Blueprint Subsea

Oculus M-Series Operating Guide

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Oculus M-Series Sonar

User Manual

UM-148-P01222-05

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1. Introduction

Traditionally, sonars were mechanical devices that operated by rotating their transducers (transmitters and receivers) to scan the sector in front of or around them. At each transducer position, a sound pulse would be transmitted into the water, and the echoes collected by the receiver before being plotted onto the display. Depending on the required resolution an image could tens of seconds to update, and any movement of the sonar during this period could smear and distort the imagery.

Unlike mechanical sonars, Oculus is a multi-beam sonar that has no moving parts, and an array of receivers that collect echoes from a single transmission pulse and mathematically combine the data into an image using a process known as “beam-forming”. This allows images to be produced many times per second and viewed in real-time like the output from a video camera.

Some Oculus sonars (with a ‘d’ suffix at the end of their name) are dual-frequency, having Low-Frequency and High-Frequency operating modes that allow the operator to choose between longer acoustic ranges or high-resolution imagery respectively.

Sonar imagery can take some training and practice to interpret as the display appears to the operator as a top-down view covering the area in-front of them, acoustically illuminating a sector up to 130° horizontally and 20° vertically depending on the selected frequency mode. The brightness of targets and textures on the display represents how much sound has been reflected from them (with gaseous or dense materials reflecting more than mud, sand and silt), while acoustic shadows can be cast based on the geometry of objects or the seabed.

In the following sections, this manual aims to explain the basics for the correct configuration and operation of the Sonar, and how to start interpreting the images it produces.

Symbols

Throughout this document the following symbols are used to indicate special precautions or procedures you should note…

WARNING!
This symbol indicates a warning you should follow to avoid bodily injury or damage to your equipment.

CAUTION
This symbol denotes precautions and procedures you should follow to avoid damage to your equipment.

NOTE
This symbol denotes special instructions or tips that should help you get the best performance from your equipment.

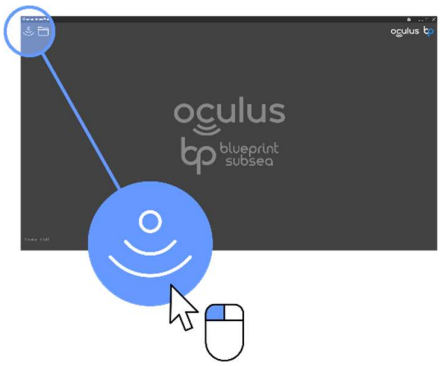
2. ViewPoint Software

ViewPoint is a software application that is used to view, record and playback imagery from the Oculus sonar, in addition to providing tools that help configure environmental and network settings.

2.1. Viewing Sonar Data

When ViewPoint starts, the Home screen is shown, but no imagery is available until the application is connected to sonar hardware.

To start viewing sonar imagery, click the “Connect” button at the top left of the display – this will attempt to find and connect to any Oculus sonar that is on the same network (and subnet) as the computer running the ViewPoint software.



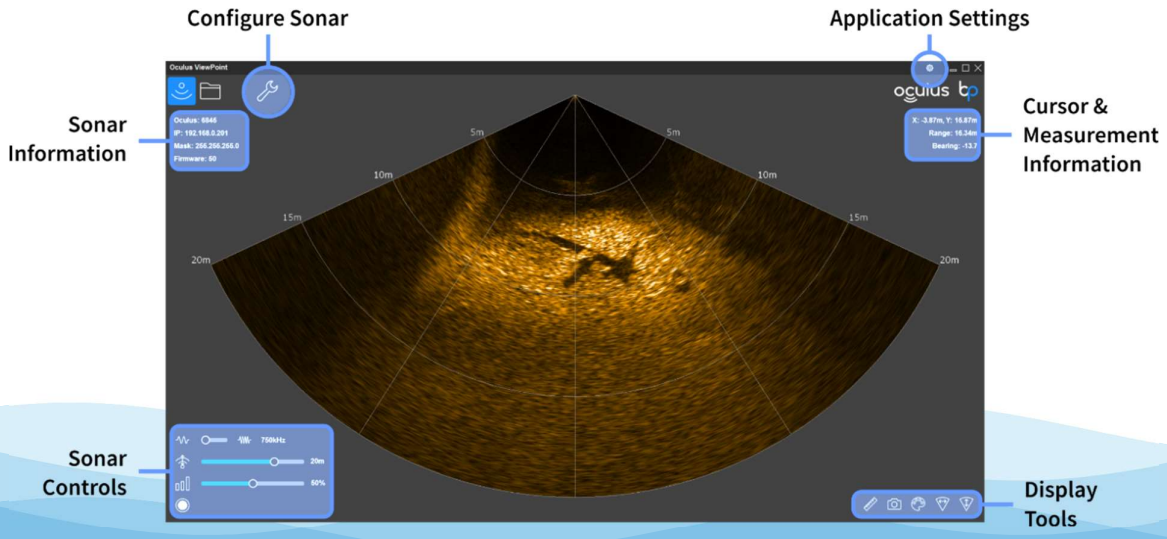
If several Oculus sonars are connected, the user will be prompted to choose the specific one they wish to connect to.

If an Oculus is configured to connect to a different subnet from that of the computer running viewpoint (i.e. the sonars IP address is 192.168.**48**.45, while the computers is 192.168.**0**.100), then Viewpoint will be able to show the presence and network details of the Oculus, but the operating system network settings will prevent a connection from being made.
In this case, the user will need to adjust the network settings of either the sonar or computer as discussed in the previous “Network Setup” section of this manual, or contact their Network Administrator for further assistance.

To disconnect from a sonar, click the highlighted “Connect” button, network traffic will stop and the sonar hardware will enter a low power state.

2.1.1. Sonar Display

When a connection is made to the Oculus, ViewPoint will show the live sonar image in the centre of the display with controls and status information arranged at the corners of the window:



2.1.2. Sonar Information

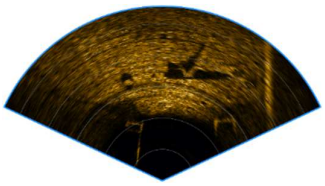
Sonar hardware information is shown at the top left of the display below the 'Connection' button – this includes the serial number of the connected sonar, network addresses and firmware version in use.

Sonar device settings can be adjusted by clicking the 'Configure Sonar' button – this is discussed in further detail in a subsequent section of the manual.

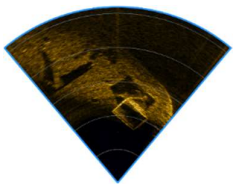
2.1.3. Frequency Mode Control

Some Oculus sonars (with a 'd' name suffix) support dual frequency operation, where the current mode can be chosen to be:

Low Frequency mode has a 130° horizontal field-of-view and allows the sonar to see targets up to it maximum range, but the definition of targets is lower than the High Frequency mode – this is commonly used for searching activities.



High Frequency mode (where supported) may have a reduced horizontal field-of-view and reduced maximum range compared to Low Frequency mode (model dependant). High Frequency mode provides high-definition images of close-up targets and is commonly used for inspection activities.



Please consult the table later in this document, or our datasheet, for model specific fields-of-view.

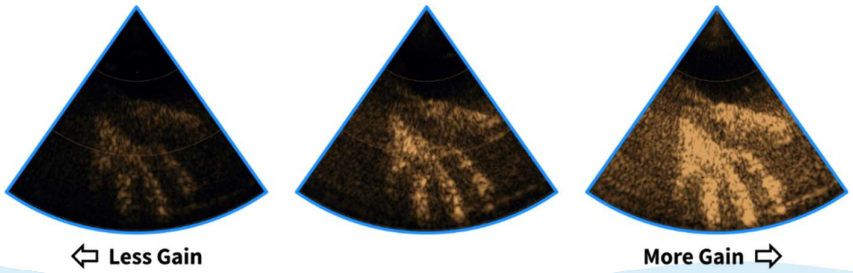
2.1.4. Range Control

Use this slider to select the range the sonar image will represent on the display. As the range is increased, the time required for the sound to reach the furthest targets and return will also increase so the image update rate with slow down. Power consumption of the sonar will also increase at higher ranges as the receiver circuitry will be active for longer periods of time while data is collected.

2.1.5. Gain Control

Use this slider to control the gain of the sonar receivers – this can be thought of like a "volume" control that can be turned up to "hear" quieter target echoes or turned down if echoes are too loud and drowning out the quieter ones.

As the display shows intensity of received echoes as colour brightness, the gain control has the effect of brightening or darkening the display:



⇦ **Less Gain**

If the display is too dark and fine details cannot be seen, then increase the gain.

More Gain ⇨

Similarly, if the display is too bright (saturated), then smaller targets and details may be lost so reduce the gain.

2.2. Display Tools

For both the Live Data and Playback displays, a selection of tools are available at the bottom right-hand side:

2.2.1. Measurement Mode



Toggles Measurement mode, where the user can use the left mouse button to drag a line between two points and range and bearing information will be shown in the cursor information area at the top right hand side of the display.

2.2.2. Snapshot Display



Saves a copy of the current sonar display into a PNG image files located in the selected Log File directory. Files are given an automatically generated name containing the date and time the snapshot was taken.
For further details on selecting or changing the Log File directory, see the “Application Settings” section below in this manual.

2.2.3. Sonar Palette



Displays a pop-up menu that allows the user to select a colour scheme for the sonar image from a selection of different predefined palettes.

2.2.4. Horizontal Display Flip



Toggles weather the sonar image has been flipped horizontally – this is useful to help align the sonar image with the mounting orientation of the hardware.

2.2.5. Vertical Display Flip



Toggles weather the sonar image has been flipped vertically – this is useful to help align the sonar image with the mounting orientation of the hardware.

2.3. Recording Sonar Data

Once ViewPoint has been connected to an Oculus sonar (as described in the previous section) and live data is being displayed, a Log File can be created that records this data and allows subsequent playback, review and export of imagery.



To start recording a Log File, click the “Record” button in the bottom left corner of the display – it will be highlighted while recording is in progress. To stop recording, click the button again

Log Files are given an automatically generated name containing the date and time recording was started, and are saved into the selected Log File directory with a “`.oculus`” file extension.

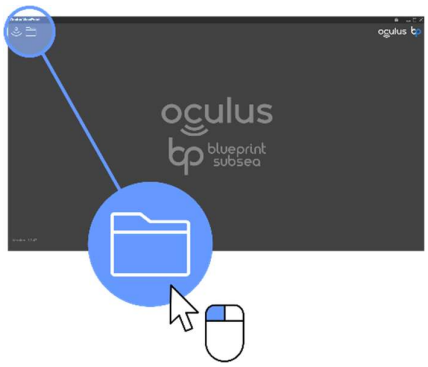


For further details on selecting or changing the Log File directory, see the “Application Settings” section below in this manual.

2.4. Replaying Sonar Data

ViewPoint can be used to review sonar imagery from a previously recorded Log File.

To choose a Log File to play back, click the "Open" button from the top-left of the display:

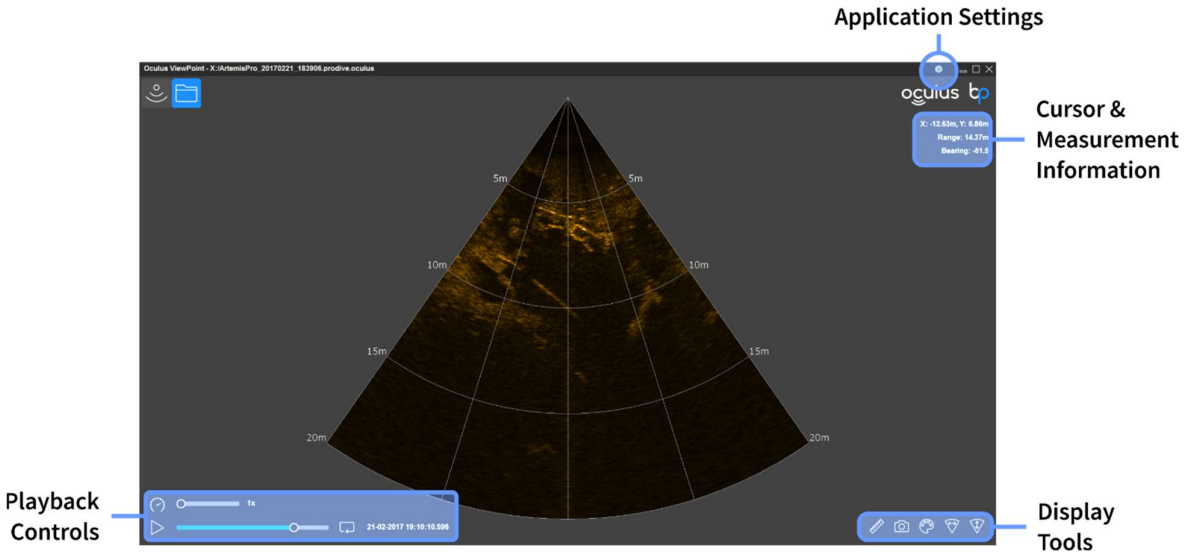


An "Open File" requester will be displayed, allowing the user to select the Log File (with "`.oculus`" file extension) that they wish to work with.

Depending on the size of the chosen Log File, it may take several seconds after the "Open" button is clicked for the file to be analysed before the Playback display is shown.

2.4.1. Playback Display

Once a Log File has been opened, the following Playback display will be shown (in the example below the Log File recorded High-Frequency sonar data, so the image is only 80° wide rather than 130°):



2.4.2. Play / Pause Control

The slider control represents the duration of the recorded Log File. Drag the slider to the desired playback position, then click the Play button to toggle the update of the sonar imagery. The timestamp of the currently displayed data is shown to the right of the position slider.

2.4.3. Playback Speed

Use this slider to control the rate as which data is replayed on the display, as a multiple of the rate at which it was recorded (i.e. x1 is real-time replay).

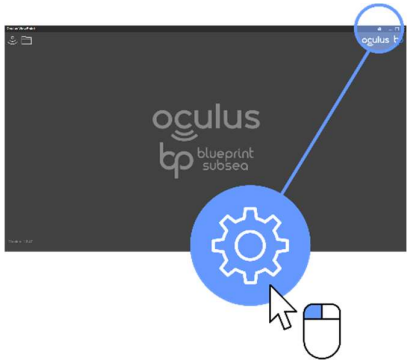
2.4.4. Repeat Control

Use this control to toggle is the Log File should automatically restart playback from the beginning of the file when the end is reached.

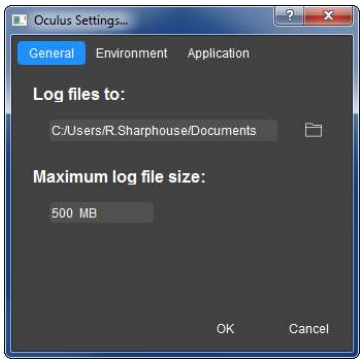
2.5. Application Settings



Settings that control the general behaviour of ViewPoint can be adjusted from the “Settings” window that is accessed by clicking the icon at the right-hand side of the programs title bar:



When the Settings window is shown, clicking one of the ‘tab’ heading across the top of the window will change its contents.







Click “OK” to accept any changes made and close the window, or “Cancel” to close without applying the changes. The following sections discuss the options available:

2.5.1. Log File Storage Location

When the Record or Snapshot buttons are clicked either a Log File or PNG image file is created in the selected Log File directory. The location of this directory can be chosen from the Settings window, under the ‘General’ tab heading.
Enter the path where Log Files should be recorded to into the text box, or click the ‘Browse’ button on the right.

2.5.2. Maximum Log File Size

Oculus sonars can produce a lot of data quickly and recorded Log Files can grow quite large quickly. To make Log Files more manageable, the maximum size of the file can be specified on the ‘General’ tab of the Settings Window.

When a Log File is being recorded and its size exceeds this value, the file is closed and recording continues in a subsequent automatically named Log File.

2.5.3. Speed (Velocity) Of Sound

For the correct and accurate ranges to targets, and to ensure that the sonar image is sharply focused, it is important that the speed of sound in water is correctly specified. For example, if Oculus is being used to measure

the range to a target 10m away with a 1% error in the speed of sound then this will result in a 10cm error in the range measurement.

From the “Environment” tab, select one of the following options to specify how the velocity-of-sound (VOS) is calcualted:

- **Fresh Water** – salinity is specified as 0 ppt (parts per thousand), and VOS is continuously calcualted from pressure and water temperature sensor readings.
- **Salt Water** - salinity is specified as 35 ppt, and VOS is continuously calcualted from pressure and water temperature sensor readings.
- **Use Velocity** - the manually specified VOS value is used.

2.5.4. Colour Theme

The colour scheme of ViewPoint can be adjusted depending on the type of environment it is being used in:

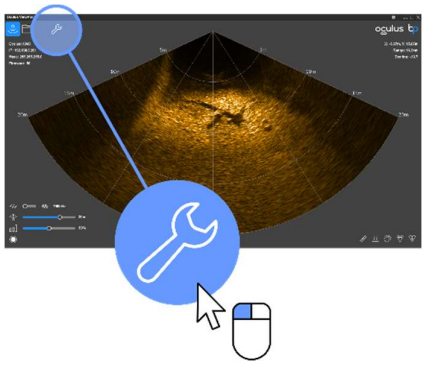
From the “Application” tab, select one of the following:

- **Dark Grey** – Standard colour scheme used for tablets and hand-held devices outdoors.
- **Navy Blue** – Often used in control rooms and low-light situations to reduce glare.

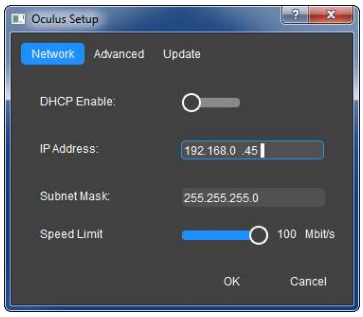
2.6. Sonar Configuration

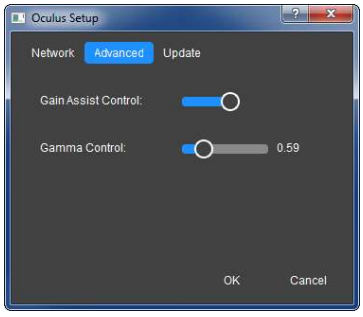
When ViewPoint is connected to an Oculus sonar (and the display is showing live data from it), the hardware configuration can be adjusted by clicking the “Configure” button at the top-left of the display:

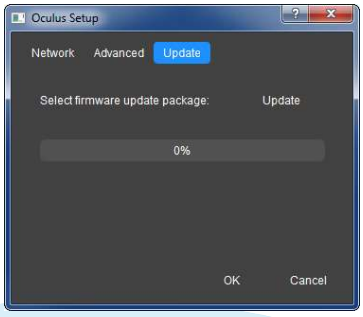
These options are used to control how the sonar hardware is configured (not the ViewPoint software application).



When the Configuration window is shown, clicking one of the ‘tab’ heading across the top of the window will change its contents.







Click “OK” to accept any changes made and close the window, or “Cancel” to close without applying the changes. The following sections discuss the options available:

2.6.1. DHCP Client

When “DHCP Enable” is active, the Oculus sonar will attempt to obtain its network IP address and subnet mask from an external DHCP server connected to the network.

If no DHCP server is found then Oculus will use a default address starting with 169.254.x.x, where the last two number groups (‘x.x’) are the hardware serial number of the Oculus interpreted as two 8-bit numbers (rather than a larger 16-bit number).

Changing this function may require the Oculus hardware to be restarted and ViewPoint reconnected to the sonar.

2.6.2. IP Address & Subnet Mask

When “DHCP Enable” is turned off, the IP address and subnet mask for the sonar can be manually specified through these two text boxes – otherwise they are disabled, and display the current DHCP assigned values.

Changing these values may require the Oculus hardware to be restarted and ViewPoint reconnected to the sonar. Possibly involving changing the IPV4 address on the PC adapter to be in the same range as the sonars new IP.

2.6.3. Network Speed Limit

If Oculus data is being sent over a bandwidth-limited network connection with other sensor/camera data (such as a DSL extender, of WiFi) connectivity issues or dropped data packets may be observed.

In such cases, the network bandwidth available to Oculus can be decreased using the “Speed Limit” control, and the sonar update rate will be reduced until the data output falls below the specified value.

2.6.4. Gain Assist

To simplify its operation for the user and produce optimal imagery across a wide variety of environments, Oculus contains an automatic-gain control algorithm.
When “Gain Assist” is active, Oculus will manage the sonar gain to ensure that the sonar image uses the full spread of the selected palette helping fine textures and details to be visible - the ViewPoint gain control will act more like a ‘brightness’ control on the display in this mode.

Like a photographer wanting manual exposure control of their photographs, experienced users or those with scientific applications may wish to disable Gain Assist, and manage the acoustic gain manually using this control.

2.6.5. Gamma Control

The Gamma control allows the user to adjust the Gamma correction applied to the sonar imagery, which represents the non-linear dark-to-light mapping of acoustic echo intensities to the sonar palette.

Under normal circumstances the user should not have to adjust the Gamma control, but experienced users may wish to optimise the sonar imagery under certain circumstances by adjusting the Gamma value from its default value of about 0.6.

2.6.6. Firmware Update

The firmware running on in the Oculus sonar can be upgraded while in the field so that new features can be added or bugs fixed without the unit being returned to the factory.
The current version of the firmware is displayed in the Sonar Information area of the display when a network connection is made.

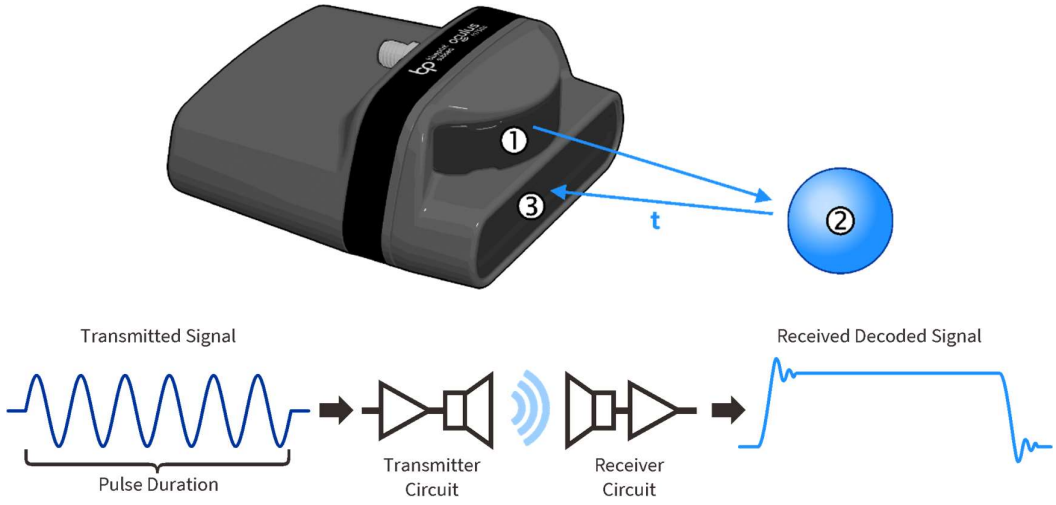
ViewPoint can be used to program new firmware into the sonar by choosing the “Update” button and specifying the new firmware file when prompted. A progress bar displays the state of the firmware update.

3. Using the Sonar

The following sections aim to explain the basics for operation of the Oculus Sonar and how to start interpreting the images it produces.

3.1. Operating Principles

Oculus is an active SONAR (SOund Navigation And Ranging), and operates by transmitting pulses of sound ① into the water and at the same time starting its receivers ③ recording the echoes that are returned as each sound pulse is reflected off objects in front of it ②.



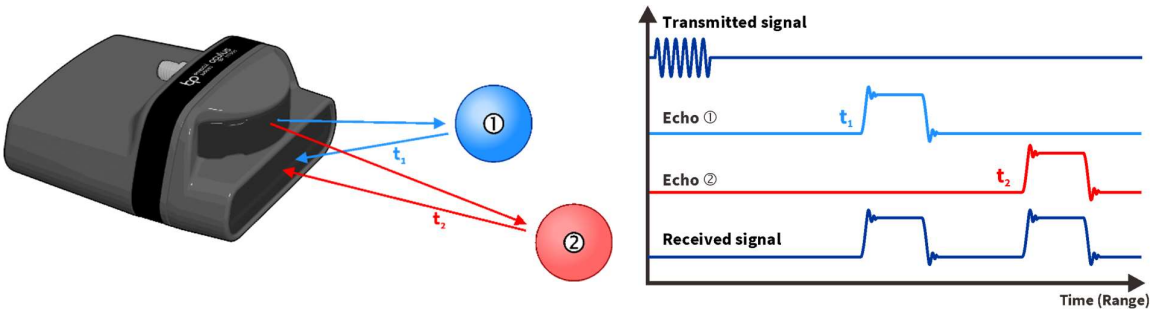
By combining the known Velocity-Of-Sound (VOS – '*c*') in water with the time the echoes were received ('*t*'), the sonar can calculate the distance the sound has travelled ('*d*').

As sound must travel from the Sonar to the target object and then back again, the range ('*r*') between the Sonar and target is half of the total distance travelled.

$$d = c \times t \qquad r = \frac{d}{2} \qquad \Rightarrow \qquad r = \frac{1}{2} \times c \times t$$

Typically, the VOS is about 1500ms^{-1}, but this can vary depending on the water temperature, water salinity and sonar operating depth. To calculate this, Oculus contains a sensor that continuously measures the operating depth and water temperature, and combines this with an appropriate Salinity value for the body of water that it is operating in, entered by the user in the control software.

In the real-world, the Sonar will see more than one target in front of it. The transmitted pulse of sound will reflect off each target at a different time, but the receiver will be recording all the echoes over a period equivalent to twice the maximum operating range (for sound travelling to and from the target).



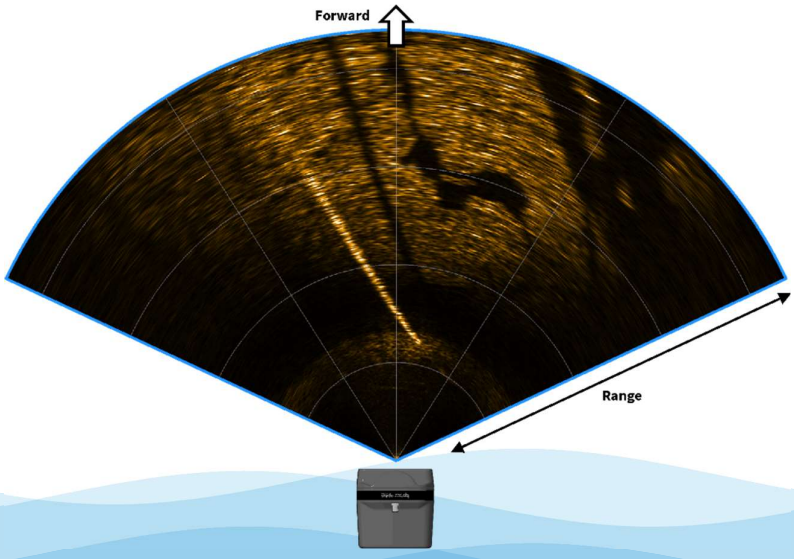
The received echoes are combined into a single received signal where their position in time directly relates to their range, while the strength of each echo depends on how reflective the target is.

Targets with densities very different from water (such as gas/air or rock/concrete) will be very reflective and have strong echoes, while echoes from materials like mud, silt, sand and plants will have weaker echoes.

The strength of the echo is displayed on the divers display as the brightness of a colour palette.

Typically, darker colours in the sonar palette are used for weak echoes, while bright-white colours are used for strong echoes.

The sonar image opposite shows how a mid-water steel cable appears brighter than the muddy seabed behind it.

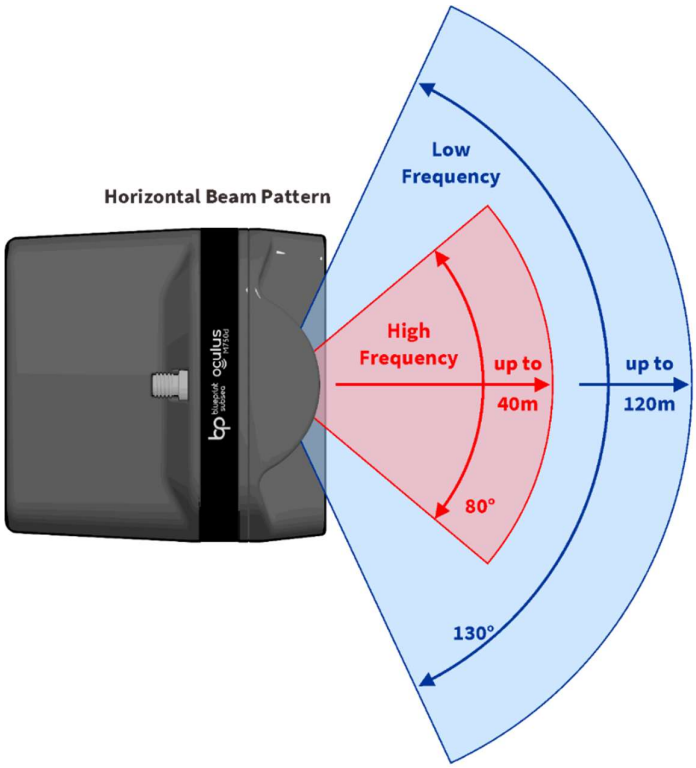


3.2. Acoustic Beam Patterns

When considering how sonars operate, it may help to think of the sonar like a torch being used in a darkened room. Only the parts of the room illuminated by the torch can be seen by the user, and if the torch has a narrow beam then their field of vision is reduced.

Similarly, the sonar has a fixed width and height to the area it 'illuminates' with sound, and these are called the Horizontal and Vertical Beam Patterns.

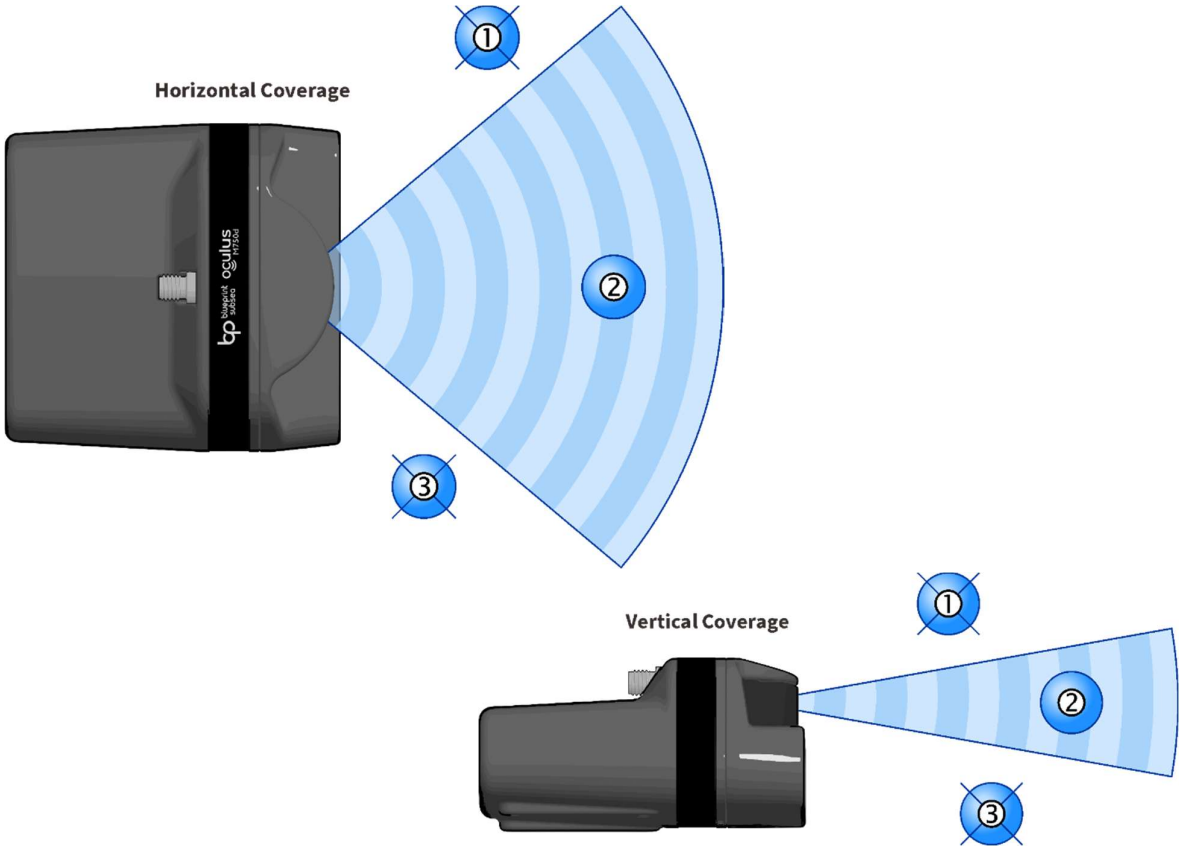
Oculus sonars with a 'd' name suffix (such as the M750d and M1200d) are dual-frequency devices that support two operating modes - **Low Frequency** and **High Frequency**.
Single frequency Oculus sonars (with a 's' name suffix such as the M370s) only support the Low Frequency operating mode. E
ach mode has its own beam pattern illustrated in the figures below:



	Horizontal Width	Vertical Width	Maximum Range (approximately up to) M370s	M750d	M1200s
• **Low Frequency**	130°	20°	200m	120m	40m
• **High Frequency**	80°	12°	N/A	40m	10m

3.3. Target Visibility

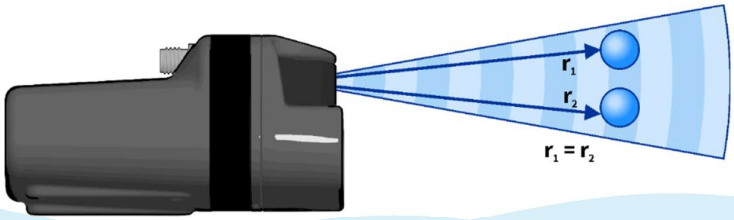
Objects (or targets) that lie within the sonar's beam will be acoustically "illuminated" and can have their echoes received (target ②), while objects that lie outside this (targets ① and ③) may not appear on the sonar display:



It should be noted that although the above diagrams show a boundary to the sonar beam, but this actually represents the 'half-power' level of the sound waves. Vertical targets outside this area may still be visible on the display, but their echo level will decrease quickly as they get further away from the beam pattern.

Horizontally, images outside the beam pattern are not shown because of the fixed width nature of the 'top-down' display.

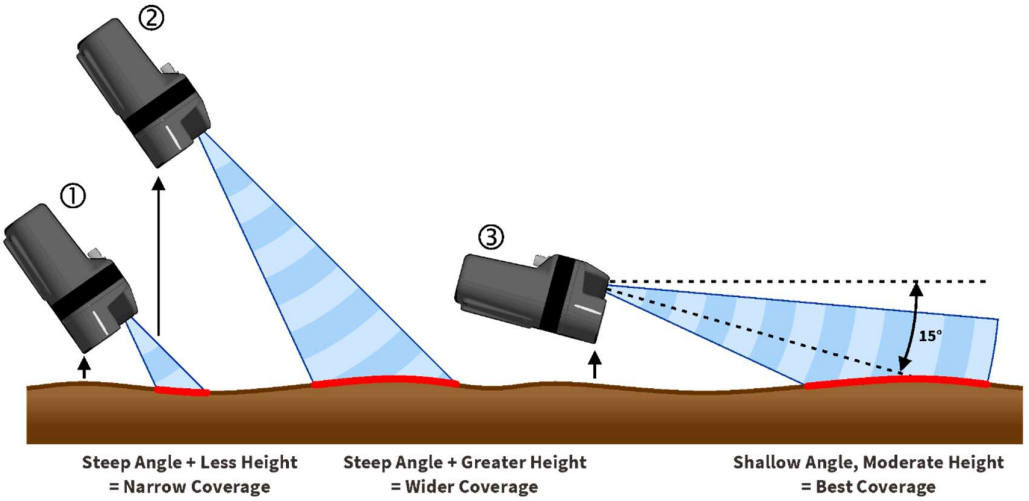
The sonar cannot determine the echoes incoming vertical arrival angle, so if two targets are in front of the sonar at the same range vertically above each other the sonar will show both these as a single result made up from a combination of their echoes.



3.4. Viewing the Seabed

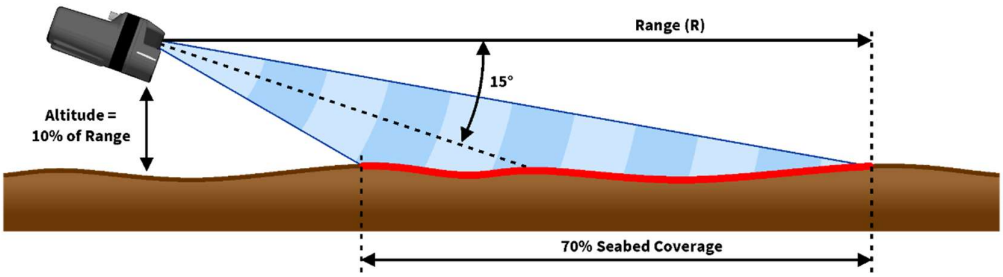
As discussed in previous sections, the sonar can be thought of like a hand-held torch with an illuminating beam that is wide horizontally and narrow vertically – continuing this analogy, the sonar images shown on the operators display can then be thought of as a "top-down" view of the area being illuminated.

For users wishing to perform search-and-location activities or seabed surveys, Oculus can be mounted such that different amounts of the seabed can be illuminated and visible on the display:



If the sonar is close to the seabed and angled downwards ① then only a small strip in front of it will be shown. By gaining altitude from the seabed the operator can illuminate a wider swathe that will make better use of the display ②.

For situations requiring the sonar to be searching the seabed in front of it, the best use of the display comes from balancing the altitude above the seabed with the sonar down angle such that the largest amount of the seabed is illuminated ③.



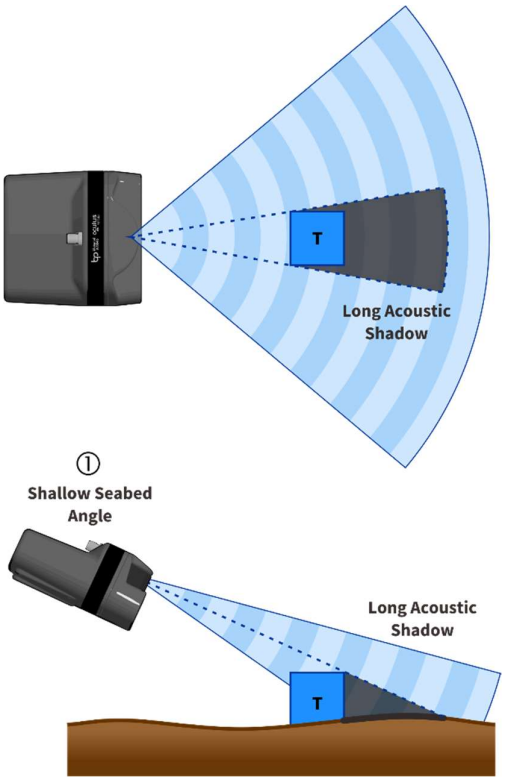
As a very general rule, the sonar can achieve an optimum 70% seabed coverage on the display if has a 15° down angle and an altitude of above 10% of the operating range – i.e. for a 20m range, the sonar should be mounted approximately 2m above the seabed, while at an 80m range the altitude should be increased to about 8m.

3.5. Acoustic Shadows

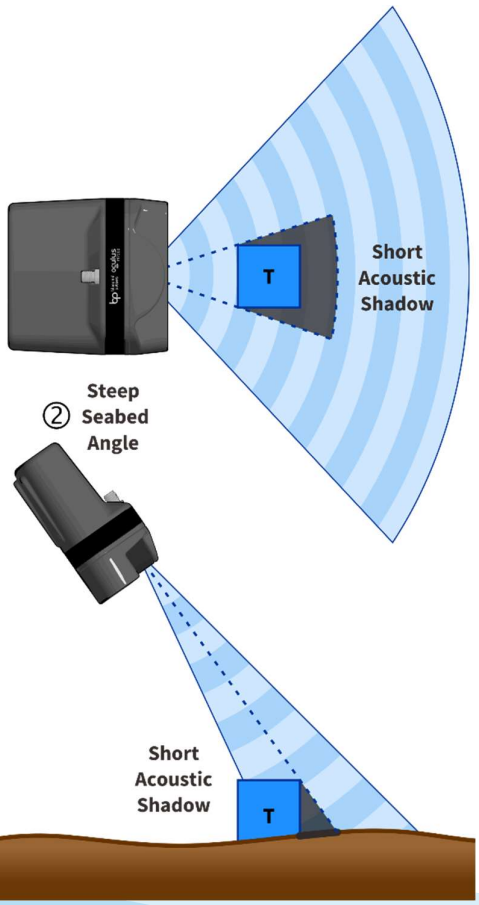
The similarities between a sonar and torch continue as the 'illumination' from the sonar can be used to generate acoustic shadows, and these can be of great assistance to the operator in determining the height, shape and orientation of targets in front of the sonar.

As previously mentioned, the display can be thought of as a top-down (or satellite) view of what lies in front of the Oculus:

① If the sonar is close to the seabed and at a shallow angle, the acoustic shadows cast by targets will be long (similar to an aerial photograph taken in the evening when the sun is low in the sky).



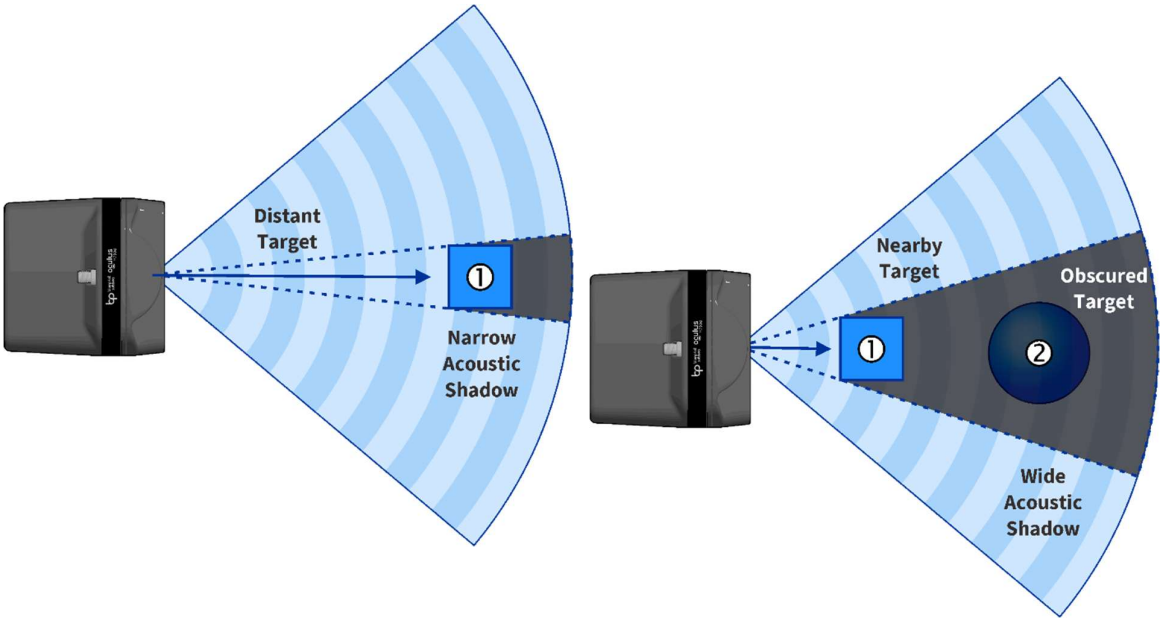
② However, if the sonar is high above the seabed and point steeply downwards then acoustic shadows will be short (like an aerial photograph then at midday when the sun is high in the sky).
In this case targets are generally harder to see, and make estimates of their height and geometry.



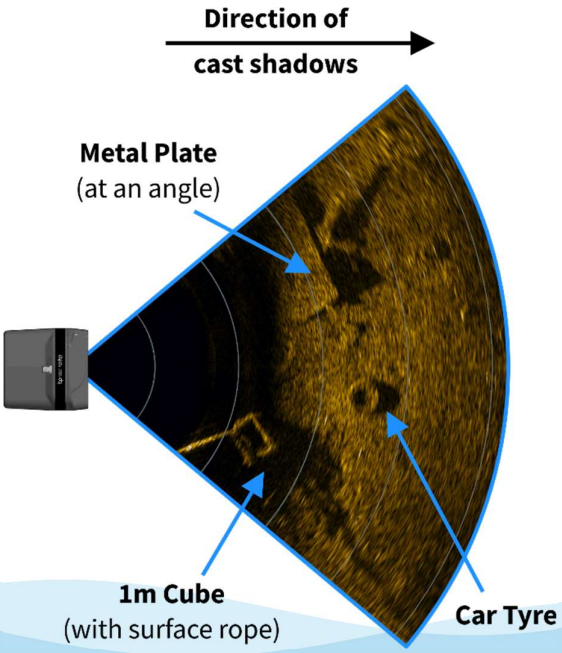
Using the "10% rule" discussed on the previous page will allow the sonar to produce good shadows behind possible targets, and with some practice the operator can start to make estimates of their height and orientation, or the terrain in front of them.

Depending on how close the sonar is to a target can also make a significant difference to the image.

Due to the way sounds waves spread out from the transmitter, shadows cast by targets that are far away will be narrow behind them ①, but the shadow width will increase as the sonar is moved closer to them. In these situations, the operator should be aware that these shadows may then hide other targets as there is no sound present to illuminate them ②.



Where the operator's visibility is becoming restricted due to shadowing from close-by targets, they should aim to increase the sonar altitude above the seabed (and the targets causing the shadows) and is possible angle the sonar downwards to compensate.



The image opposite shows an example of shadows from 3 targets being cast.

The sonar is positioned at the left of the image, and because the targets are raised above the seabed, their bright echoes are seen first and shadows are cast away from the it.

The length of the shadow gives an indication of height of the car tyre, while the metal plate is probably angled upwards as the shadow size increases along its edge.

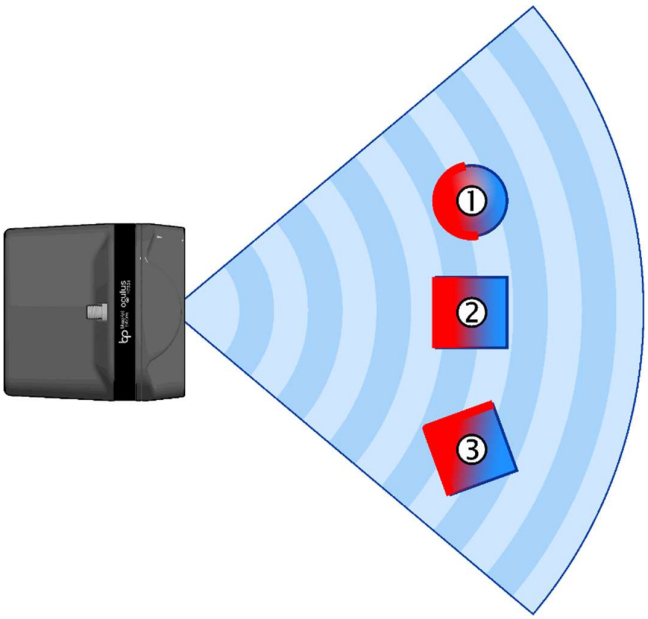
The 1m cube target also has a rope attached to its top surface and mesh sides, as these can be seen by the 'ragged' shadow and line that rises away from it.

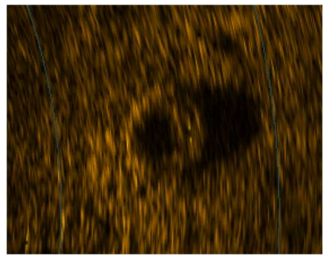
3.6. Understanding Echoes

Although it has been mentioned that the sonar display can be thought of as a top-down image of the area in front of them, there are some limitations to this analogy.

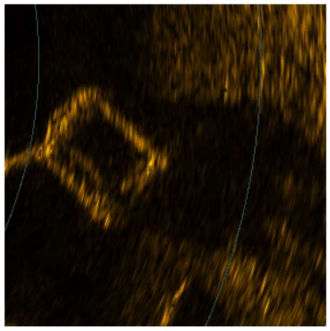
As the image is illuminated from the side by the sonar, only the edges or faces of targets closest to the sonar will be illuminated.
If a target face is at an angle, then some of the incoming sound waves will be reflected towards the sonar while others will be scattered away in different directions and the overall brightness of the target will be reduced.

The figure below illustrates this, highlighting in red the areas on three simple targets that will appear brightest on the display, and how these appear from real-world targets:





① Car Tyre

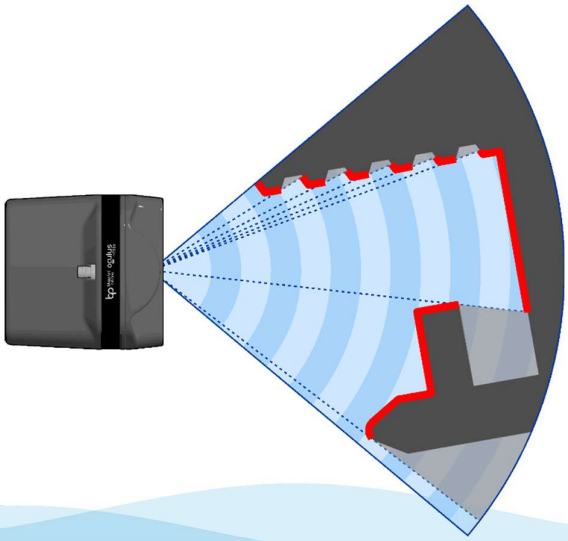


③ 1m Hollow Cube

These same principles also apply to larger environments. The figure opposite shows how some of the features found in docks or harbours may appear.

Depending on the orientation of the sonar, corrugated pilings will have small areas of shadow, and bright returns from the edges facing the diver.

Concrete walls and quays will also produce bright returns from flat surfaces, but can also have large areas of shadow behind parts of the structure.

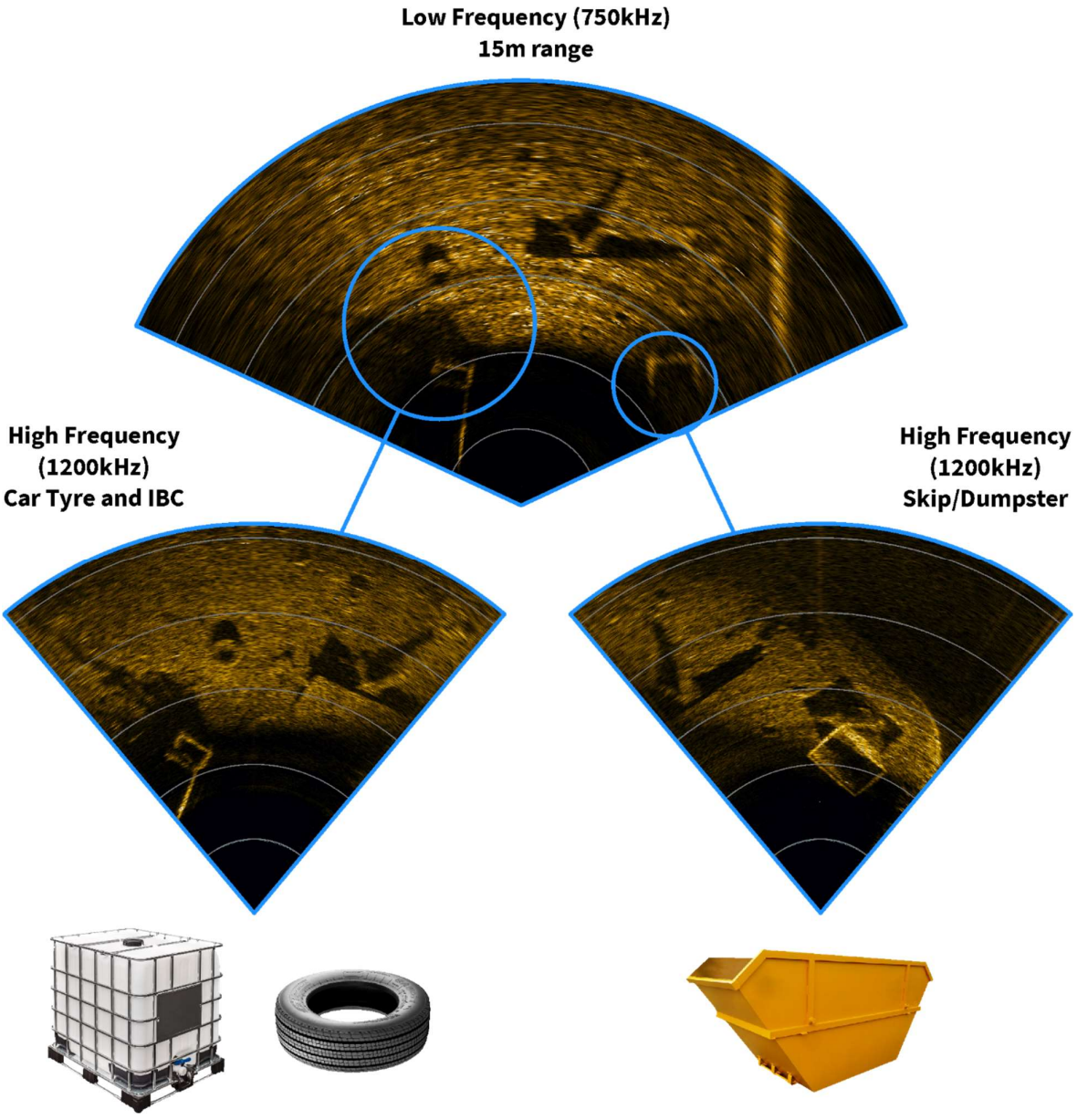


3.7. Range vs Frequency and Image Quality

As previously mentions, some Oculus sonars have two operating modes:

- Low Frequency, which allows for long range operation with a wide viewing angle – this is useful for searching and surveying tasks.
- High Frequency, which produces greater details at shorter ranges and has a narrower viewing angle – this is useful for detailed investigation of close-up targets.

The figure below shows a comparison of the same test site in both operating modes:



3.8. Summary of Sonar Operation

In general, the following points summarise operation of the sonar:

- The sonar image shows “top-down” type display of the echoes received from the targets leading edges.
- Only targets illuminated by the sonar beam can be seen:
  - 130° - 40° in the horizontal plane depending on frequency mode
  - 20°/12° vertically although this is the half-power point, and fainter targets may appear outside this.
- As no vertical information is available, vertically aligned or overlapping targets in the sonar beam will merge into a single echo.
- Dense or gaseous targets appear brightest on the display, while mud and silt will appear very dull.
- Targets cast acoustic shadows, which may obscure all or parts of targets behind them especially as the sonar approaches them.
- Change altitude above the seabed to change the angle of illumination for targets, and the length of the shadows they cast – this can help interpret features on the sonar image.
- Use the gain control to enhance faint targets or reduce the background noise reflections in a high clutter (rocky/boulder) environment.
- Where possible, use different frequency modes depending on required range and detail level:
  - Low Frequency mode for a wide viewing angle (130°) with the longest ranges supported by the sonar.
  - High Frequency mode for detailed high-resolution imagery, but reduced viewing angle and shorter-range settings.
- For navigating or surveying the seabed, mount the sonar horizontally pointing forwards with a slight down angle (10-15°).
- While gaining experience using the sonar, a good rule-of-thumb for optimal seabed coverage on the display is to aim to maintain a seabed altitude of approximately 10% of the selected sonar range.
- For accurate calibration of ranges, check the correct water salinity has been entered into the software for the operating site.

4. Technical Reference

4.1. Specifications

Mechanical

Dimensions	125mm long × 122mm wide × 62mm high
Construction	Anodised Aluminium (Titanium available on request ♦)
Weight	980g (air) 360g (water) Neutral buoyancy pack available
Depth Rating	500m
Temperature Range	-5°C to +35°C (operating) -20°C to +50°C (storage)

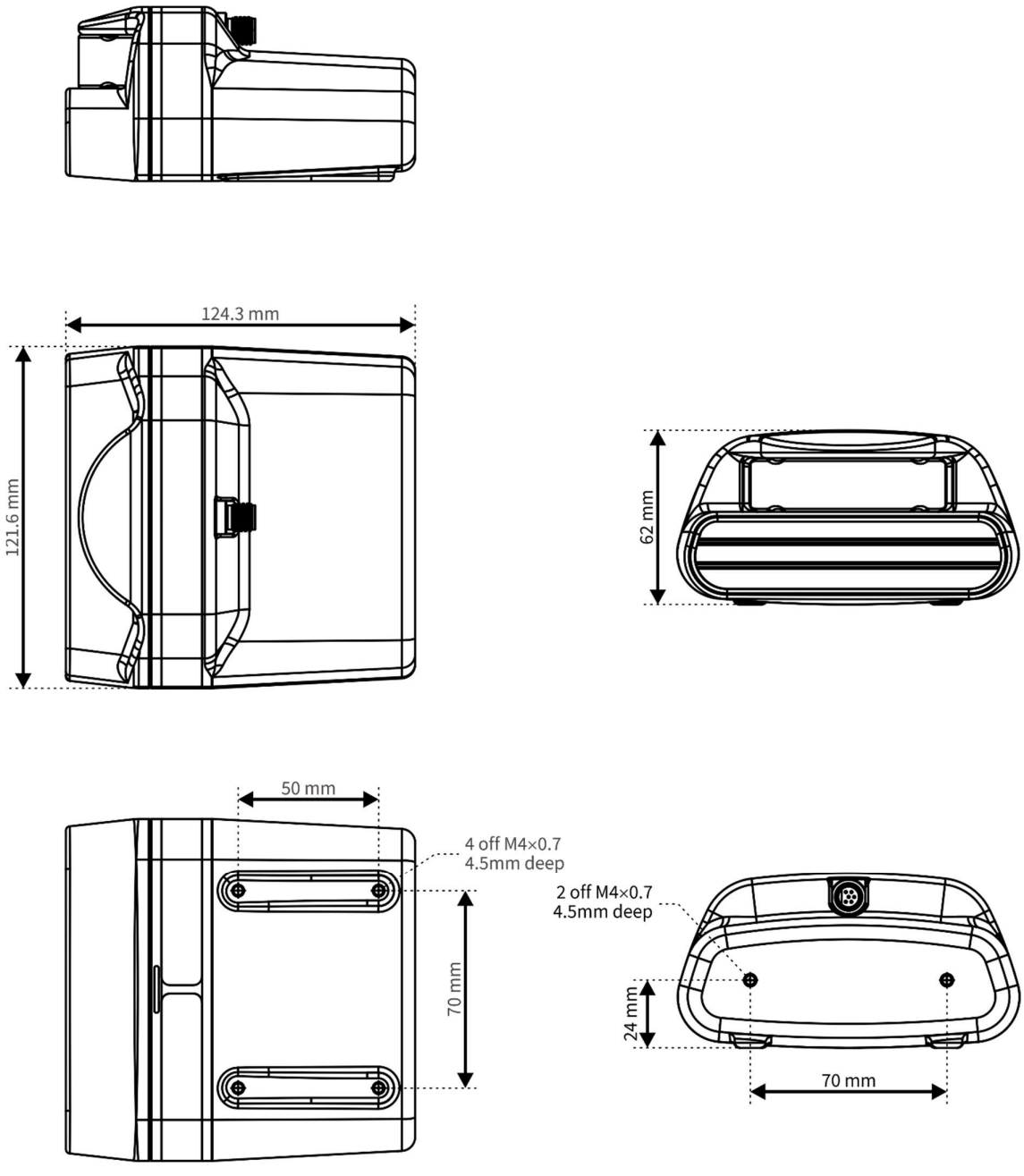
Electrical

Connector	Impulse IE55-12 series, 6-way
Communications	4-wire 100-BaseT Ethernet, 2-wire DSL extender module
Supply Voltage	12V to 32V DC non-isolated
Power Consumption	10W to 35W (model and range dependent ★)
Integrated Sensors	Water pressure and temperature (for Velocity-of-Sound calculation)

Acoustic Performance	**M370s** *BP01041*	**M750d** *BP01032*	**M1200d** *BP01042*	**M3000d** *BP02203*
Operating Frequencies	Single 375kHz	Dual 750kHz / 1.2MHz	Dual 1.2MHz / 2MHz	Dual 1.2MHz / 3MHz
Range (max)	200m	120m / 40m	40m / 10m	30m / 5m
Range (min)	0.2m	0.1m	0.1m	0.1m
Range Resolution ★	8mm	4mm / 2.5mm	2.5mm / 2.5mm	2.5mm / 2mm
Update Rate (max) ★	40Hz	40Hz	40Hz	40Hz
Horizontal Aperture	130°	130° / 130°	130° / 60°	130° / 40°
Vertical Aperture	20°	20° / 20°	20° / 12°	20° / 20°
Number of Beams (max)	256	512	512	512
Angular Resolution	2°	1° / 0.6°	0.6° / 0.4°	0.6° / 0.4°
Beam Separation	0.5°	0.25° / 0.25°	0.25° / 0.16°	0.25° / 0.10°

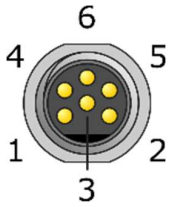
★ *indicates parameter is dependent on range.*
♦ *consult factory for availability and further details.*
Please note that all functions & specifications may be subject to change in line with our policy of continual product development.

4.2. Mechanical Dimensions



A 3D STEP model of the sonar housing is available on request via the website or Technical Support contact details at the end of this manual.

4.3. Sonar Connector Pinout



IE55-12 series
Bulkhead Connector
(face view)

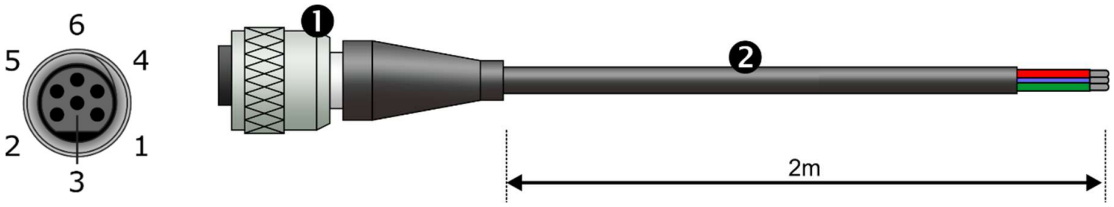
Pin	Signal	Comments
1	GROUND	Power supply Ground
2	POWER IN+	Power supply Positive (see specifications for voltage range)
3	ETHERNET TX- ★	100BaseT TX Pair Minus (transmit from the Sonar)
4	ETHERNET TX+ ★	100BaseT TX Pair Pos (transmit from the Sonar)
5	ETHERNET RX- ★	100BaseT RX Pair Minus (receive into the Sonar)
6	ETHERNET RX+ ★	100BaseT RX Pair Pos (receive into the Sonar)

★ Ethernet signal directions given with respect to the Oculus sonar, and naming derived from MDI style-wiring on the Sonar. Auto MDI/MDI-X is supported by the sonar hardware.

4.4. Ethernet Sonar Whip Wiring

Drawing…

Diagram for illustrative purposes only and not to scale – see wiring description below for connections.



Materials…

Item	Qty	Description	Part Number
❶	1	Impulse IE55-12 series inline moulded female plug.	*IE55-12-CCP/UT*
❷	2m	Oculus Polyurethane jacked 6-way 6.5mm cable. (2 power conductors, 2 x Unshielded Twisted Pairs)	BP01151

Wiring…

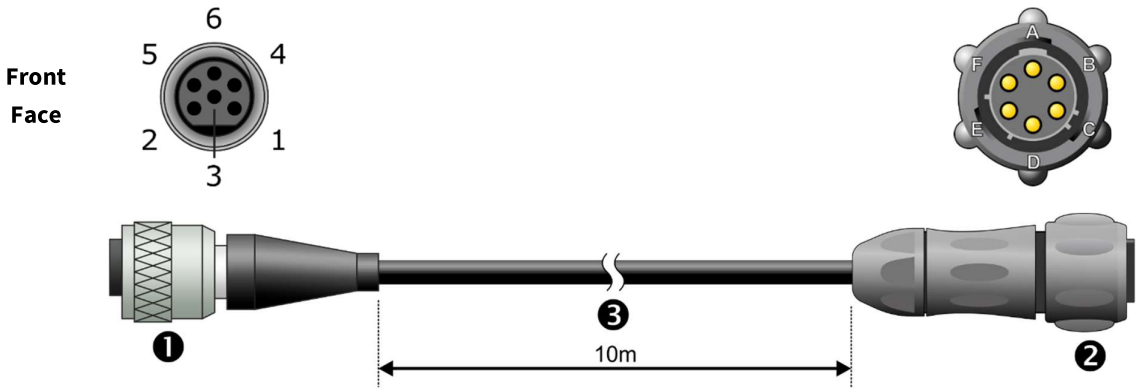
Item ❶ Pin	Signal	Wire Colour (❷)
1	GROUND	BLACK
2	POWER IN+	RED
3	ETHERNET TX- ★	BLUE
4	ETHERNET TX+ ★	WHITE
5	ETHERNET RX- ★	GREEN
6	ETHERNET RX+ ★	YELLOW

★ Ethernet signal directions given with respect to the Oculus sonar, and naming derived from MDI style-wiring on the Sonar. Auto MDI/MDI-X is supported by the sonar hardware.

4.5. Ethernet Deck Lead Wiring

Drawing...

Diagram for illustrative purposes only and not to scale – see wiring description below for connections.



Materials...

Item	Qty	Description	Part Number
❶	1	Impulse IE55-12 series inline moulded female plug.	*IE55-12-CCP/UT*
❷	1	Souriau UTS series 6-way free male plug, shroud and crimps (24 AWG, gold plated)	*Pin Housing: UTS6JC106P* *Crimp Pin: SM24WL-3S26*
❸	10m	Oculus Polyurethane jacked 6-way 6.5mm cable. (2 power conductors, 2 x Unshielded Twisted Pairs)	BP01151

Wiring...

Item ❶ Pin	Signal	Wire Colour (❸)	Item ❷ Pin
1	GROUND	BLACK	A
2	POWER IN+	RED	B
3	ETHERNET TX- ★	BLUE	C
4	ETHERNET TX+ ★	WHITE	D
5	ETHERNET RX- ★	GREEN	E
6	ETHERNET RX+ ★	YELLOW	F

★ Ethernet signal directions given with respect to the Oculus sonar, and naming derived from MDI style-wiring on the Sonar. Auto MDI/MDI-X is supported by the sonar hardware.

5. Product Support

5.1. Website

For the latest software and firmware updates, as well as production information, manuals and datasheets, visit

www.blueprintsubsea.com

We welcome any feedback you may have about our Oculus sonars, from bug reports to ideas for new features or hardware to support – please use the contact details on the website (or shown below) to get in touch.

5.2. Technical Support

If your Oculus sonar is not operating properly, please consult the 'Troubleshooting' section of this manual and further information on the support section of the website to see if the problem can be easily remedied.

However, if you need further support, you can contact us via your distributor or directly at…

- Web — *www.blueprintsubsea.com* (for access to on-line resources and technical support)
- Email — *support@blueprintsubsea.com*
- Telephone — +44 (0)1539 531536 (9:00am to 5:00pm, Monday to Friday, UK Time)

For all the above please provide the following information to help us with your technical support request…

- Part and Serial Numbers of the system components. These are located on the labels of each item and are in the form "BPxxxxx.xxxxxx".
- Version number of the ViewPoint software and Oculus firmware you are using.
- The operating system name, version, type (32 bit or 64 bit) and service pack upgrade your computer is using.
- Brand and model of your computer (processor type and memory configuration is also useful if known).
- Name of the distributor where the system was purchased from.

If you need to return your Oculus sonar for servicing or repair, please…

- Contact us (using the details above) for returns information and shipping details.
- Pack your sonar back in the original packaging (or other suitable container), and include written documentation including your contact details (including contact phone number), a description of the problem and any symptoms occurring.
- If your product is still under warranty, please include a copy of your receipt (showing proof and date of purchase).
- To protect our staff, please ensure the product has been suitably decontaminated and cleaned prior to return such that it is safe to handle.
- Please return the product back to Blueprint Subsea, using an insured courier and delivery confirmation.

6. Limited Warranty Policy

The manufacturer, Blueprint Design Engineering Limited (hereafter after referred to as Blueprint), warrants that at the time of shipment all products shall be free from defects in material and workmanship and suitable for the purpose specified in the product literature.

Conditions

Unless other terms are specifically requested and mutually agreed in writing prior to dispatch, the conditions of the warranty include, but are not limited to:

- The warranty is only deemed to be valid if the equipment was sold through Blueprint or one of its approved distributors.
- The warranty commences immediately from the date of customer acceptance and runs for a period of 365 days. Customer acceptance will always be deemed to have occurred within 72 hours of delivery.
- The equipment must have been installed and commissioned in strict accordance with approved technical standards and specifications and for the purpose that the system was designed.
- The warranty is not transferable.
- Blueprint must be notified immediately (in writing) of any suspected defect and if advised by Blueprint, the equipment subject to the defect shall be returned by the customer to Blueprint, via a suitable mode of transportation and shall be freight paid.
- The warranty does not apply to defects that have been caused by failure to follow the recommended installation or maintenance procedures, or defects resulting from normal wear & tear, incorrect operation, fire, water ingress, lightning damage or fluctuations in vehicles supply voltages, or from any other circumstances that may arise after delivery that is out with the control of Blueprint. (Note: The warranty does not apply in the event where a defect has been caused by isolation incompatibilities.)
- The warranty does not cover the transportation of personnel and per diem allowances relating to any repair or replacement.
- The warranty does not cover any direct, indirect, punitive, special consequential damages or any damages whatsoever arising out of or connected with misuse of this product.
- Any equipment or parts returned under warranty provisions will be returned to the customer freight prepaid by Blueprint
- The warranty shall become invalid if the customer attempts to repair or modify the equipment without appropriate written authority being first received from Blueprint.
- Blueprint retains the sole right to accept or reject any warranty claim.
- Each product is carefully examined and checked before it is shipped. It should therefore be visually and operationally checked as soon as it is received. If it is damaged in anyway, a claim should be filed with the courier and Blueprint notified of the damage.
- Any customer acceptance testing (if applicable) must be performed at either Blueprint premises or at one of their approved distributors unless mutually agreed in writing prior to despatch.

Blueprint reserve the right to change specifications at any time without notice and without any obligation to incorporate new features in instruments previously sold.

If the system is not covered by warranty, or if it is determined that the fault is caused by misuse, repair will be billed to the customer, and an estimate submitted for customer approval before the commencement of repairs.

7. Notices

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Specifications and information contained in this document are subject to change without notice, and does not represent a commitment on the part of Blueprint Design Engineering Ltd.

Handling Recommendations



The product contains sensitive electronic components that may be damaged by an Electrostatic Discharge (ESD) if handled incorrectly. To minimise risk of damage, users should avoid dismantling the unit, touching any exposed electrical contacts on external connector, or inserting anything other than the recommended cabling into the connectors.

Waste Electrical & Electronic Equipment Statement



Under the European Union (EU) directive on 'Waste Electrical & Electronic Equipment' (Directive 2002/96/EC), from August 13, 2005, products categorised as electrical or electronic equipment cannot be discarded as municipal waste by placing in landfill, dumping in the sea or incineration. SEPARATE collection is mandatory.

At the end of its life, you should either return this system and its associated leads & accessories (if appropriate) to Blueprint Design Engineering Ltd with a certificate of decontamination (we reserve the right to protect our staff from the effects of any contamination) or it should be sent to an appropriate treatment or recycling agency.

Restriction of Hazardous Substances Statement



Under the European Union (EU) directive on the 'Restriction of Hazardous Substances' (Directive 2002/95/EC), from July 1, 2006, electrical and electronic equipment cannot contain lead ("lead free"), mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE).
All components of the ArtemisPRO system, sold by Blueprint Design Engineering Ltd, fully comply with this legislation where applicable.



Distributor...

P/N: BP01222.5

UM-148-P01222-05
April 2024