N,009.01,K,D,*46

ODOMSingle Frequency

et HHHHH

where: " et " is the identifier

HHHHH is the high frequency depth in mm

Example:

et 05438

Dual Frequency

et B HHHHH LLLLL

where: " et B " is the identifier

HHHHH is the high frequency depth in mm

LLLLL is the low frequency depth in mm

Example:

et B 05438 05502

DBS

\$SDDBS,aaaaa,f,bbbb,m,cccc,F*cc

where:

\$SDDBS	identifier (DBS = Depth Below Surface)
aaaaa	depth in feet (may be blank)
f	foot label
bbbb	depth in metres (may be blank)
m	metres label
cccc	depth in fathoms (may be blank)
F	fathom label
cc	Checksum

Example

\$SDDBS,,f,088.98,M,,F*3D

DBT

\$SDDBT,aaaaa,f,bbbb,m,cccc,F*cc

where:

\$SDDBT	identifier (DBT = Depth Below Transducer – NB: Surveyor draft value is NOT added to depth data in this format)
aaaaa	depth in feet (may be blank)
f	foot label
bbbb	depth in metres (may be blank)
m	metres label
cccc	depth in fathoms (may be blank)
F	fathom label
cc	Checksum

Example

\$SDDBT,,f,088.48,M,,F*3D

ATLAS 25

DA00088.51 m

DB00089.04 m

where:

DA signifies high frequency transducer data

DB signifies low frequency transducer data

Other Outputs

Sound Velocity, Tide, Heave and Aux/Gyro data outputs may also be individually turned on or off. When on, the instrument will simply echo the incoming data strings in the output data, as they are received.

4.2.6 DISPLAY SETUP

4.2.6.1 LCD delay

To conserve power, the user may set the LCD screen to shut down after a period of inactivity (i.e. no key presses). Use the up and down keys to scroll through the desired interval, from 1 to 10 mins, or select "ON" for always on.

When in standby mode, the LCD screen will come back on when any key (except ON or OFF) is pressed.

Note that all other instrument activity (i.e. logging, data output) continues with the screen in standby mode.

4.2.6.2 Grid Lat/Long

Position data may be displayed and logged in either Latitude / Longitude format according to the chosen spheroid, or in Eastings / Northings format according to a Local Grid projection. The detailed setup of the spheroid or grid is covered under Geodetic Setup (section 4.2.8), but defaults are WGS84 and UTM.

To switch between displaying data in the currently programmed spheroid or grid, use the up/down keys to toggle between LAT/LONG and EAST/NTH, using Enter to confirm. This function is not changeable whilst logging is turned ON.

4.2.6.3 Display Input Number

As a diagnostic tool, the full data input string from any single chosen parameter may be displayed across the bottom of the screen. Use the up/down keys to scroll through the available options, and Enter to confirm:

Off	No input displayed
Port 1	External GPS input
Port 2	External digital echosounder input
Port 3	Sound Velocity Input
Port 4	Tide Input
Port 5	Heave Input
Port 6	Auxiliary (or Gyrocompass) Input

4.2.6.4 Contrast

The graphics LCD display has an adjustable contrast function. The user may wish to adjust this according to local temperatures; as with all LCD's, the display will tend to darken in high temperatures, and lighten in cool. This may be done through the Menu by using the up and down keys to scroll up and down the contrast range, from 0 to 100%. Again use Enter to confirm.

Alternatively, the Contrast button on the front panel will scroll up through the contrast range in slightly larger increments.

4.2.6.5 Back Light

The display also has an adjustable back light function for use in dim light conditions. Be aware that increasing the back light intensity will have implications on power consumption.

Use the up and down keys to scroll up and down the back light range from 0 to 100%, using Enter to confirm.

Alternatively, the Light button on the front panel will scroll up through the light intensity range in slightly larger increments.

4.2.7 GEODETIC SETUP

The MIDAS Surveyor will display and log position data in either Latitude/Longitude or Eastings/Northings format. This may be set under the Display Setup sub-menu (section 4.2.7.2).

To display data in Lat/Long format, the desired spheroid must be defined – as default this is WGS84, but the user may alter this under the Geodetic Setup menu. Each spheroid is defined by 9 parameters, two of which define the shape of the spheroid, and 7 of which define the datum of the spheroid. The MIDAS Surveyor allows all of these 9 parameters to be set as required.

<u>Spheroid Shape</u>	<u>WGS84 Default Value</u>
Semi-major axis	6378137.0000
Flattening (actually entered as 1/Flattening)	298.25722300

<u>Spheroid Datum</u>	<u>WGS84 Default Value</u>
X axis linear position	0.000
Y axis linear position	0.000
Z axis linear position	0.000
X axis rotational position	0.000000
Y axis rotational position	0.000000
Z axis rotational position	0.000000
XYZ Datum Scale Factor	0.0000000

Note that some spheroid references give an “E²” figure instead of Flattening. E² stands for Eccentricity ², which is:

$$E^2 = 2 \times \text{Flattening} - \text{Flattening}^2$$

Solving this equation gives:

$$\text{Flattening} = 1 - \sqrt{1 - E^2}$$

The value that the MIDAS Surveyor requires is 1 / Flattening, which should be in the region of 300.

Note also that some spheroid definitions (particularly in the USA) only use the Linear Position Datum values. The remainder (rotational positions and scale factor) should be set to zero.

To display data in Eastings/Northings format, the local grid must be defined – as default this UTM (Universal Transverse Mercator), but again, the user may alter this and define their own grid under the Geodetic Setup menu. The MIDAS Surveyor will only allow a Transverse Mercator Projection to be used. A total of 5 parameters must be set to define the local grid:

<u>Grid Parameters</u>	<u>UTM Default Value</u>
Origin Longitude	3.000000
Origin Longitude	0.000000
False Easting	500000.000
False Northing	0.000 (North Hemi)
	10000000.000 (South Hemi)
Scale Factor	0.9996

4.2.7.1 Defaults

The default spheroid is WGS84, and the default grid is UTM. If any of the defining parameters for the spheroid or grid have been altered, the default settings can be restored as follows:

- Highlight the WGS84 default or UTM default function in the sub menu as required, and use the arrow keys to scroll to “DATUM = WGS84” or “grid/proj = UTM” to revert to default settings. Again, use Enter to confirm.

When using a UTM projection, the user may also set the position of the Central Meridian Zone – by default this is 3°, but may be changed in 6° steps up or down. Whether the system is being operated in the North or South Hemisphere may also be defined.

- To alter the UTM CM zone, use the arrow keys to move the centre of the grid in 6° steps, using Enter to confirm.
- To alter the Hemisphere, use the up or down key to toggle between North and South, again using Enter to confirm.

4.2.7.2 Changing Grid and Spheroid Parameters

All the parameters for setting up the spheroid and local grid as detailed above are to be found in the Geodetic Setup sub menu. However, the method for changing these large numbers is different to that thus far encountered; it would take a long time to scroll up or down to the required value. The method described below applies to all of the parameters detailed above:

- To alter the desired parameter, press the Enter key.
- An arrow will appear under the leading digit of the number. Use the up and down keys to alter this digit as required. The digit will scroll from 0 through to 9, followed by a “-“ sign, a “.” and finally a space.
- When the digit has been correctly set, use the right arrow key to move to the next digit and repeat the process.
- When the full number is displayed on screen as required, press the Enter key.

4.2.8 ECHOSOUNDER SETUP

The MIDAS Surveyor incorporates Valeport’s own echosounder, which is able to operate as either a single or dual channel system. As standard, the MIDAS Surveyor is supplied with a single 210kHz analogue transducer, but an additional 33kHz transducer may be supplied as well. Alternatively a single combined 210/33kHz transducer may be supplied.

4.2.8.1 Internal/External Echosounder

The MIDAS Surveyor may use either its integral echosounder and transducer or a depth input from an external digital device. Alternatively, depth sounding may be disabled entirely.

Use the arrow keys to toggle between internal echosounder, external echosounder, or disabled, and Enter to confirm.

4.2.8.2 E/S Velocity

The internal echosounder relies on knowing the correct speed of sound to provide accurate data. This may be checked using an external device such as a Valeport SoundBar 2 Digital Bar Checker. Use up and down to scroll up and down the sound velocity range until desired figure is reached. Confirm using Enter.

For fresh water use, the sound velocity is likely to be in the region of 1470m/s. For salt water use it is likely to be in the region of 1510m/s. These figures will vary dramatically according to local conditions.

If performing a traditional Bar Check, the Sound Velocity may be scrolled up and down until the correct depth is indicated.

4.2.8.3 Draft

For accurate total water depth information, the position of the transducer face below the surface needs to be known. This should be measured and entered for both High Frequency (HiFr) and Low Frequency (LoFr) transducers, if fitted. This number may be adjusted according to Bar Check data from a SoundBar 2 Digital Bar Check, or during a standard Bar Check procedure.

To adjust the draft, use the up and down keys to scroll through the draft range, from 0 to 5m, with Enter to confirm. The unit is set to a factory default of 0.5m draft for both high and low frequency transducers.

4.2.8.4 Metres/Feet

The MIDAS Surveyor may display data in either metres or decimal feet. Use the up or down key to toggle between the two units, and Enter to confirm.

4.2.8.5 Gating

Under certain circumstances, it may be desirable to eliminate echoes from outside an expected range. The Gating function allows this, and it is particularly useful for performing a standard Bar Check procedure, where complications may arise from other echoes. Both maximum and minimum Gates may be set; the minimum gate is the value below which data will not be displayed, and the maximum gate is the value above which data will not be displayed.

In either case, use the up and down keys to scroll up and down the available range, from 0 to 100m. Under normal operating circumstances, both gates should be set to zero.

4.2.8.6 Single/Dual Frequency

The user will be required to setup the MIDAS Surveyor for either single or dual frequency operation. Note that if set to single frequency operation, the main Run screen will show a single depth reading and single graphical trace. If set to dual frequency, then it will show two depth readings and two graphical traces. It is assumed that if a single frequency is used, it will be High Frequency. Toggle between the two settings using up/down and confirm with Enter.

4.2.8.7 Vertical Scale

The graphical trace on the display will automatically adjust its maximum and minimum values to keep track of the bottom. The range of the scale must be set by the user as number of metres; available ranges are: 4, 5, 6, 10, 12, 15, 20, 30 or 60m. Use up or down to scroll through the options and Enter to confirm.

Note that when using a dual frequency system, the scale of each graph will be the same. The scales are labelled left and right, and an additional scale will be displayed midway if the range alters during a trace

4.2.8.8 Horizontal Scale

The horizontal scale of the trace may also be adjusted. This is effectively done as “pings per pixel”, and may be set from 1 to 20 using the up, down and Enter keys. Note that when the trace reaches the end of the display, it begins again at the left of the screen, with approximately 1cm being “carried over”.

4.2.8.9 Raw & Corrected

Depth data may either be displayed and logged as measured, or corrected for Tide and Heave data inputs. Use this function to Toggle between logging and displaying of RAW or CORRECTED data. Up/down to toggle, Enter to confirm.

4.2.9 GPS SETUP

4.2.9.1 GPS Type

The MIDAS Surveyor is supplied as standard with an integral 12 channel GPS receiver, with SBAS differential correction.

In order to accommodate customers who may wish to use an external differential input, the system has a certain amount of intelligence in that if an external differential input is applied, it will recognise this and automatically use it in preference to the internal SBAS correction. If an external GPS receiver is used, then the internal receiver must be manually disabled.

Use the up or down key to toggle through Internal, or External GPS, and Enter to confirm.

Note that any external GPS input must include GGA & VTG data strings.

4.2.9.2 GPS Reset

Each time the MIDAS Surveyor is turned on, it will attempt to reacquire its satellite fixes. If this fails, the user may force a reset using this function.

If satellite acquisition repeatedly fails, check antenna position and cable connections.

4.2.9.3 GPS RTCM baud

This feature changes the baud rate at which the internal receiver communicates with the system microprocessor. It should not be changed.

4.2.9.4 Antenna Offset

The position given by the GPS system is that of the antenna. For survey data to be as accurate as possible, the relative position of the antenna to the transducer should be known. Ideally, the GPS antenna will be fixed directly above the transducer, but this is not always practical. In such circumstances, the antenna offset should be entered into the instrument.

Enter the 3D offset as X, Y and Z values:

- X Antenna offset across the boat in metres, with the antenna positioned to Starboard being entered as +ve, and the antenna to Port being –ve.
- Y Antenna offset along the boat in metres, with the antenna positioned to Forward being entered as +ve, and the antenna towards the Stern being –ve.
- Z Antenna offset above the transducer in metres, entered as a +ve value.

4.2.9.5 Heading Source

The GPS data string will provide vessel heading information, but this may be unreliable at slow speeds. If the user decides to use an external heading input such as a Gyrocompass in preference, this must be entered. Use up or down to toggle between “Heading from GPS” and “Heading from Auxiliary Input”.

4.2.9.6 GPS differential mode

The GPS differential mode can be selected via the menu from:

- SBAS
- Beacon
- None

This functionality is only available on units fitted with the Hemisphere Crescent modules.

4.2.10 SENSOR SETUP

This section of the menu allows the user to setup the Surveyor to receive data from other external inputs, specifically sound velocity, tide, heave and gyro/auxiliary.

4.2.10.1 Velocity Sensor

Use this function to toggle the measurement of sound velocity from an external device on and off. Arrow keys to toggle, Enter to confirm. Turning this on opens the appropriate communications port (baud rate set under The RS232 Com Setup, Section 4.2.4). Data will be updated on the screen at the rate at which it comes in, but will only be logged according to the interval set under the Logging Setup (Section 4.2.3)

4.2.10.2 Tide Height Setup

4.2.10.2.1 Tide Sensor

The Surveyor will accept a variety of tide data sources. The relevant source should be selected from the available list using the up, down and enter keys. Available sources are from GPS Height (suitable if an external RTK system is being

used), TIDEGAUGE, which the default format for the Valeport Model 740 tide gauge. There are also 6 generic formats, which assume that the tide data is at either the beginning or end of a longer data string, and is in either centimetre, metre or feet format:

cm...TG	TG...cm
m ...TG	TG...m
ft...TG	TG...ft

4.2.10.2 Set Tide Height Offset

The source of the external tidal data may be referenced to a different datum level than that of the survey location. For that reason, it is possible to enter an offset value that will be added to the incoming tide data. The number should be entered in the “long number” format, setting each character individually by scrolling through 0 to 9, with space, “-“ and “.”

4.2.10.2.3 Set Tide Height Average

Particularly with RTK tide height data, the data input may be rapid (every second). In such cases, it may be desirable to average the incoming data over a period of time to eliminate the effects of wave action on the data. Use up and down to scroll through the available average periods, from OFF (every tide value is used for data correction) in 10 seconds increments up to 120 seconds.

4.2.10.3 Heave Sensor

If the vessel is fitted with a Heave Sensor, data from it may be used to provide real time compensation of the depth data for boat motion. To activate the Heave input, select the required data format from the available list. Note: Only TSS 33X format is currently available.

4.2.10.4 Gyro/Aux Setup

The Gyro / Auxiliary port is slightly different in that it is always open. Any data that comes in on this port will be logged as it is received. However, if it is a gyrocompass that is connected to this port, you can choose whether to take the Surveyor heading display from this, or from the GPS input. As usual, use up/down and Enter to scroll and confirm the two options. Note that if heading is taken from a gyrocompass, it must be in standard NMEA format.

4.2.10.5 Set PIC Op Modes

The data input from each device fitted to the MIDAS Surveyor is controlled by a small microprocessor called a PIC (Programmable Integrated Circuit). As standard, each PIC is set to accept data inputs at a maximum of 16Hz. However, certain input devices may have data rates much higher than this (e.g. a Heave sensor at 60Hz); in these cases, the operating mode of the relevant PIC must be changed to cope with the higher data rate.

The operating mode of each PIC is set as either Mode 0 (standard) or Mode 1 (high data rate). Entering the Set PIC Op Mode function reveals a string of six characters of either 0 or 1. As standard they will be all zeroes (000000). This signifies that all PICs are in Mode 0. To change a PIC to Mode 1, simply use the cursor keys to scroll to the appropriate digit as indicated below, and then use the up and down keys to change between 0 and 1, with Enter to confirm changes.

Digit 1	GPS
Digit 2	Echosounder
Digit 3	Sound Velocity

Digit 4	Tide
Digit 5	Heave
Digit 6	Auxiliary / Gyro

Note that under normal circumstances, the only PIC that should be set to Mode 1 is the Heave sensor. This happens by default when the Heave Sensor is enabled.

4.2.11 TIME SETUP

GPS transmissions contain time as well as position data. However the MIDAS surveyor also requires an on board clock to control its operating sequences, and it is more practical to use this to maintain instrument time on a second by second basis. The clock used in the system has a stated accuracy of 20ppm, which equates to better than 2 seconds per day. Note however that each time the instrument is switched on, it corrects the on board clock to the GPS time (if available), ensuring that no significant timing errors can occur.

The part of the GPS time data that is used is simply "number of seconds past the hour". For this reason, the user must set the clock to the correct date and approximate local time before use.

The sub-menu functions allow the user to individually set the year, month, date, hour, minute and second. It is advised that the correct year, month, date and hour are entered, together with approximately correct minute and second values. The system will correct these final two values to GPS time as soon as a valid fix is obtained. If no fix is available when the clock is set, the entered values for minutes and seconds will be used instead, and corrected as soon as there is a fix. The assumption is that surveying will not begin until a valid GPS fix is achieved anyway.

Use the Up and Down keys to scroll the values up and down, and the Enter key to set.

4.2.11.1 1/2 Hour Time Zones

Some locations use 1/2 hour time zones rather than the standard 1 hour increments. Since GPS timings are given as time past the hour, the MIDAS Surveyor must include a feature to allow it to correct the time to the nearest 1/2 hour. If the local time zone is a 1/2 hour zone, go to the last function in the Time Setup sub-menu, labelled "Time Zone 1/2hr". Use and or down key to toggle between "Normal Time Zone" and "1/2hr Time Zone", and Enter to confirm.

4.2.11.2 Set Time

Once the date, time and appropriate time zone have been entered, the user must confirm the entry.

Under the Set Time function, use up or down to scroll between "Set Time Now" and "Do Not Set Time". Note that for the time to be set, you must scroll through the options to "Set Time Now", *even if it already says this when you enter the menu*. This is to ensure that the time is not set accidentally. Use the Enter key to confirm.

The MIDAS Surveyor will immediately adjust the internal clock to the values set, or to match the GPS time signal if it is available.

4.2.12 BEEP, RELAY, ETC.

4.2.12.1 Beep

Each key press or Fix Mark from the instrument causes a beeper to sound. The user can control the duration of this beep on an arbitrary scale from 0 (OFF) to 10 (approximately 1.5 seconds). Use up and down to scroll up and down the range, and Enter to confirm.

4.2.12.2 Relay

The MIDAS Surveyor is fitted with a relay switch to provide control to external systems. The relay is closed each time a Fix is made, and the user can control the duration of closure on an arbitrary scale from 0 (OFF) to 10 (approximately 1.5 seconds). Use up and down to scroll up and down the range, and Enter to confirm. Access to the relay switch is gained by splicing the required wires out of the Fix Mark cable, as indicated in the wiring information in Section 6.

4.2.12.3 External Power

The MIDAS Surveyor can also supply a 12v DC output to auxiliary devices connected to the instrument. This is done through the communications sockets, according to the wiring schedule given in Section 6. Toggle this function on and off using the up or down key (Enter to confirm).

- Notes:
- 1) This must be activated if using an external beacon receiver as differential input.
 - 2) There is no individual control of power to each socket – they are either all on or all off.

4.2.13 UTILITIES

4.2.13.1 Simulate Mode

Simulate Mode causes the unit to display and log programmed data rather than the actual data coming in from the sensors. This feature is useful for familiarisation with the system in laboratory conditions before deployment commences.

Having accessed Simulate Mode, use up/down to toggle between using Online Inputs (actual data) or Simulated Mode.

Note that the instrument will always turn on in normal "Online Inputs" mode.

4.2.13.2 Set All Default

If the system settings have been corrupted for some reason, it is possible to return the system to the factory default settings. Scroll to Reset All Defaults, and press Enter. The system will shut down, and when it is turned on again, all default settings will have been restored. In summary these are:

- Single channel only
- Internal GPS
- All external inputs off
- All baud rates set to 19200
- Echosounder draft settings 0.5m
- Sound Velocity set to 1500m/s
- WGS84 Spheroid and UTM Grid

4.2.13.3 Emulate PC Keyboard

For testing it may be desirable to control the system with a PC rather than via the keypad. If the Surveyor is connected to a PC running a terminal emulation program, and the Emulate PC keyboard function is enabled, then the following key strokes replicate the Surveyor keys as shown:

F1, F2, F3, F4	same as on keypad
?	key emulates 'MENU'
!	key emulates 'HELP'
<	emulates 'CONTRAST'
>	emulates 'LIGHT'
←	emulates LEFT ARROW
→	emulates RIGHT ARROW
↓	emulates DOWN ARROW
↑	emulates UP ARROW
[emulates ESCAPE
=	emulates ENTER

4.2.13.4 **Echo External RTCM**

When setting up a Marine Beacon input, it may be desirable to confirm that the receiver is actually picking up a signal. Selecting this particular test mode will force any incoming data from the Beacon receiver to be directly echoed back out of the main RS232 communications port (in place of any other output data). Although the data is in binary format and therefore unintelligible, its presence may be used to confirm that a Beacon signal is in fact being received.

4.2.14 **COMMAND MODE**

This function will cause the instrument top to stop displaying and recording data, and will allow communications with PC. This mode is required for data upload using the SurveyLog software.

4.2.15 **POWER OFF**

The instrument can be turned off by using the Power Off function in the Menu.

Alternatively, pressing and holding the Power Off key for 5 seconds will cause shutdown.

In the unlikely event of the system completely hanging up, a hardware reset can be forced by holding the Off key down for 40 seconds.

5 SURVEYLOG SOFTWARE

5.1 INTRODUCTION

SurveyLog is the user interface program supplied with the MIDAS Surveyor GPS Echosounder system from Valeport Ltd. The program is written in Delphi, and will run on all PCs operating Windows 95 or above. As is the nature of all software, the faster the computer, the better the software will perform. As an absolute minimum, we recommend the following PC specification:

- Pentium 100MHz (or equivalent)
- 32Mbyte RAM
- CDROM Drive
- 1 spare comm port
- 100Mbyte Disk Space

Note that installation of SurveyLog itself requires only a few Mbyte of disk space. However, Windows will utilise a large amount of disk space as “virtual memory” (upwards of 20Mbyte), which must be taken into account. Further, note that a 16Mbyte binary file from the instrument will translate to over 110Mbyte of calibrated text files – make sure that there is enough hard disk space to allow for translation of any uploaded files.

This manual will guide the operator through all the functions that SurveyLog has to offer, including data extraction and a wide variety of data viewing formats. Please note that although SurveyLog offers a variety of data display modes, it offers no data editing features, so users may wish to use a standard hydrographic survey package for data manipulation.

5.2 INSTALLATION

As with all installation programs, we recommend that all other applications be closed before commencing installation.

SurveyLog is supplied on a single CDROM. It does features an Auto-run facility, but if this does not start users will be required to run the Setup.exe program manually. This can be done either by selecting Run from the Start menu, and browsing for the Setup.exe file under the CD drive (typically drive D or E), or by clicking on the Setup.exe program under the CD drive in Windows Explorer.

The Setup.exe program will launch a wizard that will guide the user through the remainder of the installation process. By default, the installation program will create a new directory in which to install SurveyLog, although you may change this if you wish:

C:\Program Files\SurveyLog


On completion of installation, a window will appear with a shortcut icon to the program. This may be dragged onto the desktop if required:



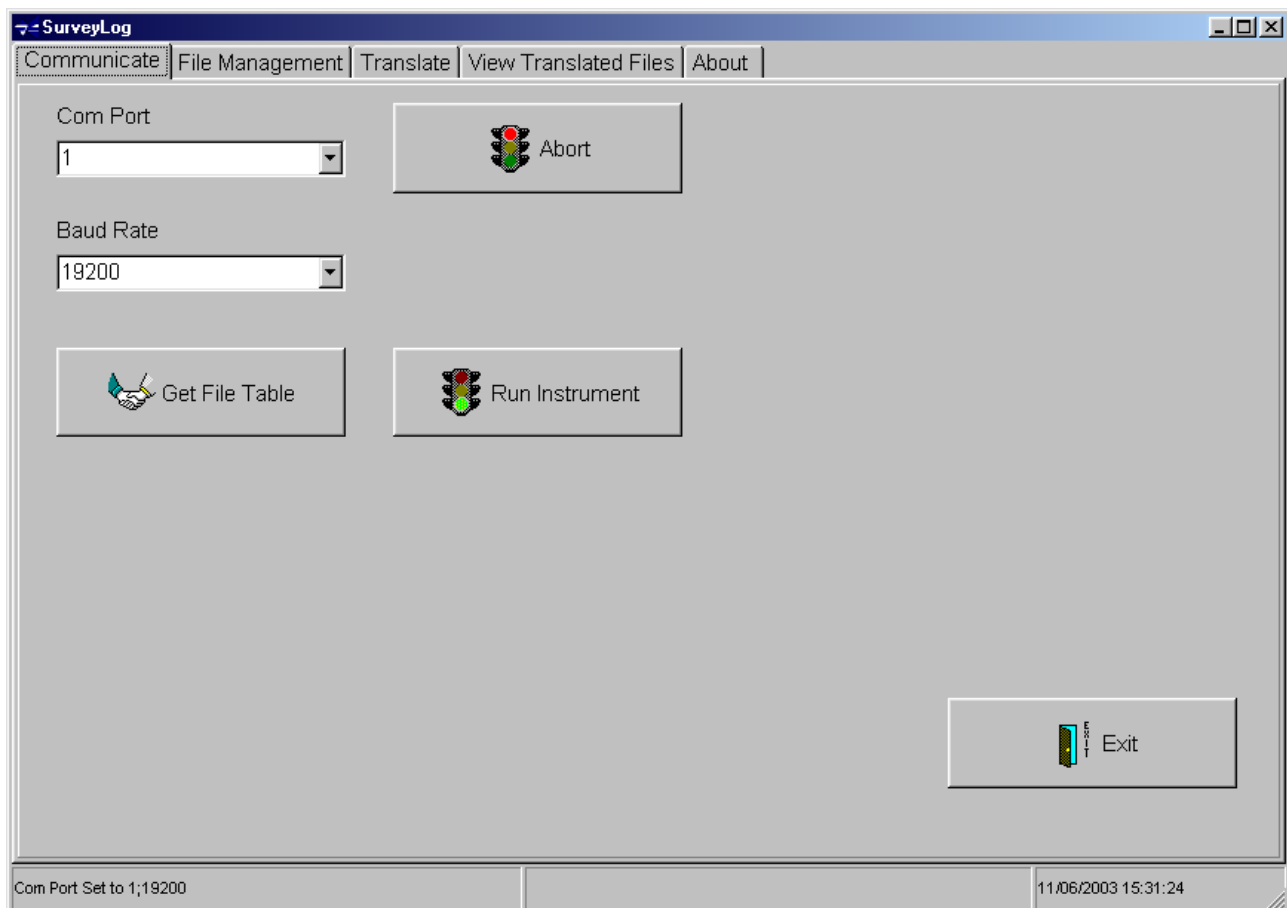
Note that SurveyLog software is distributed free with the equipment – therefore no password or software key is required for installation.

To Run the software, simply double click the Desktop icon. The following pages describe the operation of the software.

5.3 ESTABLISHING COMMUNICATIONS

Double clicking the desktop icon (), or running the SurveyLog.exe program through Windows Explorer, will reveal the following screen, which allows access to all major SurveyLog functions. Note that all features are accessed through a selection of tabs at the top of the page – there is no menu bar.

The opening screen will appear as below:

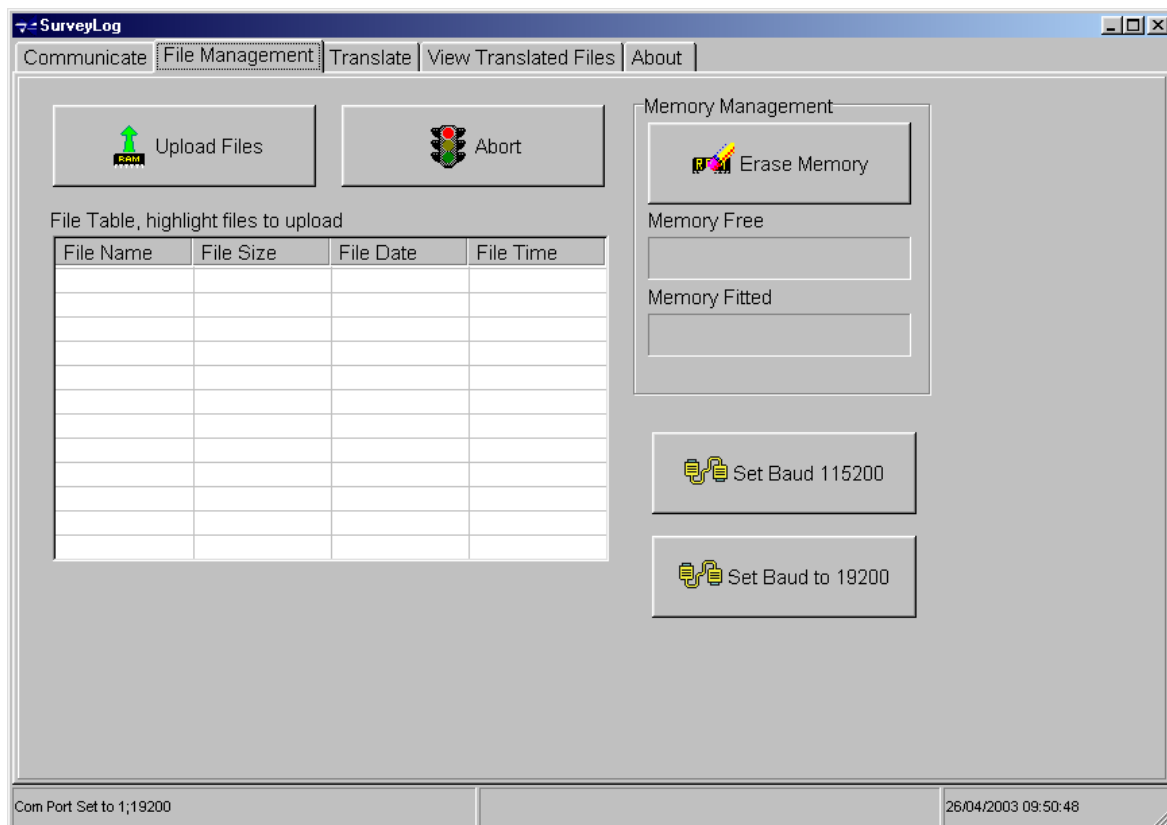


- Press the Menu button on the keypad
- Scroll to the third option down – “Data Upload”
- Press the Enter button twice to accept this.
- The screen should change to the Data Upload mode screen
- In SurveyLog, select the appropriate communications port from the drop down list, and the baud rate of the MIDAS Surveyor main output.
- Click the “Get File Table” button.

SurveyLog will now interrogate the MIDAS Surveyor, and obtain a list of all the data files stored in the instrument memory. A new file will have been created each time logging has been turned ON (but not from Pause mode).

The program will automatically move to the next tab, “File Management” when the file table has been read.

5.4 FILE MANAGEMENT & DATA UPLOAD



- To upload large files, it is advisable to use a higher baud rate to minimise the upload time. Use the Set Baud 115200 button to change the baud rate of both PC and instrument.
- Highlight the data files of interest using the mouse; the standard Windows protocol of using Ctrl and Shift to select multiple files applies.
- Click the Upload Files button. The data files will be automatically uploaded into a subdirectory of the SurveyLog program directory as follows:

C:\Program Files\SurveyLog\program\Surveyor\{ddmmyyyy}

The files will be named FILE????.bin, where ????. signifies the file number.

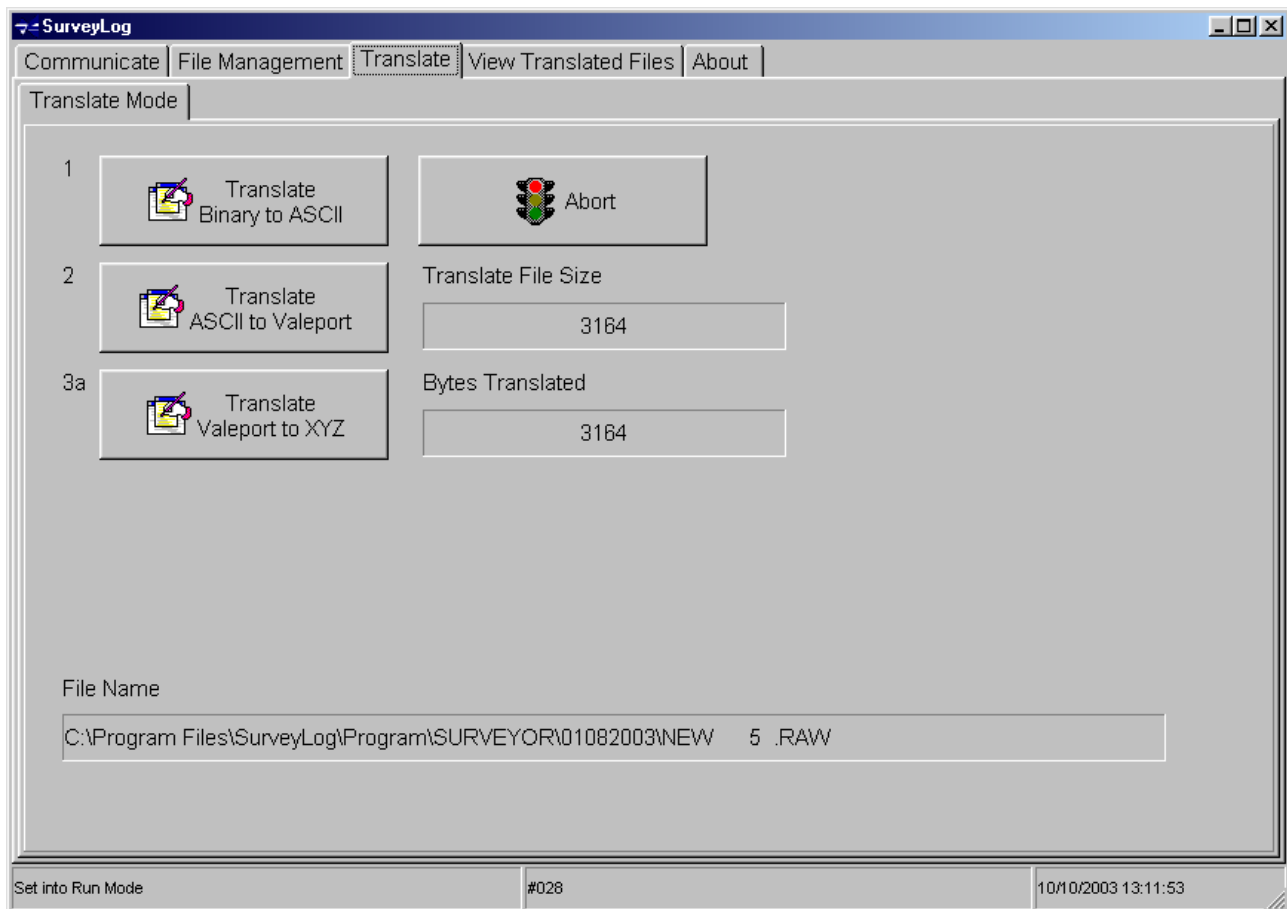
Once the files have been uploaded, the memory may be erased by clicking on the Erase Memory button. **DO THIS WITH CAUTION!** Once erased, data files cannot be recovered, so be sure that all required files have been successfully uploaded with no data corruption. The file upload protocol used is “Zmodem with error correction”, which is an extremely robust communications protocol. As such, data corruption is very rare, but for important files it is advisable to view the data and confirm that upload has been successful before erasing the memory.

Further data viewing does not require the MIDAS Surveyor to be connected to the PC. If the baud rate has been increased for data upload purposes, it can now be reset by clicking the “Set Baud 19200” button. Note that the button will revert the baud rate to whatever it was before it was increased.

To return the instrument to normal operating mode, it is necessary to click the Run Surveyor button on the opening “Communicate” page. Once this is done, the MIDAS Surveyor may be disconnected from the PC.

5.5 TRANSLATING DATA

Click on the Translate tab at the top of the page.



To save memory space, all data is logged in the instrument and uploaded to PC in binary format. The first stage in converting the data to a viewable state is to translate it into ASCII text. Click on the “Translate Binary to ASCII” button. A standard Windows “open file” box will appear, in which the required binary file should be highlighted. Again note that more than one file can be selected if required.

On clicking Open, the translation process begins. All data will be turned into ASCII text exactly as it was logged, with no data processing or interpolation occurring.

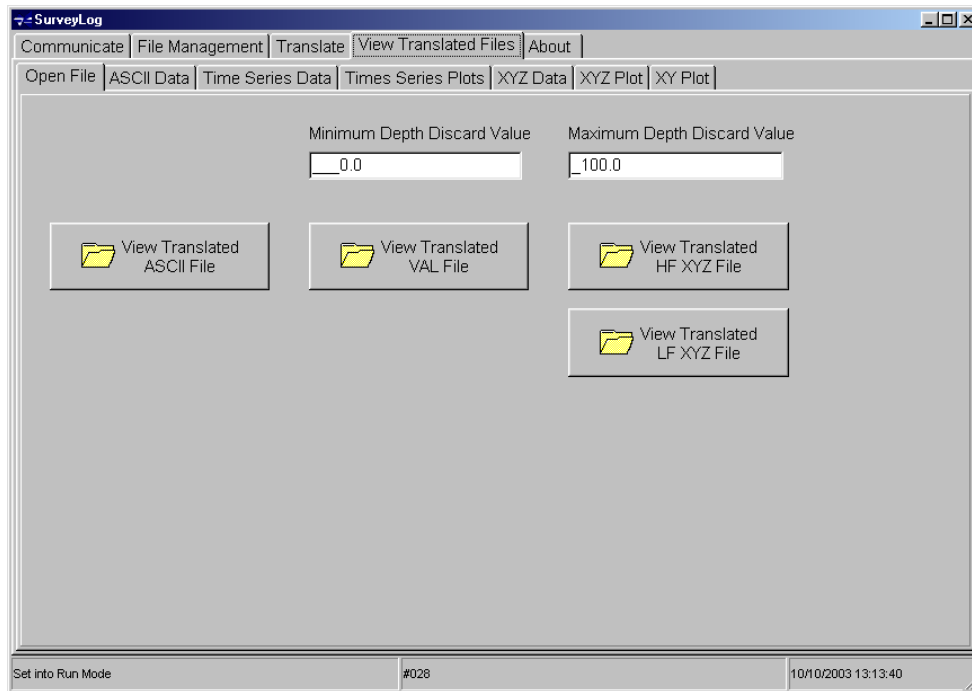
To allow the data to be viewed as graphical and time series plots, all data points must be correctly time stamped. This requires a further translation process from ASCII format into “Valeport” format. This process interpolates the precise time of each data point to enable a time series of each parameter to be created.

Simply click the “Translate ASCII to Valeport” button, and select the required file. The Valeport format file will then be generated. For details of how to view this file, see the next section.

Finally, the Valeport format file may be further translated into an XYZ (CAD) file of 3 dimensional data. Click the “Translate Valeport to XYZ” button, and select the required file. The XYZ file will then be generated. For details of how to view this file, refer to Section 5.6.2.

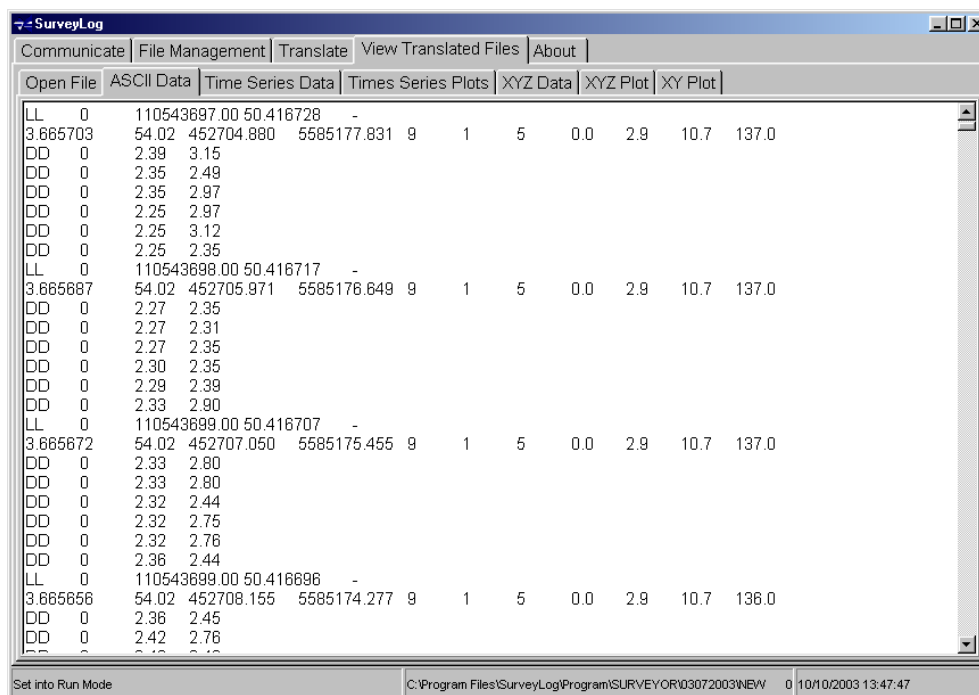
5.6 VIEWING DATA FILES

In order view a data file, it must first be opened. The “View Translated Files” tab opens as illustrated.



5.6.1 ASCII DATA FILES

To view the logged data exactly as it was recorded, with no processing or interpolation, simply click the “View Translated ASCII File” button. A standard Windows “Open File” dialog box will appear. Select the required file (ending in .RAW), and click Open. The data may then be viewed by clicking the ASCII Data tab at the top of the page. This data may be viewed and copied into external programs, but may not be edited & saved within SurveyLog.



5.6.1.1 ASCII File Data Format

The data is recorded in sequence as it is measured. With so many possible data inputs (position, depth, tide, heave, sound velocity, gyro) all coming at independent (asynchronous) times, it is necessary for each data type to be identified in the file.

Looking at an ASCII data file, the first 40 or so lines of data are simply header information describing the system setup. The data lines then begin, as shown in the sample screen on the previous page. The various data lines and their identifiers are as follows:

ID	DATA TYPE	STRING COMPOSITION
LL	GPS Position	Ident No. Time (s) since Year 2000 Latitude (WGS84) Longitude (WGS84) GPS Height (m) above datum Easting (local grid) Northing (local grid) Data count (housekeeping purposes only, normally 8 or 9) Type of Fix 0: No Fix 1: Uncorrected Fix 2: Differentially Corrected Fix (SBAS or Beacon) 3: RTK data (external input only) Number of satellites Age of Correction (0 if SBAS or no correction) HDOP Speed (knots) Heading (degrees)
DD	Corrected Depth	Ident No HF depth (m) LF depth (m)
DH	Corrected Depth + Heave	Ident No HF depth (m) LF depth (m) Heave correction value (cm)
DJ	Corrected Depth + Heave + Tide	Ident No HF depth (m) LF depth (m) Heave correction value (cm) Tide Correction value (cm)
DT	Corrected Depth + Tide	Ident No HF depth (m) LF depth (m) Tide Correction value (cm)
ED	Uncorrected Depth	Ident No HF depth (m) LF depth (m)
EH	Uncorrected Depth + Heave	Ident No HF depth (m) LF depth (m) Heave correction value (cm)
EJ	Uncorrected Depth + Heave + Tide	Ident No HF depth (m) LF depth (m) Heave correction value (cm) Tide Correction value (cm)
ET	Uncorrected Depth + Tide	Ident No HF depth (m) LF depth (m) Tide Correction value (cm)

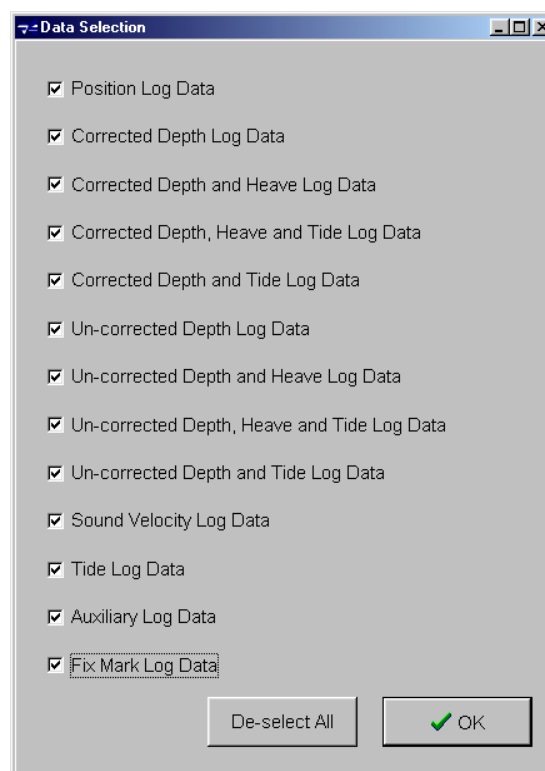
ID	DATA TYPE	STRING COMPOSITION
PP	Logging Paused	Ident No Time of Pause
CC	Logging Continued	Ident No Time of Continue
SV	Sound Velocity Data	Ident No Sound Velocity currently applied to echosounder Latest Sound Velocity reading (mm/s)
TI	Tide Data	Ident No. Latest Tide Data Input (cm)
AX	Auxiliary input data	Ident No Number of characters in string (padded to even number) Data string
FX	Fix Mark	Ident No Fix Mark Sequence Number

5.6.2 DISCARDING ERRONEOUS DEPTH DATA

It is a fact of hydrographic surveying that occasional spurious data points will be encountered from false echoes. SurveyLog allows such points to be ignored in Valeport and XYZ files. Simply set the lower and upper limits for valid data points before clicking on either the “View Translated VAL File” or the “View Translated XYZ file” buttons. In the example screen shown under Section 5.6, points below 0.0 and above 100.0m depth will be ignored.

5.6.3 VALEPORT FORMAT FILES

To view a Valeport format file, which allows Time Series Data and Plots, click the “View Translated VAL File” button. Highlight the required file when asked. Data may be viewed in either a list (notebook) type format or graphically. When the file is opened, the following screen appears, listing out all the possible data line types (as described under the ASCII file formats, Section 5.6.1.1). Only the selected data types will be opened from the chosen file (if available).



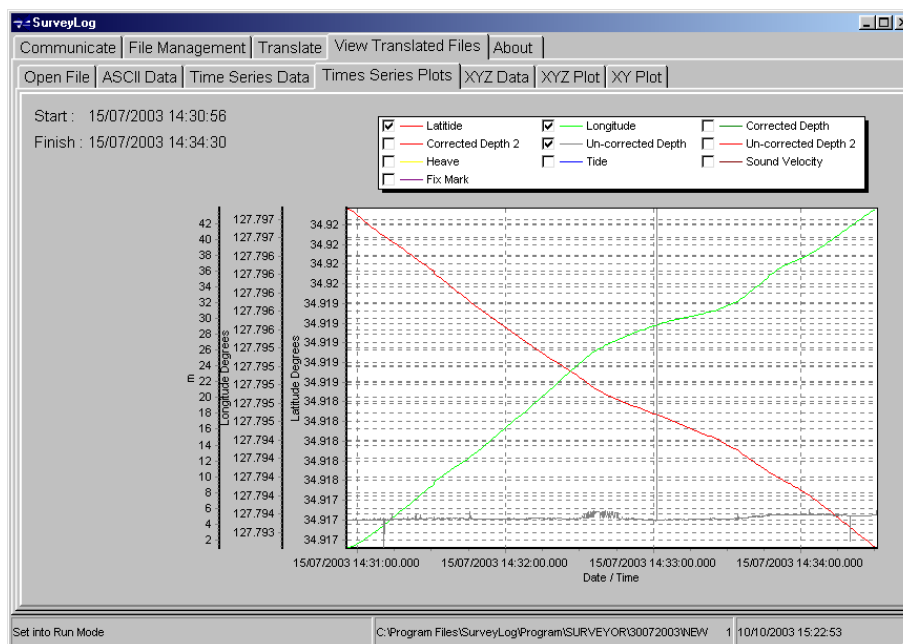
Once the required data types have been selected, view the time series of data by clicking the Time Series Data tab.

ID	Date/Time	Value 1	Value 2	Value 3	Value 4	Value 5	Value 6	Value 7
ED	1 15/07/2003 14:30:59.000	4.52	0.00					
ED	1 15/07/2003 14:30:59.167	4.56	0.00					
ED	1 15/07/2003 14:30:59.333	4.56	0.00					
ED	1 15/07/2003 14:30:59.500	4.72	0.00					
ED	1 15/07/2003 14:30:59.667	4.56	0.00					
ED	1 15/07/2003 14:30:59.833	4.56	0.00					
LL	1 15/07/2003 14:31:00.000	34.920293	127.793278	30.01	5689584.381	-5627842.427	9	1
ED	1 15/07/2003 14:31:00.000	4.56	0.00					
ED	1 15/07/2003 14:31:00.167	4.52	0.00					
ED	1 15/07/2003 14:31:00.333	4.52	0.00					
ED	1 15/07/2003 14:31:00.500	4.52	0.00					
ED	1 15/07/2003 14:31:00.667	4.52	0.00					
ED	1 15/07/2003 14:31:00.833	4.56	0.00					
LL	1 15/07/2003 14:31:01.000	34.920272	127.793294	30.01	5689584.873	-5627838.706	9	1
ED	1 15/07/2003 14:31:01.000	4.52	0.00					
ED	1 15/07/2003 14:31:01.167	4.52	0.00					
ED	1 15/07/2003 14:31:01.333	4.52	0.00					
ED	1 15/07/2003 14:31:01.500	4.49	0.00					
ED	1 15/07/2003 14:31:01.667	4.49	0.00					
ED	1 15/07/2003 14:31:01.833	4.62	0.00					
LL	1 15/07/2003 14:31:02.000	34.920252	127.793310	30.01	5689585.236	-5627834.985	9	1
ED	1 15/07/2003 14:31:02.000	4.59	0.00					
ED	1 15/07/2003 14:31:02.167	4.52	0.00					
ED	1 15/07/2003 14:31:02.333	4.62	0.00					
ED	1 15/07/2003 14:31:02.500	4.52	0.00					
ED	1 15/07/2003 14:31:02.667	4.59	0.00					
ED	1 15/07/2003 14:31:02.833	4.52	0.00					

The data line formats are very similar to those for the simple ASCII text files, but with the addition of a date and time stamp for each data line. In the case of the GPS (LL) data lines, this is calculated from the time stamp within that data line. For the remaining data line types, the date and time are calculated by linear interpolation between the GPS lines. For example, if there are 6 depth readings between successive GPS lines (which are one second apart), they will be time stamped 1/6 second apart.

As with the basic "ASCII" format, this data may be copied and pasted into other packages, but cannot presently be edited.

To view the Time Series data graphically, click the Time Series Plots tab. The start and finish times of the file are indicated in the top left hand corner of the screen,



All logged parameters may be viewed on the graph, which has multiple Y axes. To display/remove a parameter from the graph, simply check/uncheck the label at the top of the plot.

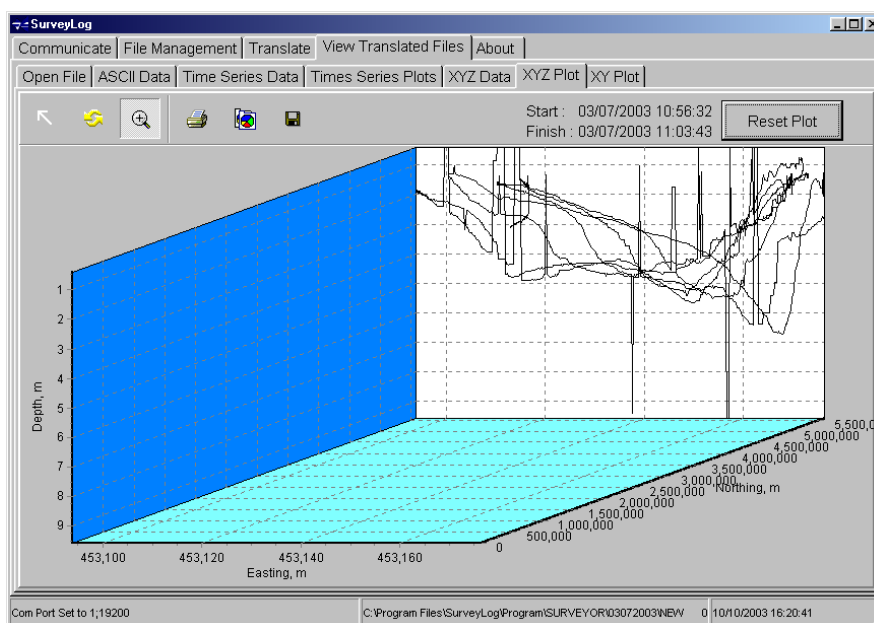
5.6.4 XYZ FORMAT FILES

Like the Valeport format files, XYZ files may be viewed in either a list or graphical format. Two XYZ files will be created for each data file, one for the High Frequency data (____XZH.nnn) and one for Low Frequency data (____XZL.nnn). To open the data from either file, click the “View Translated HF XYZ File” or “V View Translated LF XYZ File” as appropriate.

To view the text data of the XYZ file, click the “XYZ data” tab. Again, this data may be copied and pasted into other packages, but cannot presently be edited.

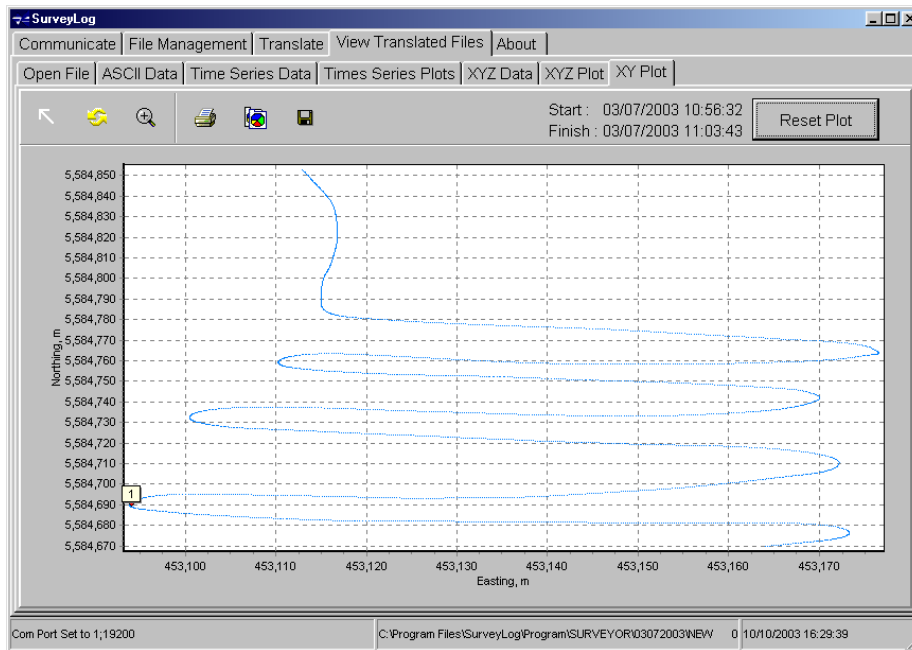
Date/Time	Easting	Northing	Depth
03/07/2003 10:56:32.833	453113.29	5584851.17	3.06
03/07/2003 10:56:33.000	453113.36	5584850.85	3.05
03/07/2003 10:56:33.167	453113.43	5584850.54	3.05
03/07/2003 10:56:33.333	453113.50	5584850.23	3.05
03/07/2003 10:56:33.500	453113.56	5584849.92	3.05
03/07/2003 10:56:33.667	453113.63	5584849.61	3.05
03/07/2003 10:56:33.833	453113.69	5584849.30	3.06
03/07/2003 10:56:34.000	453113.76	5584848.99	3.02
03/07/2003 10:56:34.167	453113.82	5584848.68	3.02
03/07/2003 10:56:34.333	453113.89	5584848.37	2.99
03/07/2003 10:56:34.500	453113.95	5584848.06	2.99
03/07/2003 10:56:34.667	453114.02	5584847.75	2.99
03/07/2003 10:56:34.833	453114.08	5584847.44	3.02
03/07/2003 10:56:35.000	453114.14	5584847.13	2.99
03/07/2003 10:56:35.333	453114.21	5584846.82	2.99
03/07/2003 10:56:35.667	453114.28	5584846.52	2.99
03/07/2003 10:56:36.000	453114.34	5584846.21	2.96
03/07/2003 10:56:36.333	453114.41	5584845.90	2.96
03/07/2003 10:56:36.667	453114.48	5584845.60	2.96
03/07/2003 10:56:37.000	453114.54	5584845.29	2.96
03/07/2003 10:56:37.167	453114.61	5584844.98	2.92
03/07/2003 10:56:37.333	453114.68	5584844.67	2.92
03/07/2003 10:56:37.500	453114.74	5584844.36	2.92
03/07/2003 10:56:37.667	453114.81	5584844.06	2.92
03/07/2003 10:56:37.833	453114.88	5584843.75	2.96
03/07/2003 10:56:38.000	453114.94	5584843.44	2.96
03/07/2003 10:56:38.167	453115.01	5584843.13	2.96
03/07/2003 10:56:38.333	453115.07	5584842.82	2.96

To view a 3D plot of the survey, click the “XYZ plot” tab.



This graph shows the plot of the survey, with the X axis corresponding to Eastings, the Y axis to Northings, and the Z axis to Depth. The function buttons allow the graph to be rotated and zoomed, as well as printed, copied to clipboard and saved as a bitmap. Reset plot returns to original view.

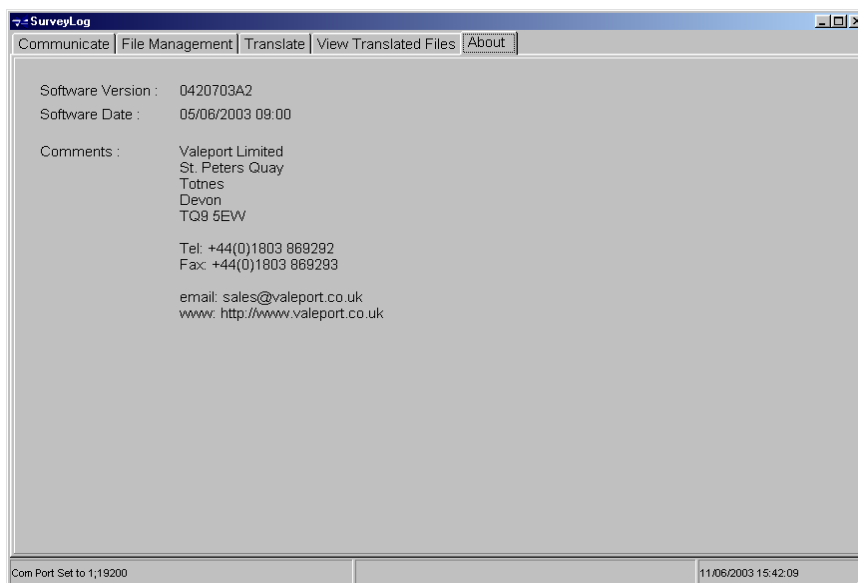
To view a plot of the survey track, complete with Fix Mark annotations, click the “XY plot” tab.



This graph shows the survey track, with the X axis corresponding to Longitude and the Y axis to Latitude. The Fix Mark annotations are numbered sequentially.

5.7 ABOUT

The About page lists contact details for Valeport, together with the version number of the SurveyLog program:



6 WIRING SCHEDULES

The following pages contain cableforms as detailed below:

0420WO.C00 Midas Surveyor cableform Layout

0420C08 - Echo Sounder Line Connector to Junction Box

0420C09 - Echo Sounder 33KHz Transducer to Junction Box

0420C10 - Echo Sounder 210KHz Transducer to Junction Box

0420C11 - External Power / Charger Lead

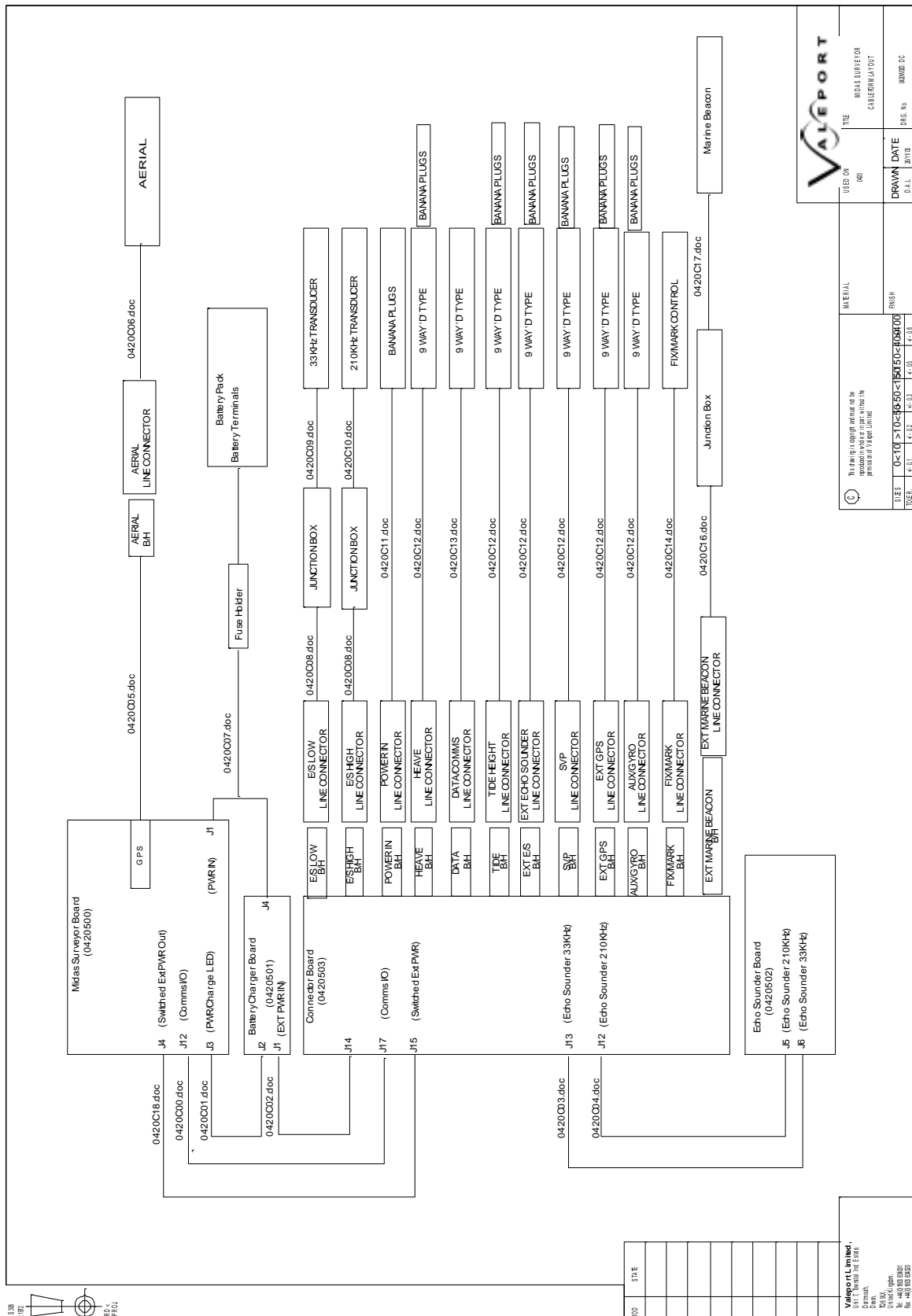
0420C12 - External Instrument RS232 Comms Lead

0420C13 – Standard RS232 Data output / PC Comms Lead

0420C14 - Fix Mark Lead

0420C16 - Marine Beacon Line Connector to Junction Box

0420C17 - Marine Beacon to Junction Box



CABLEFORM No. : 0420C08C

CABLEFORM NAME : Echo Sounder Line Connector to Junction Box
 DRAWN BY : D.LAKIN

PRODUCT : Midas Surveyor

CABLE			END 1 :		END 2 :		FUNCTION
WIRE TYPE	WIRE COLOUR	WIRE LENGTH (mm)	5 Way Male Line Connector (Fischer)	PIN	Junction Box	PIN	
Supplied by Fischer 7 CORE SCREENED 24AWG, 6.2mm MAX DIAMETER PROP785 (BIPTN AF507)	SCREEN	1000	SE103A054-130/6.2	1	Connector block	3	SCREEN
	BLACK			2		4	SIG+ (33KHz)
	WHITE			3		5	SIG- (33KHz)
	YELLOW			4		1	SIG+ (210KHz)
	GREEN			5		2	SIG- (210KHz)

CABLEFORM No. : 0420C09B

CABLEFORM NAME : Echo Sounder 33KHz TRANSDUCER to Junction Box
 DRAWN BY : D.LAKIN

PRODUCT : Midas Surveyor

CABLE			END 1 :		END 2 :		FUNCTION
WIRE TYPE	WIRE COLOUR	WIRE LENGTH (mm)	Transducer	PIN	Junction Box	PIN	
2 CORE SCREENED FLYING LEAD	BLACK (variable)	As supplied	33KHz Transducer		Connector block	4	SIG+ (33KHz)
	BLUE (variable)					5	SIG- (33KHz)
	SCREEN					1	SCREEN

CABLEFORM No. : 0420C10B

CABLEFORM NAME : Echo Sounder 210KHz TRANSDUCER to Junction Box
 DRAWN BY : D.LAKIN

PRODUCT : Midas Surveyor

CABLE			END 1 :		END 2 :		FUNCTION
WIRE TYPE	WIRE COLOUR	WIRE LENGTH (mm)	Transducer	PIN	Junction Box	PIN	
2 CORE SCREENED FLYING LEAD	BLUE (variable)	As supplied	210KHz Transducer		Connector block	1	SIG+ (210KHz)
	RED (variable)					2	SIG- (210KHz)
	SCREEN					3	SCREEN

CABLEFORM No. : 0420C11B

CABLEFORM NAME : External Power/Charger Lead
 DRAWN BY : D.LAKIN

PRODUCT : Midas Surveyor

CABLE			END 1 :		END 2 :		FUNCTION
WIRE TYPE	WIRE COLOUR	WIRE LENGTH (mm)	4 Way Female Line Connector (Fischer)	PIN	Banana Plugs	PIN	
Supplied by Fischer 7 CORE SCREENED 24AWG, 6.2mm MAX DIAMETER PROP785 (BIPTN AF507)	SCREEN	2000	SE103Z053-60/6.2	1			Screen
	BLACK			2	RED Banana Plug		Power +ve
	WHITE			3			Power +ve
	YELLOW			4	BLACK Banana Plug		Power -ve

CABLEFORM No. : 0420C12B

CABLEFORM NAME : EXTERNAL INSTRUMENT COMMS LEAD
 (heave, Tide, depth, SVP, aux/gyro, GPS)
 DRAWN BY : D.LAKIN

PRODUCT : Midas Surveyor

CABLE			END 1 :		END 2 :		END 3 :	FUNCTION
WIRE TYPE	WIRE COLOUR	WIRE LENGTH (mm)	7 Way Male Line Connector (Fischer)	PIN	9 WAY 'D' TYPE MALE	PIN	Banana Receptacle	
Supplied by Fischer 7 CORE SCREENED 24AWG, 6.2mm MAX DIAMETER PROP785 (BIPTN AF507)	SCREEN	2000	SE103A057-130/6.2	1	449-764			Screen
	BLACK			2		3		RS232Tx (OUT OF MIDAS)
	WHITE			3		2		RS232Rx (IN TO MIDAS)
	YELLOW			4				N/C
	GREEN			5		5	Black ¹ (rapid 17-2460)	Signal GND / 0v OUT OF MIDAS
	BLUE			6				
	RED			7			Red ² (rapid 17-2462)	+12v OUT OF MIDAS

¹ Connect to BLACK Banana receptacle using 50cm black 7/0.2 wire, heatshrink joint inside D connector

² Connect to RED Banana receptacle using 50cm red 7/0.2 wire, heatshrink joint inside D connector

CABLEFORM No. : 0420C13B

CABLEFORM NAME : DATA/COMMS LEAD
DRAWN BY : D.LAKIN

PRODUCT : Midas Surveyor

CABLE			END 1 :		END 2 :		FUNCTION
WIRE TYPE	WIRE COLOUR	WIRE LENGTH (mm)	7 Way Male Line Connector (Fischer)	PIN	9 WAY 'D' TYPE FEMALE	PIN	
Supplied by Fischer 7 CORE SCREENED 24AWG, 6.2mm MAX DIAMETER PROP785 (BIPTN AF507)	SCREEN	2000	SE103A057-130/6.2	1		N/C	SCREEN
	BLACK			2		2	RS232Tx (OUT OF MIDAS)
	WHITE			3		3	RS232Rx (IN TO MIDAS)
	GREEN			5		1,5,6,8	GND

CABLEFORM No. : 0420C14B

CABLEFORM NAME : FIX/MARK LEAD
DRAWN BY : D.LAKIN

PRODUCT : Midas Surveyor

CABLE			END 1 :		END 2 :		FUNCTION
WIRE TYPE	WIRE COLOUR	WIRE LENGTH (mm)	6 Way Male Line Connector (Fischer)	PIN	SINGLE POLE 1 WAY SWITCH	PIN	
Supplied by Fischer 7 CORE SCREENED 24AWG, 6.2mm MAX DIAMETER PROP785 (BIPTN AF507)	SCREEN	2000	SE103A056-130/6.2	1	RS 373-1640		SCREEN
	BLACK			2			RELAY 2 ¹
	WHITE			3		A	FIX INPUT
	YELLOW			4		B	GND
	GREEN			5			FLASH ENABLE ¹
	BLUE			6			RELAY 1 ¹

¹ Ensure no open ends that can short, also ensure enough of a tail should a customer require these connections.

CABLEFORM No. : 0420C16B

CABLEFORM NAME : Fischer 7 way line connector to Beacon Junction Box
DRAWN BY : D.LAKIN

PRODUCT : Midas Surveyor

CABLE			END 1 :		END 2 :		FUNCTION
WIRE TYPE	WIRE COLOUR	WIRE LENGTH (mm)	7 Way Male Line Connector (Fischer)	PIN	JUNCTION BOX	PIN	
Supplied by Fischer 7 CORE SCREENED 24AWG, 6.2mm MAX DIAMETER PROP785 (BIPTN AF507)	SCREEN	1000	SE103A057-130/6.2	1	6 Way CONNECTOR BLOCK	5	Screen
	BLACK			2		N/c	GPS OUT
	WHITE			3		N/c	GPS IN
	YELLOW			4		4	GPS DIFF IN
	GREEN			5		1	SIG/PWR GND
	BLUE			6		3	GPS DIFF OUT
	RED			7		2	+12v OUT

CABLEFORM No. : 0420C17B

CABLEFORM NAME : Marine Beacon to Junction Box

PRODUCT : Midas Surveyor

DRAWN BY : D.LAKIN

CABLE			END 1 :		END 2 :		FUNCTION
WIRE TYPE	WIRE COLOUR	WIRE LENGTH (mm)	Marine Beacon 6 way connector	PIN	Junction Box	PIN	
6 CORE SCREENED FLYING LEAD	BLACK	As supplied	6 Way female as supplied	1	Connector block	1	Power GND
	WHITE			6		1	Signal GND
	YELLOW			6		1	Signal GND
	Cable drain (bare wire)			5		1	Antenna GND
	Braided Cable Shield					1	Antenna GND
	RED			2		2	Power +(9-16vDC)
	BLUE			3		3	Beacon Tx Data
	GREEN			4		4	Beacon Rx Data