

Diver Mounted Display (Un-Tethered)

Product Manual

0747-SOM-00004 Issue 02



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Warning Symbols

Throughout this manual the following symbols may be used where applicable to denote any particular hazards or areas which should be given special attention:



Note

This symbol highlights anything which would be of particular interest to the reader or provides extra information outside of the current topic.



Important

When this is shown there is potential to cause harm to the device due to static discharge. The components should not be handled without appropriate protection to prevent such a discharge occurring.



Caution

This highlights areas where extra care is needed to ensure that certain delicate components are not damaged.



Warning

DANGER OF INJURY TO SELF OR OTHERS

Where this symbol is present there is a serious risk of injury or loss of life. Care should be taken to follow the instructions correctly and also conduct a separate Risk Assessment prior to commencing work.

Help & Support

First please read this manual thoroughly (particularly the Troubleshooting section, if present). If a warranty is applicable, further details can be found in the Warranty Statement, 0080- STF-00139, available upon request.

Tritech International Ltd can be contacted as follows:



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<http://www.tritech.co.uk>

Prior to contacting Tritech International Ltd please ensure that the following is available:

1. The Serial Numbers of the product and any Tritech International Ltd equipment connected directly or indirectly to it
2. Software or firmware revision numbers
3. A clear fault description
4. Details of any remedial action implemented



Contamination

If the product has been used in a contaminated or hazardous environment you must de-contaminate the product and report any hazards prior to returning the unit for repair. Under no circumstances should a product be returned that is contaminated with radioactive material.

The name of the organisation which purchased the system is held on record at Tritech International Ltd and details of new software or hardware packages will be announced at regular intervals. This manual may not detail every aspect of operation and for the latest revision of the manual please refer to <http://www.tritech.co.uk>

Tritech International Ltd can only undertake to provide software support of systems loaded with the software in accordance with the instructions given in this manual. It is the customer's responsibility to ensure the compatibility of any other package they choose to use.

System Overview

The DMD system has been designed to provide divers with the ability to navigate and execute inspections in zero visibility conditions.

Utilising the Gemini range of Multibeam imaging sonars allows the user to select the most suitable sonar for the type of operation required. Employing a high degree of resolution and field of view the diver can opt for either the Gemini 720ik or Gemini 1200ik Multibeam imaging sonars, both provide excellent range, resolution and field of view. These high specification Multibeam imaging sonars provide a diver with a high degree of confidence while working in zero visibility conditions and allow searches to be undertaken far more efficiently than using conventional search pattern techniques. The DMD systems have been designed to be used with the Inodive accessory rail system, allowing for the DMD system to be used with an extensive range of dive masks and helmets. All of the Gemini sonars, when supplied with a DMD system, are built-up with an Inodive interface to allow for seamless installation onto the dive mask/helmet.

Power and control of the DMD system can either be through a tethered connection to the surface, where the topside operator controls what the diver sees, or the diver can work autonomously with no need for a surface connection by utilising a diver battery pack and DMD hand controller. The tethered system (DMD-T) is intended primarily for surface air dive systems where the supplied tether connects the diver to the surface and control of the sonar is undertaken by the support team. The same DMD-T system can be used by scuba divers, where it's acceptable to be attached to the surface by the tether. The untethered system (DMD-U) allows the diver to operate totally independent of a surface connection, with the diver himself taking control of the sonar operation. This is of particular benefit where a diver wishes to operate in a covert fashion or where there may be hazards that the tether could get snagged on.

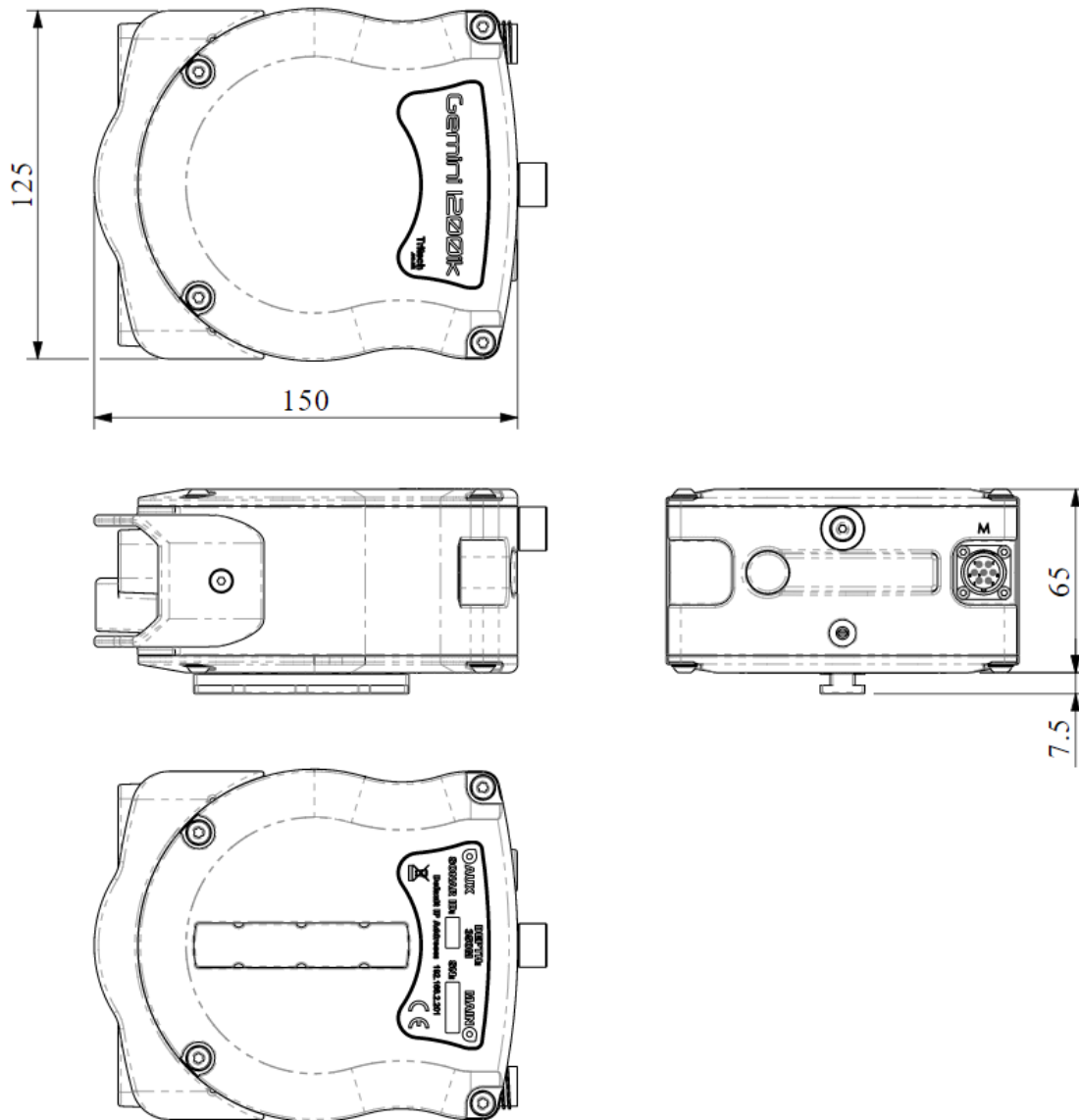
By using the DMD system, a diver has the ability to view the sonar image on the diver mounted monacle, allowing the diver to quickly and efficiently locate targets of interest. The DMD-U system allows the diver to adjust settings using a custom hand controller and record data of interest on the subsea computer, while the DMD-T system allows the support diver on the surface to make any necessary adjustments to the sonar settings and highlight any targets of interest for the diver to investigate.

The Inodive rail system simplifies the fitting and removal of the DMD system. This allows the sonar to be removed from the mask/helmet and attached to a Gemini sonar pistol grip where this may at times offer some advantage, such as difficult to reach areas or where a different sonar viewing angle may be beneficial. The innovative Monocle design allows for it to be accurately positioned on the divers helmet/mask and yet it can also easily be lifted out of the divers view and later replaced back into the same position by the diver when it's required.

Technical Specification

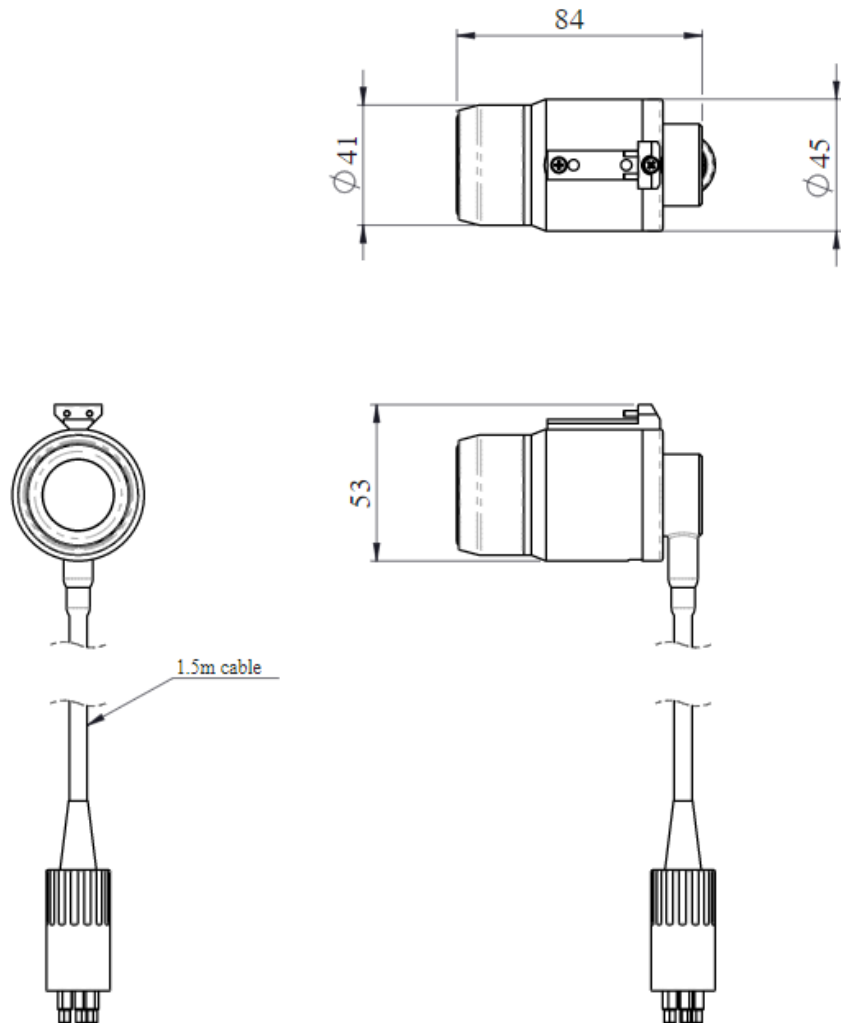
The system is designed to be used with our Gemini range of multibeam sonars, primarily the Gemini 1200ik and 720ik multibeam sonars fitted with an Inodive mounting plate.

Physical Dimensions 1200ik & 720ik



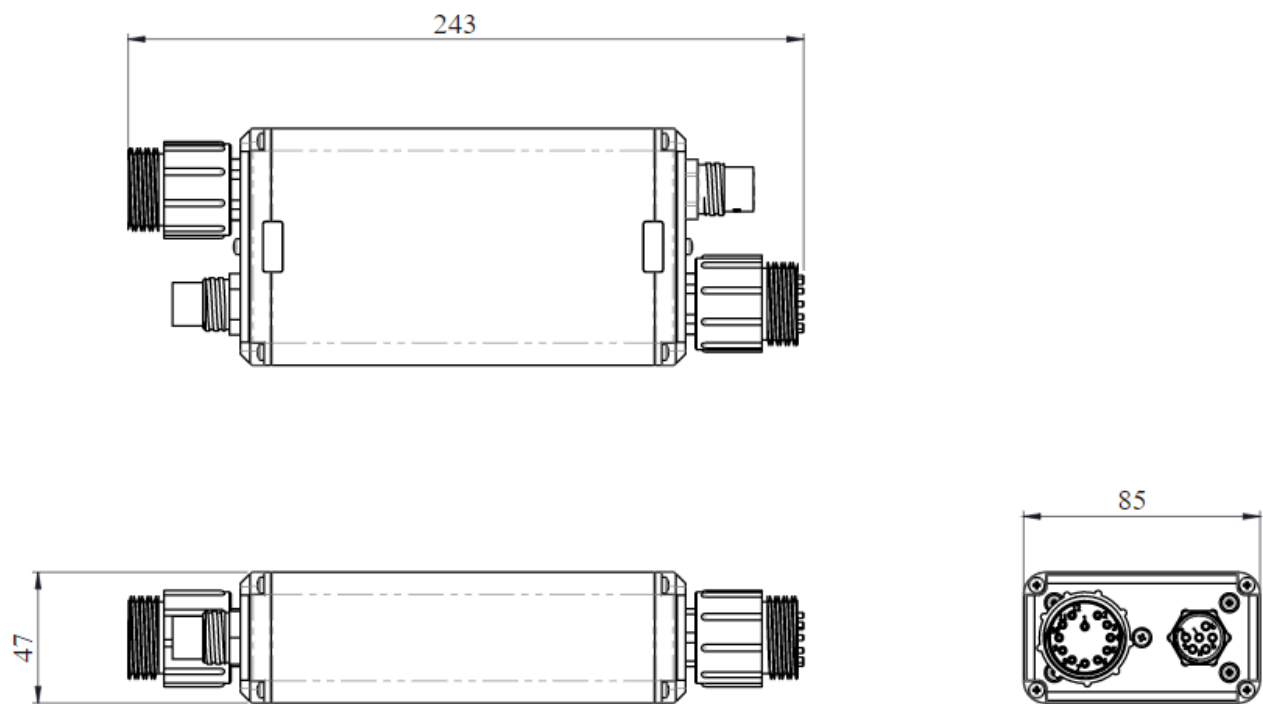
Please refer to the Gemini 1200ik & 720ik manuals available on our website www.tritech.co.uk for full sonar specifications

Monocle Specifications



Monocle specification	
Power requirement	0.5W @ +5V DC
Depth rating	100m
Display input	RGB, HSYNC, VSYNC
Display resolution	SVGA (800 X 600)
Connector	SubConn Micro Circular series
Weight in water	0.09kg

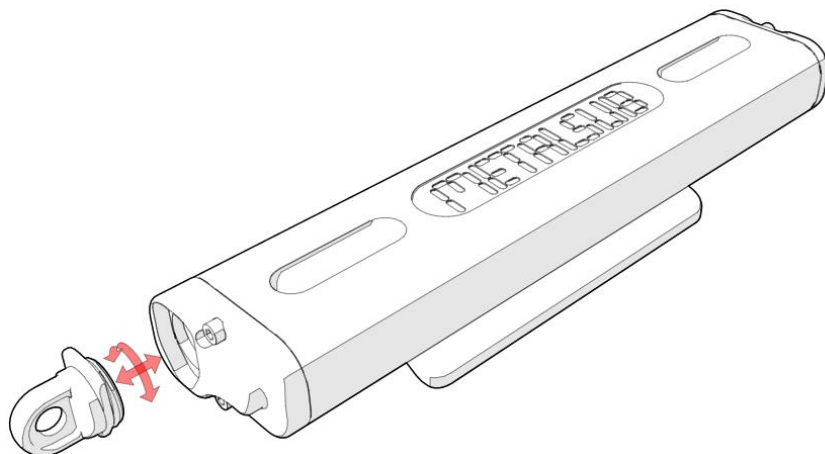
Subsea Computer (SSC) Specifications



Subsea computer	
Power requirement *	10W @ 20 - 42 VDC
Depth rating	100m
Connectors	SubConn Micro Circular series
Weight in water	0.54kg

* Does not allow for attached accessories

Battery Specifications



The Metalsub FX1210 with a fixed mounting plate

- Equipped with Metalsub's unique anodising layer, according to US Military Standards (MIL-A-8625-E type3 class2). This protective layer is also impregnated with Teflon, which guarantees a high degree of corrosion resistance.
- Equipped with an overpressure valve, so that any gases which arise during charging can safely leave the battery.
- The battery tank has only one connection that is used both to connect to and power the DMD-U system and to charge the tank.
- Equipped with Metalsub's very robust cable light coupling: connect or remove in seconds with just a quarter turn.

Battery specification	
Casing Material	Aluminium, hard-anodized and impregnated with Teflon*
Weight above water	2.8 kg
Weight under water	1.6 kg
Maximum dive depth	250 meters
Battery type	Ni MH
Battery power	12V 10Ah
Charging time	5 hours
Security	Overpressure valve for any battery gas leakage
Battery charger	Metalsub MP2500

* Anodised in accordance with American Military Standard MIL-A-8625-E type 3 class 2.



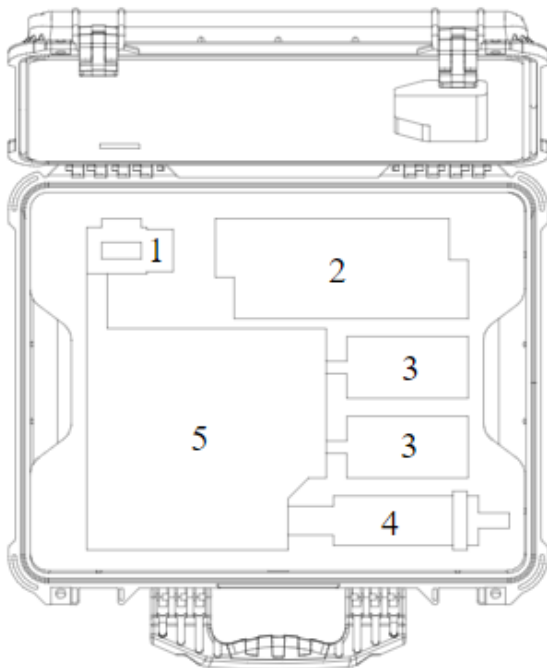
At full capacity the batteries have enough charge to power the SSC, monacle & sonar for a period of time in excess of the 2 hours available air capacity of any standard diver air tanks

Hardware Installation & Configuration

The full DMD-U system is contained within 2 separate rugged deployment transit cases :

- DMD-U Instrument Deployment Case
- DMD Sonar Deployment Case

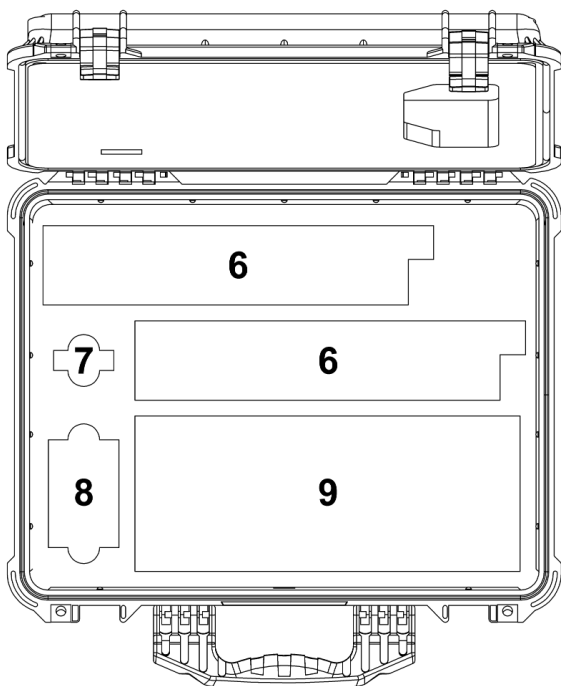
DMD-U Instrument Deployment Case



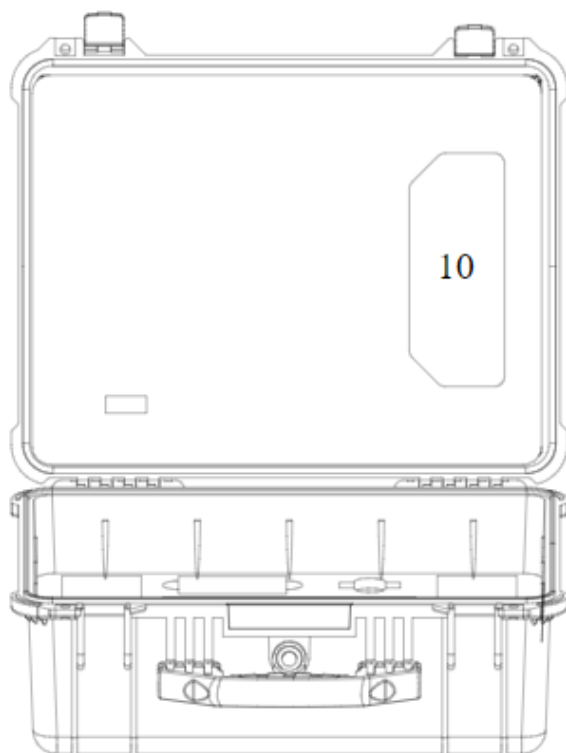
The DMD Instrument Deployment case is a rugged transit case featuring bespoke cut-outs for safely storing and transporting all the items and accessories (other than the sonar head) required to install and deploy the system on site. The case consists of two removeable trays as detailed below.

Tier 1 TOP LEVEL	
1	S12148 DMD Monocle
2	S12384 Subsea Computer SSC (with S12469 sleeve)
3	S07536 Metalsub Charger (MP2500)
4	S12560 DMD Hand Controller
5	S12055* Dive mask / Helmet accessory rails x2 S12363* Inodive Monocle Clamping slide S12049* Sonar 0.5" Clamping Slide (Inodive) 12051* Sonar Clamping slide with Spigot (Inodive) S12275 Monocle mounting rod S12467 Monocle Locking Pivot Assembly S12521 Double Ended rigid snap hook S12504 SubConn MCDC12F S12505 SubConn MCDC10M S09174 SubConn MCDC6M S12506 SubConn MCDC8M S10071 SubConn MCDC8F

* Fitting rails and accessories specified in the table above are for the OTS Guardian Divers face mask. Mounts and fittings for other dive masks are available on request



Tier 2 BOTTOMLEVEL	
6	S07535 Metalsub Battery 12V 10Ah
7	S09684 USB Pen Drive
8	Accessories Kit Box
9	S12412 1.5M DMD Sonar Cable S12507 SubConn MCDC10F S10071 SubConn MCDC8F S11541 SubConn MCDC6F S12508 SubConn MCDC12M Connector Dummy AC Mains Leads for Metalsub Charger Tritech Branded Cable Tie



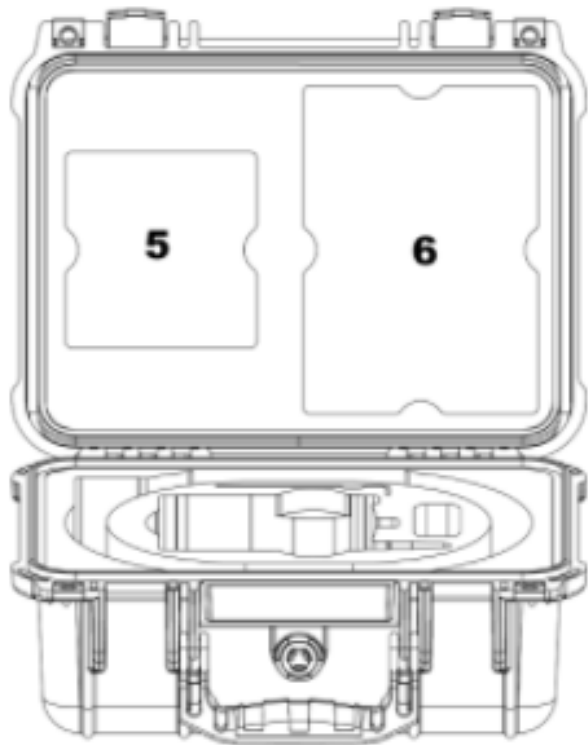
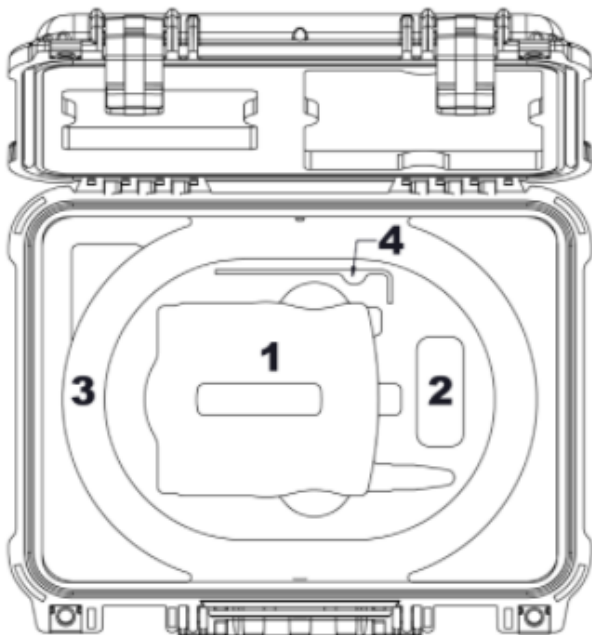
CASE LID	
10	Document Folder (Build Record)

DMD Sonar Deployment Case

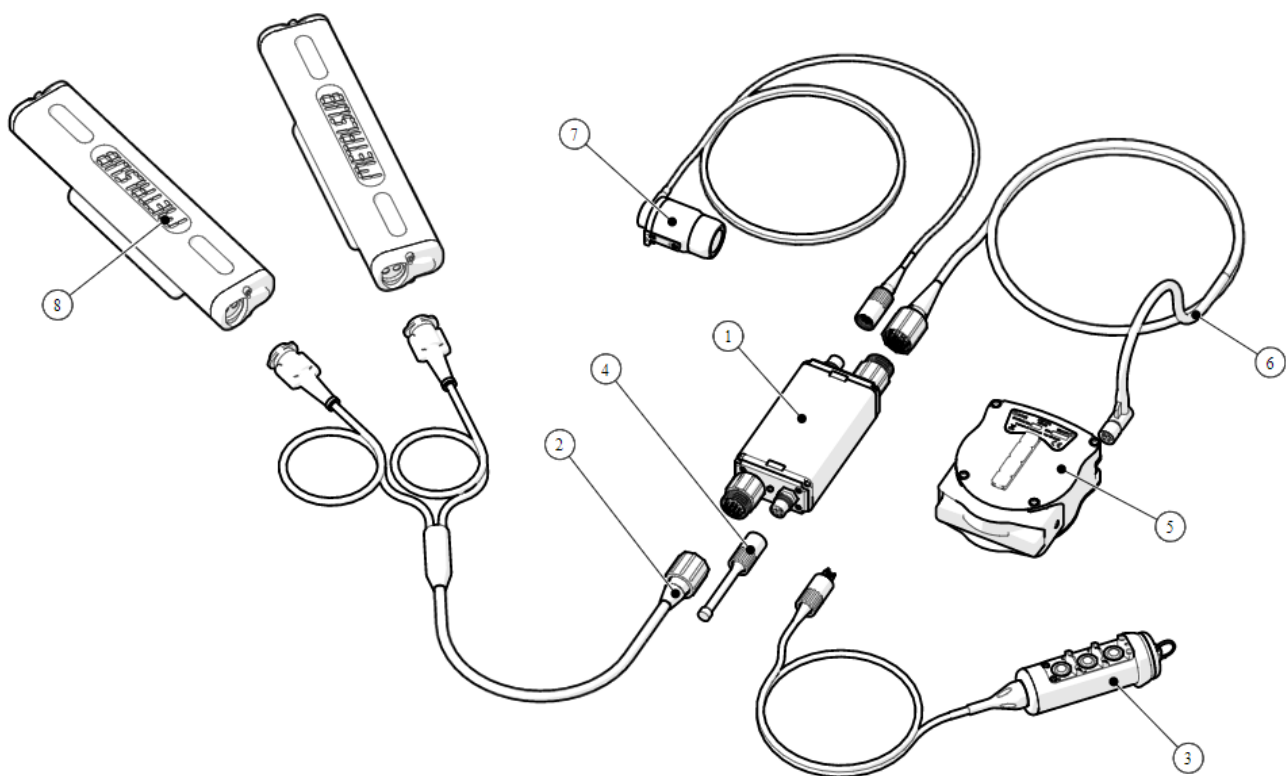


The DMD Sonar Deployment case is a rugged transit case featuring bespoke cut-outs for safely storing and transporting the Gemini 720ik or 1200ik multibeam sonar heads.

SONAR CASE	
1	Gemini 1200ik or 720ik Sonar
2	Spare storage
3	Cable Storage
4	2mm Hex Drive Key
5	CD storage
6	Document storage



System Connections



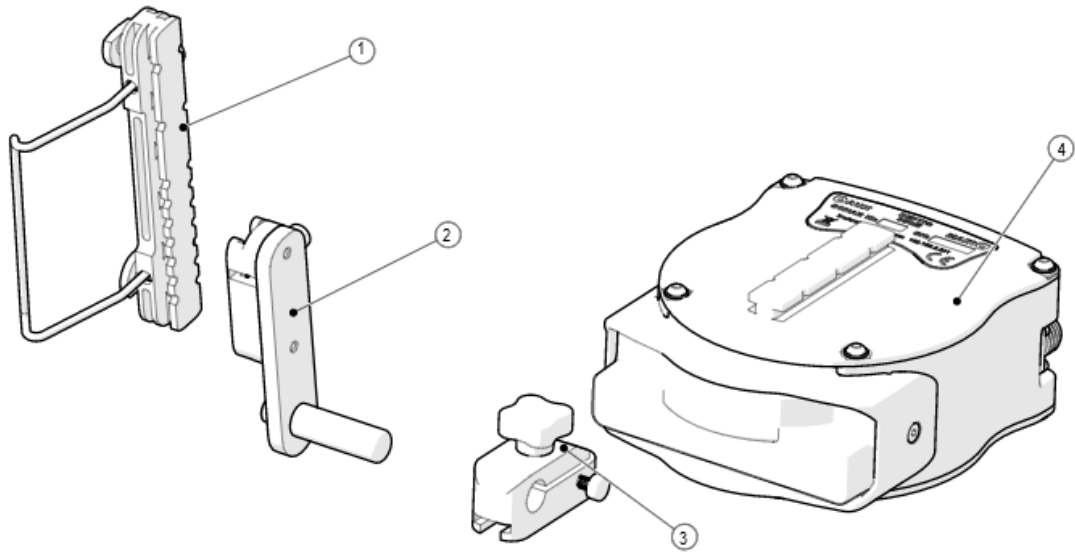
The diagram above shows the different parts and cable connections required to the SSC before the system is powered on and deployed.



If not fitting the DMD Hand Controller (untethered operation) or Diver Comms connection (tethered operation) the Blanking Plug (item 4) must be fitted. **Submerging the unit and powering ON with this connection exposed will result in damage to the SSC not covered under the warranty.**

Item	Qty	Part No.	Description
1	1	S12384	DMD Subsea Computer (SSC)
2	1	S12509	SubConn MCOM12F TO Metalsub Power Cable
3	1	S12560	DMD Hand Controller
4	1	S09174 & S08059	SubConn MCDL6M Dummy Plug & MCDLS-F Locking Sleeve
5	1		Gemini ik Sonar with Inodive Mounting
6	1	S12412	Impulse MKS(W)-307-CCP to Subcon MCOM10M Cable Assembly
7	1	S12148	DMD Monocle Assembly
8	2	S07535	Metalsub Battery 12V 10Ah

Assembly & Fitting of Sonar onto Mask (Using the OTS Accessory Rails)



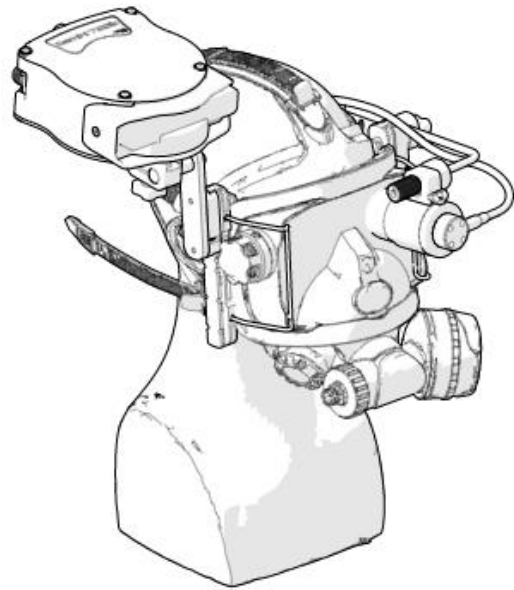
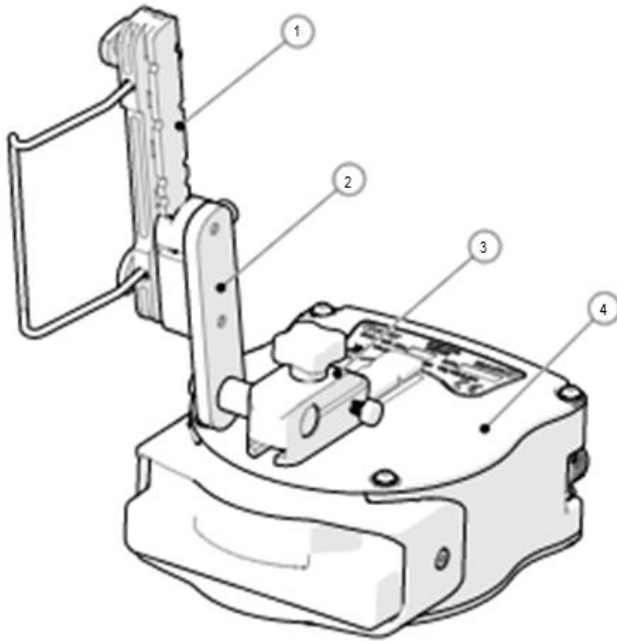
The diagram above shows the parts required to construct and mount the sonar onto the OTS Guardian diver mask

Item	Qty	Part No.	Description
1	1	S12055	OTS Guardian Accessory Rail
2	1	S12051	Spigot Assembly, 90 degree
3	1	S12049	Clamping Slide with 1/2" Hole
4	1		Gemini ik Sonar with Inodive Mounting

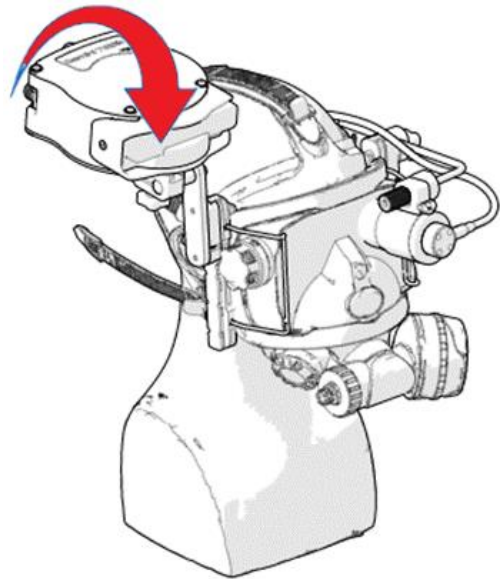
To assemble and mount the sonar to the side of the mask:

- Slide Clamping Side with ½" Hole (3) onto the slide connection on the underside of the Gemini ik sonar (4)
- Slide the 90 Degree Spigot Assembly (2) onto the Accessory Rail (1)
- Slide the Sonar (4) and clamping slide (3) onto the mounting spigot (2)
- Use the knob on the Clamping Slide (3) to fix the sonar firmly in place when correctly adjusted for position

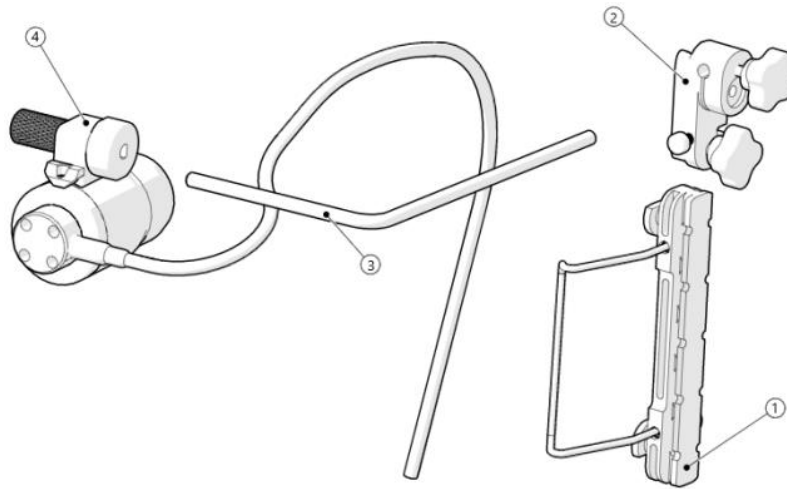
The illustrations below show the mounting fully assembled and attached to the side of the mask.



During use the diver may find it helpful to reach up and adjust the orientation of the sonar slightly using gentle pressure to rotate it forward or backward on the mounting spigot. This will assist with the best operating angle for the sonar dependant on the positioning of the diver in the water (i.e. standing, crawling, swimming etc.).



Assembly & Fitting of Monocle onto Mask (Using the OTS Accessory Rails)



The diagram above shows the parts required to assemble and mount the Monocle onto the OTS Guardian diver mask

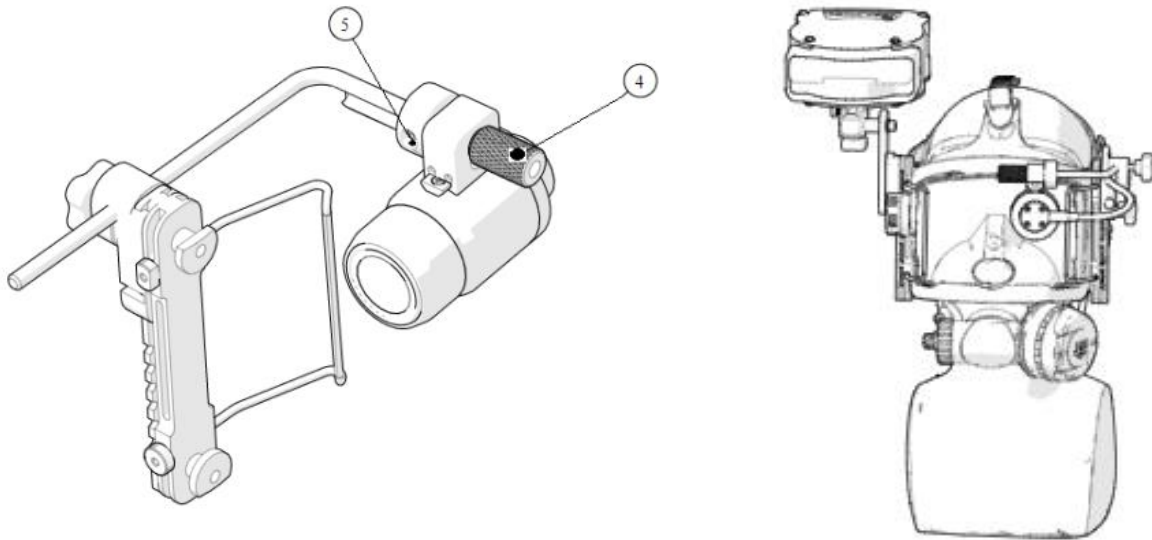
Item	Qty	Part No.	Description
1	1	S12055	OTS Guardian Accessory Rail
2	1	S12363	Clamping Slide with 1/4" Hole
3	1	S12275	Shaped 1/4" Mounting Rod
4	1	S12467	DMD Monocle and Locking Assembly

To assemble and mount the sonar to the side of the mask:

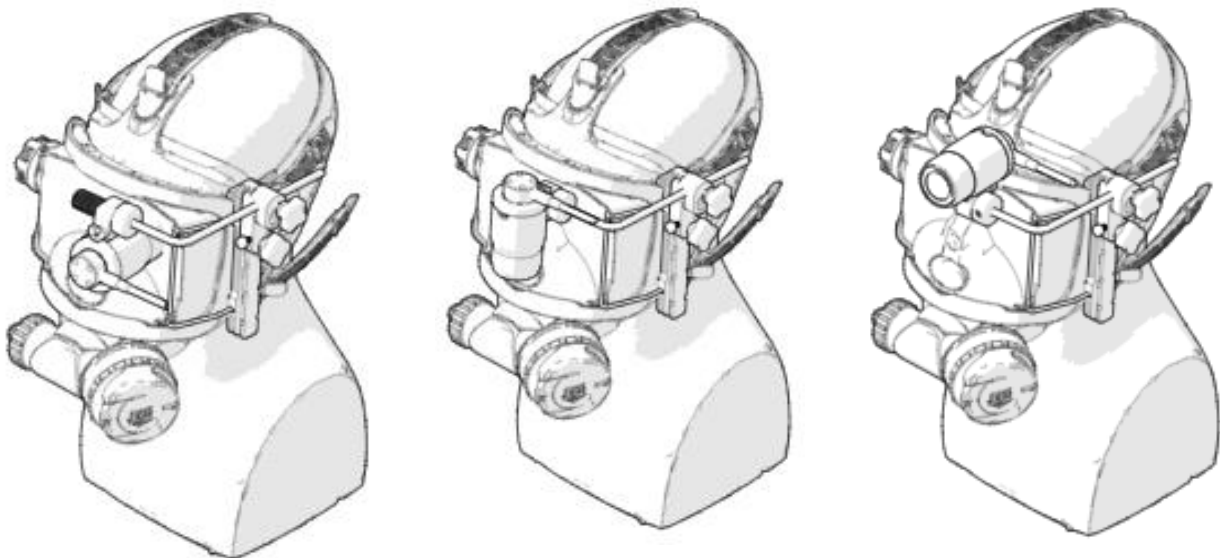
- Take the Clamping Slide [2] and slide onto the Accessory Rail [1]
- Slide the long section of the 1/4" bar [3] through the hole in the clamping slide [2], and when the monocular is up against the diver mask turn the knob clockwise to lock the bar in place
- Loosen \ unscrew the knurled section of the monocular mount assembly [4] and loosen \ unscrew 2.5mm hex screw [5]. The monocular can now be slid onto the angled rod and the whole assembly mounted on the divers mask
- The monocular slides onto the locking assembly as shown below:



- When positioned for comfort and best view for the diver re-tighten the knurled section [4] and 2.5mm hex screw [5] to lock in place.



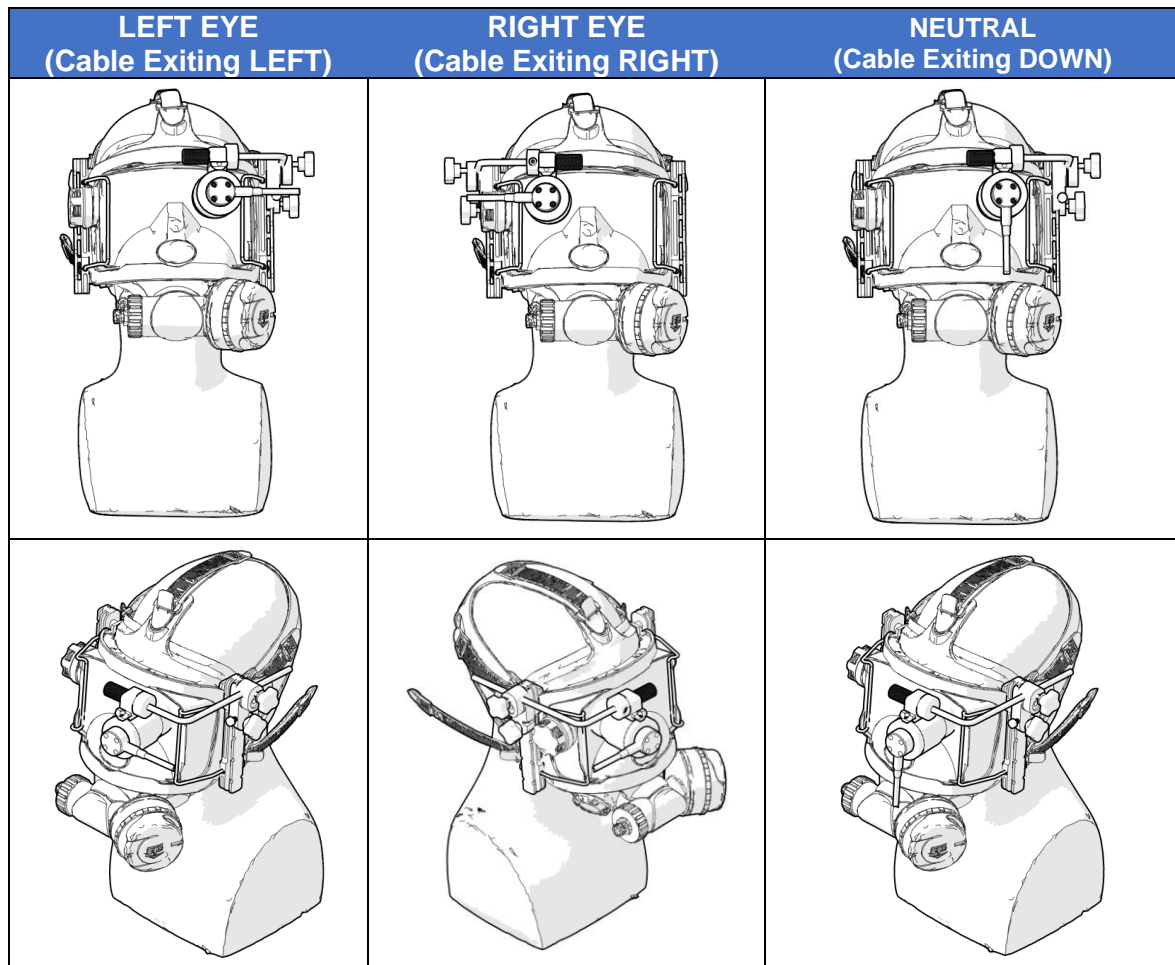
The monocular assembly is designed to allow it to be flipped up and out of the view of the diver if required. Simply hold the front & rear of the monocular between the thumb and index finger and rotate the assembly around the mounting bar. The monocular will click into final position either against the mask or at 180 degree rotation flipped up and out of the way



Monocle Orientation

The monocle can be configured in any one of 3 separate configurations:

- For fitment and use over the divers LEFT EYE only
- For fitment and use over the divers RIGHT EYE only
- Neutrally, can be used over EITHER EYE (in this configuration cable routing may not be ideal)

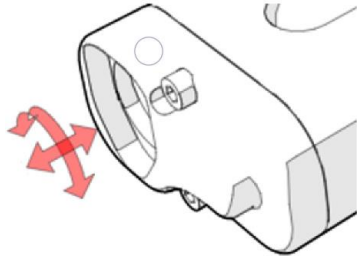


The monocle orientation is specified at the point of purchase and is fixed no attempt should be made to alter this in the field. Any attempt to do so may result in damage to the monocle. Should you require a different monocle orientation than originally specified please contact Trittech International for advice.

DMD System Operation

Switch On & Start-Up Sequence

When all connections have successfully been made as per the section 'System Connections' the unit is ready to be powered on and 'go live'.

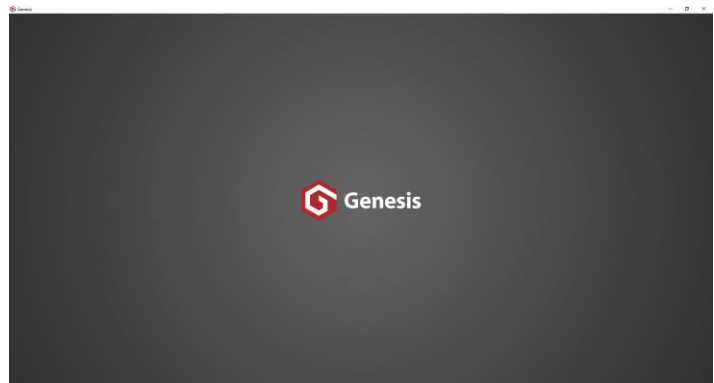


To locate the battery cable connector into the battery correctly push inward and rotate to lock in place. To remove rotate in the opposite direction and pull out.



As soon as both of the Metalsub batteries are connected the system will boot-up and start to operate.

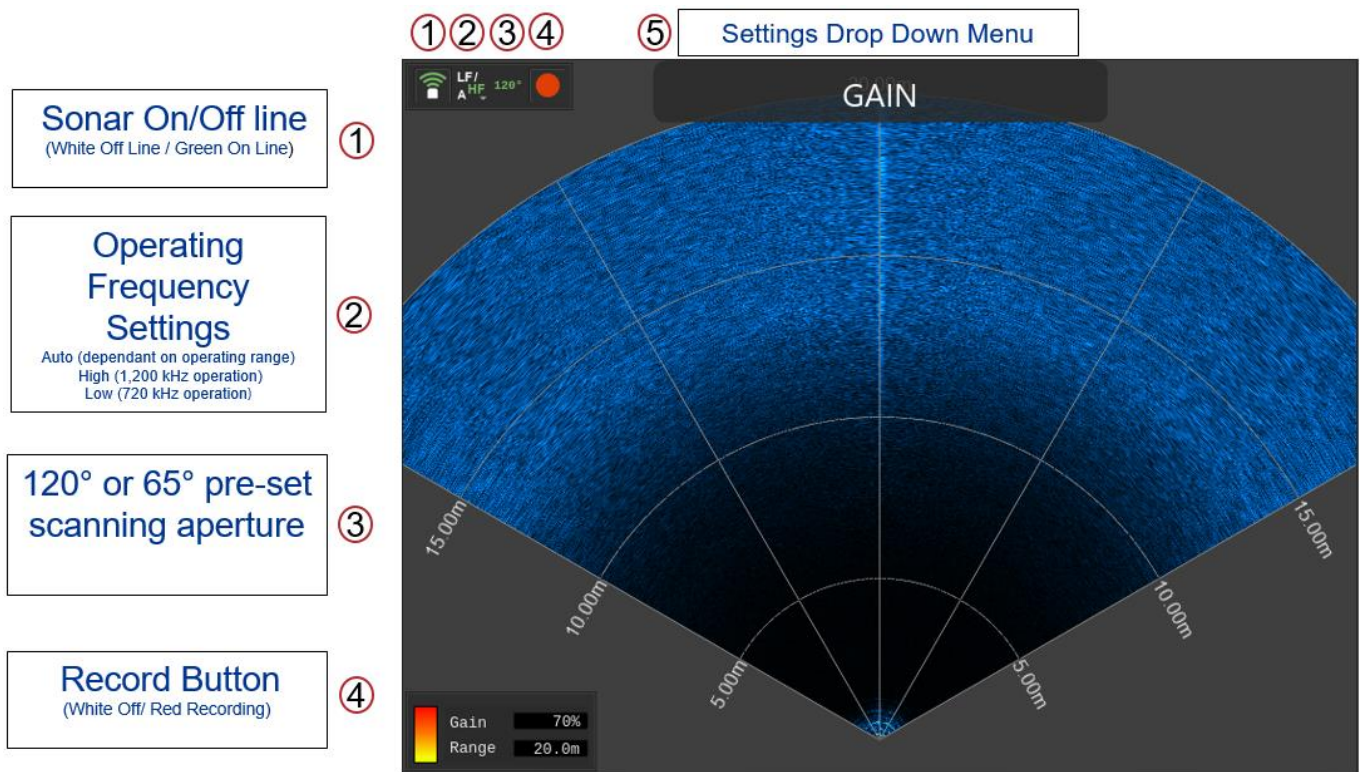
With batteries connected the system can be viewed booting-up through the monocular. The Genesis version splash screen will appear briefly followed by a plain Grey screen as seen below



With the hand controller connected, the system will automatically recognise that it is running in 'Un-Tethered mode'. The Genesis sonar display GUI will initialise and the sonar will immediately go on-line and initiate logging.

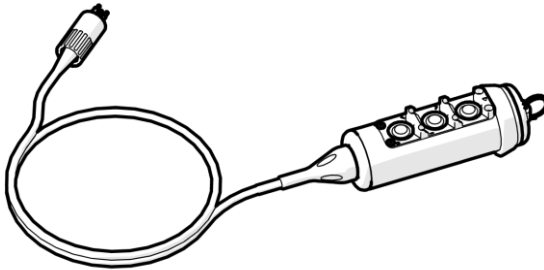
Software Display & Operation

During operation of the system the illustration below shows the view seen by the user through the DMD Monocle.



Operation Using the Hand Controller

Operation control & adjustment of all sonar controls and settings within the Genesis display can be made through the drop-down menu using the hand controller.



The *MODE* button is the top button on the hand controller marked by a white triangle ► and used to cycle through the Menu options

The *UP* and *DOWN* buttons are below the *MODE* button marked ▲ ▼ (and I O) respectively. These are used to adjust the settings for each menu option.



The menu options can be accessed sequentially in a loop by pressing the *MODE* button starting from 'RANGE' and finishing at 'ADVANCED' prior to looping back to 'RANGE'. The current menu option is displayed at the top centre of the screen and the following flow charts detail the different menu options.

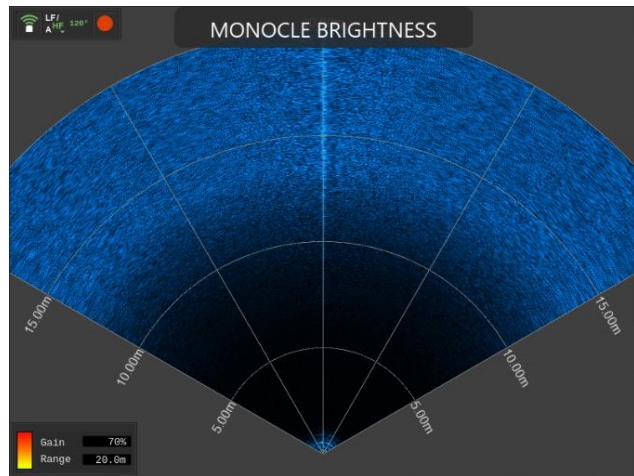
If no control input is made from the hand controller for 10 seconds (i.e. there is an inactivity period of 10s) the current menu position will reset and disappear from the top centre of the display. To reactivate the menu display the user will be required to press the *MODE* button again.



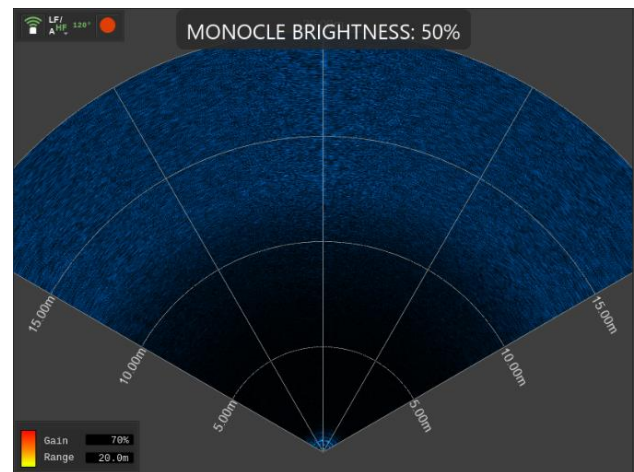
The buttons on the hand controller provide 'haptic feedback' to the user. A slight vibration should be felt upon the successful depression of a button

The example below illustrates the use of the controller and menu to adjust the display brightness of the DMD Monocle display.

Press the *MODE* button ► to move through the menu until the 'MONOCLE BRIGHTNESS' settings are reached

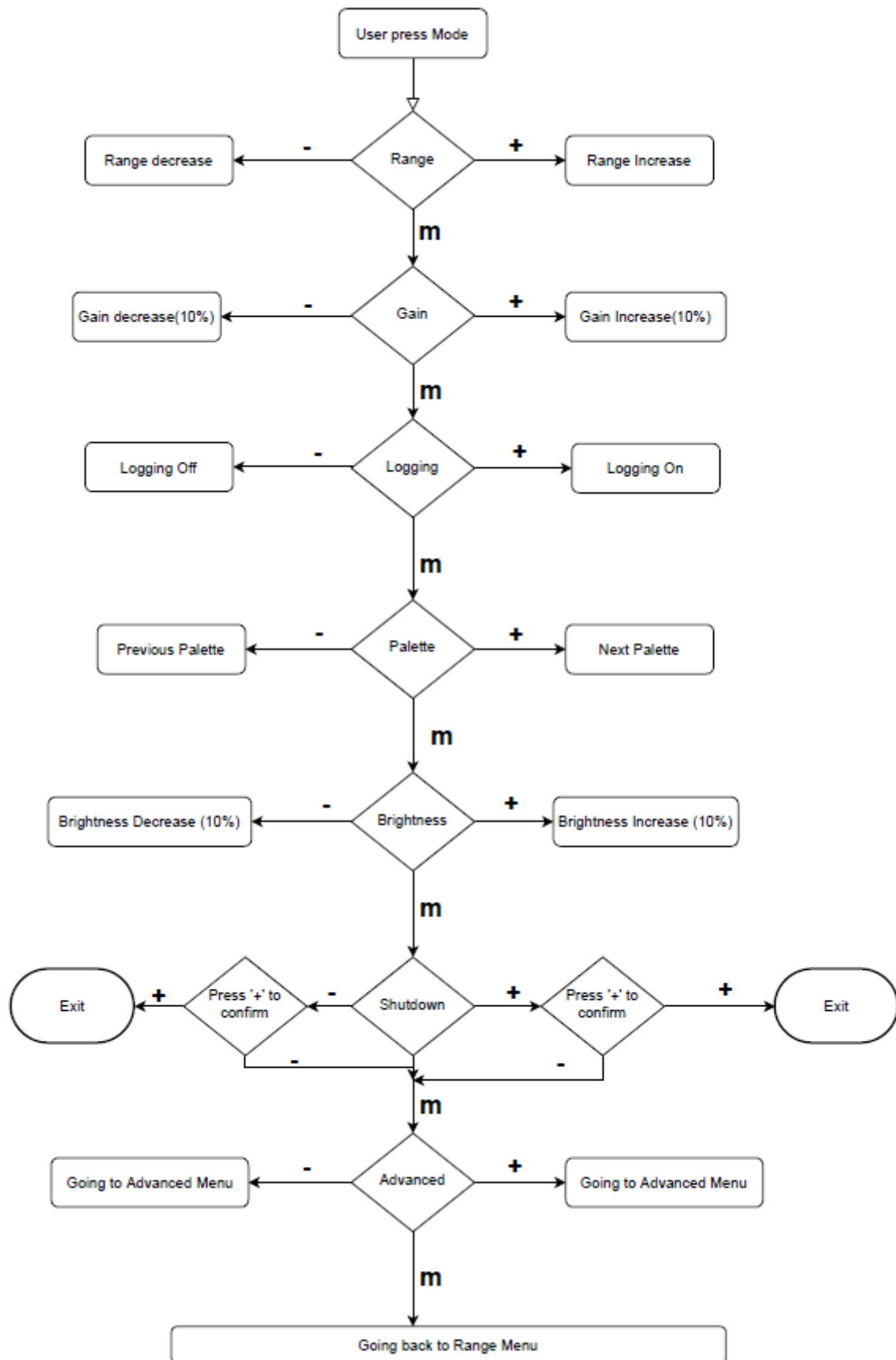


Use the *UP* ▲ and *DOWN* ▼ buttons to adjust the setting in 10% steps as required. The adjusted setting will be displayed on the Monocle display as it is changed.

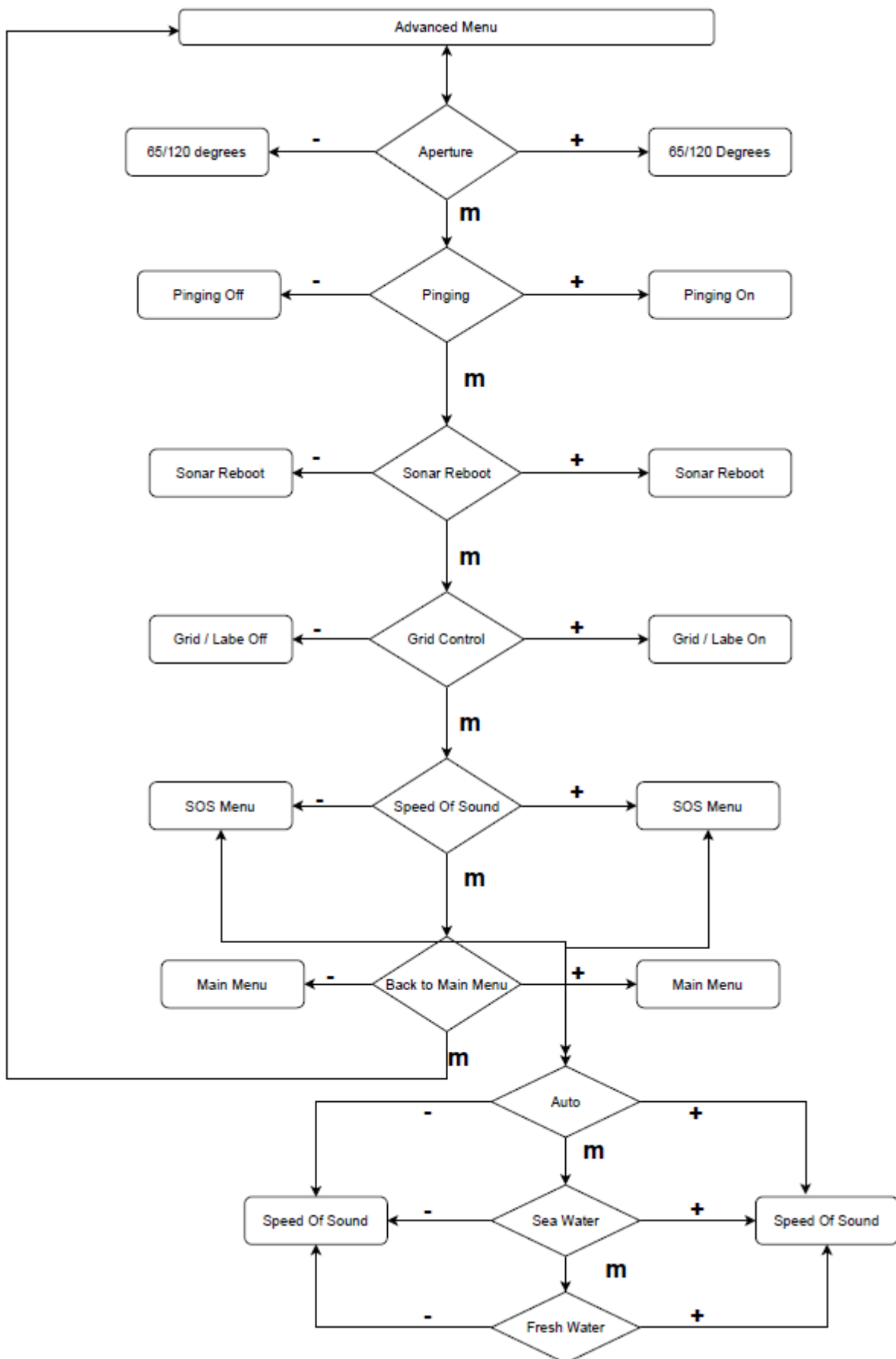


Press *MODE* to move through the menu to change a different setting or the menu will exit after 10 seconds.

Main Menu Layout and Flow Chart

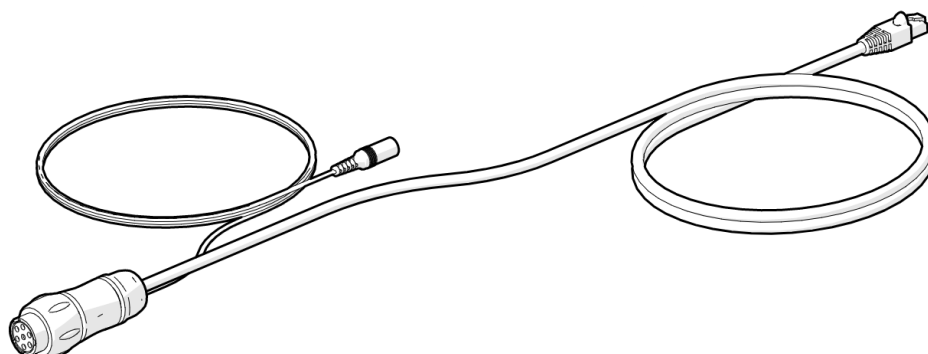


Advanced Menu Layout and Flow Chart



Management of DMD Log Data and Software

Setup of the SSC Content Management System



The Un-Tethered system is supplied with a content management cable assembly. When plugged into the sonar port on the SSC this cable enables an Ethernet connection to be setup between the SSC and the users PC or laptop. By installing and using the 'Content Management Tool', a separate software utility, the user can then download and manage any recorded log-files stored on the SSC's internal 256GB SD card. This cable can also be used to install any future updates of the Genesis sonar control GUI loaded onto the SSC.



[DMD SSC Content Management Tool Installer.msi](#)

Before using the cable you must install the Content Management Tool application onto your Windows PC. This program is available from the USB pen drive supplied with your DMD system.

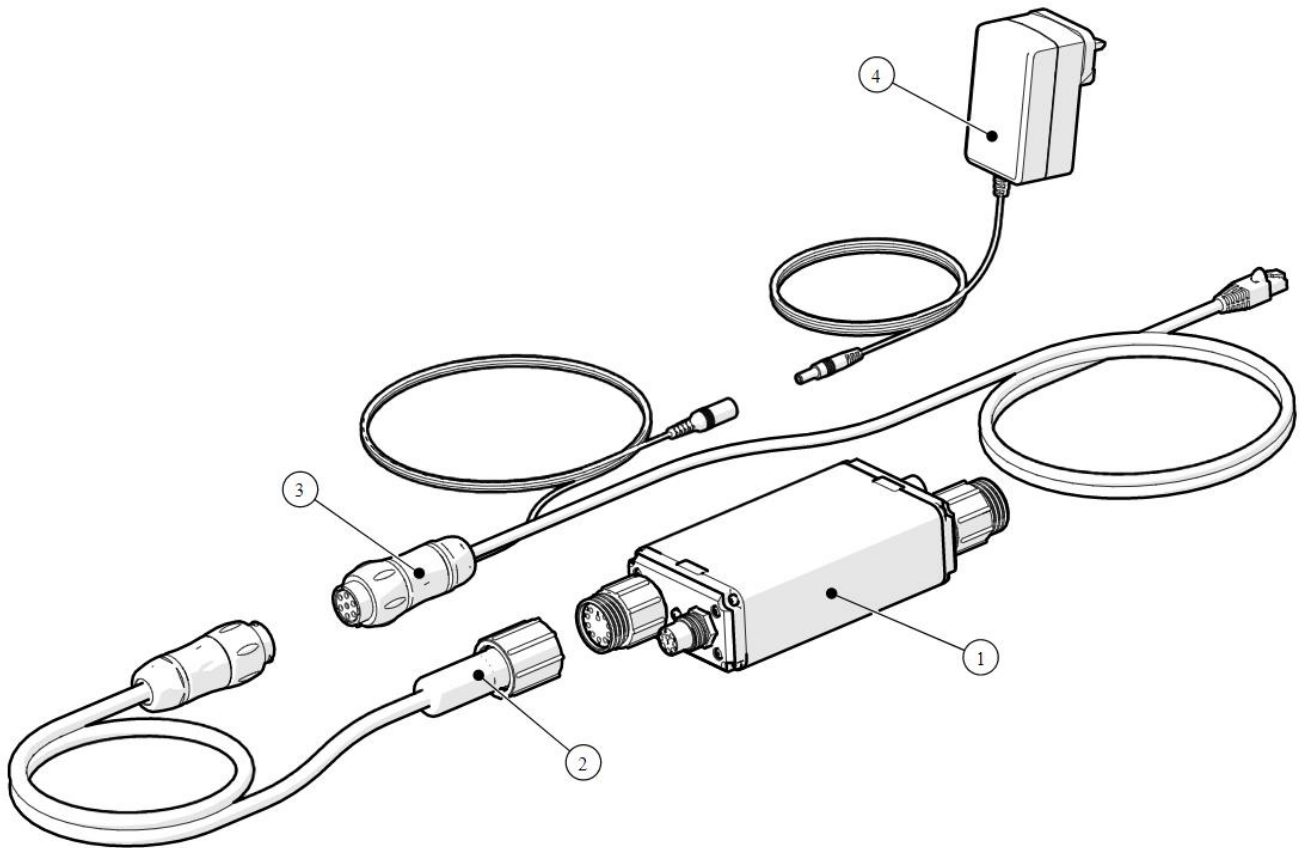
After installation a purple DMD SSC Management icon will be placed onto your desktop.



The IP address of the DMD SSC is set to 192.168.2.60 and default address of the Gemini sonar 192.168.2.201. To communicate with the SSC over the Content Management Cable you must have your Ethernet network adapter **manually** set to a corresponding IP address 192.168.2.xxx (example 192.168.2.101) with Subnet Mask 255.255.255.0.

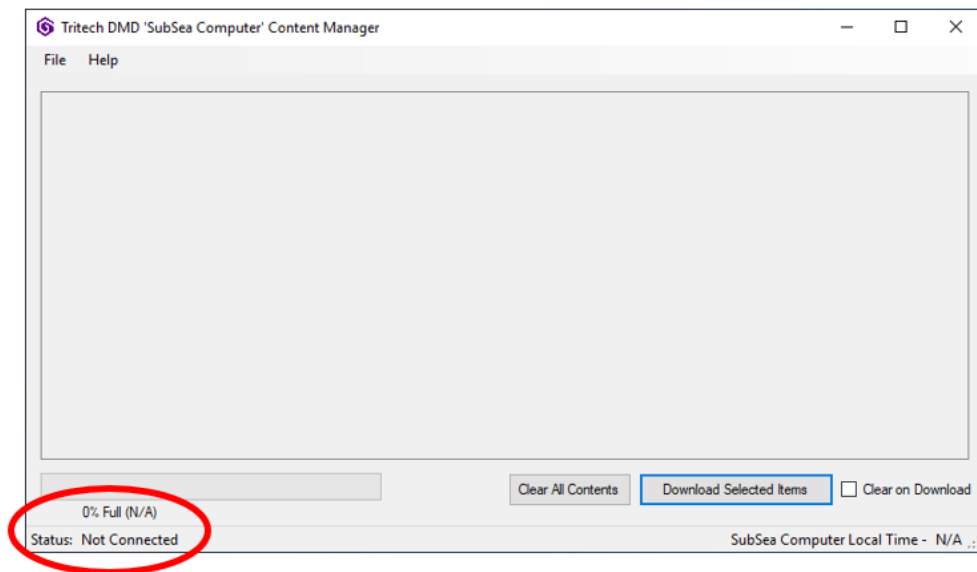
Do not set the PC network address to the same as the DMD SSC or Gemini sonar.

The illustration below shows the different items needed to connect the SSC to the PC and how they are connected. The SubConn to Souriau adapter cable [2] allows connection between the Content Management Cable [3] and DMD Subsea Computer [1]. The system is powered by the supplied AC to 24V DC power supply [4] and the RJ45 plug on the Content Management Cable [3] into the Ethernet Network Adapter of your PC.



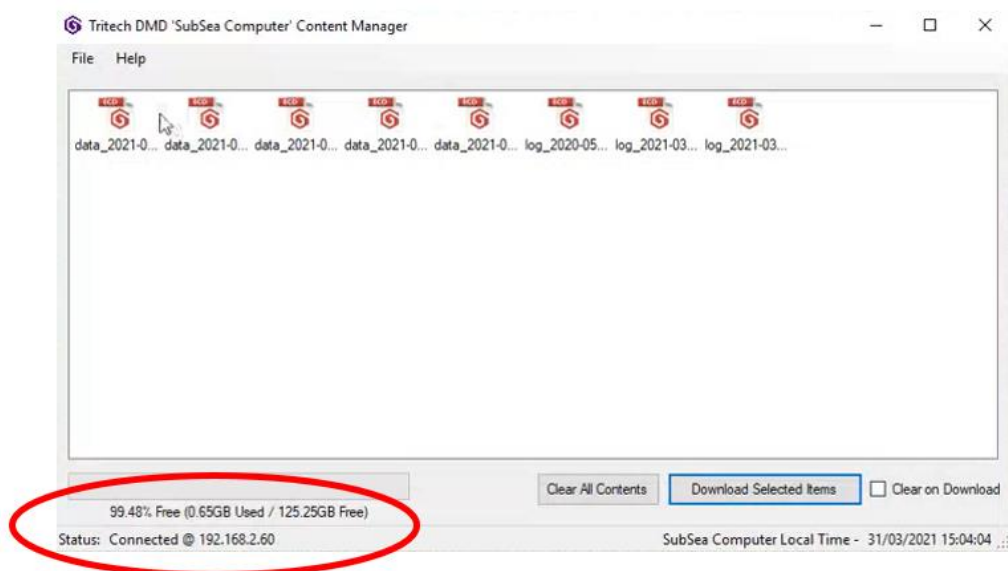
Item	Qty	Part No.	Description
1	1	S12384	DMD Subsea Computer
2	1	S12585 (Part A)	Subconn MCOM10M to Souriau UTS1JC147P
3	1	S12585 (Part B)	Souriau UTS6JC147S to 2.1mm DC Fem & RJ45
4	1	S12588	Universal AC to 24V DC Power Supply (2.1mm)

Upon launching the application the content management interface will open up as shown below.

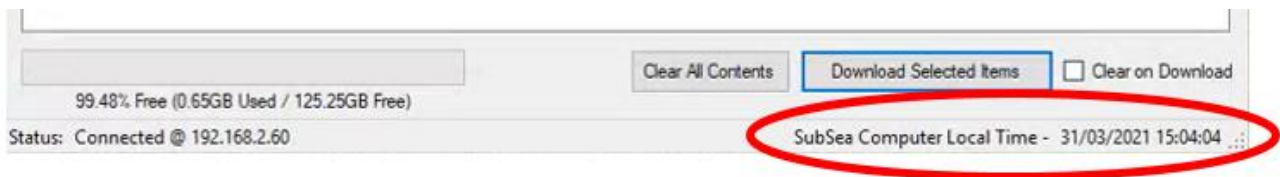


The application will continually poll the Ethernet port until it detects a connection with the SSC. It will display "Status: Not Connected" until then. If the PC\Laptop Ethernet port is configured to be within the same dynamic range as that of the SSC then a connection will be made within a short period.

When a connection has been achieved, Status will report as 'Connected' displaying the IP address of the SSC and above that the used/free space available on the SD memory card. Any log files recorded to the SD memory card will be displayed within the management window.



Setting & Synchronisation of the SSC Date & Time



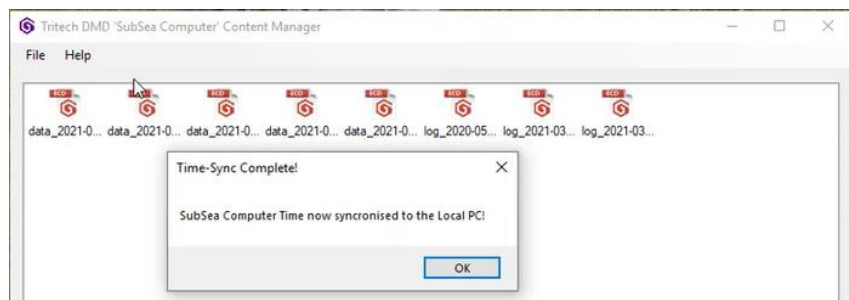
The SSC contains a real time clock with an on board CMOS battery back up. When connected the time and date currently set within the SSC is reported at the bottom right of the display as circled above.

As this time and date is used by the Genesis display GUI in the naming convention of any recorded log files and also as the system may well be used in differing time zones around the world it may well be necessary to adjust the current time and date setting within the SSC. This is achieved by syncing the SSC to the local time and date of the connected PC or laptop.

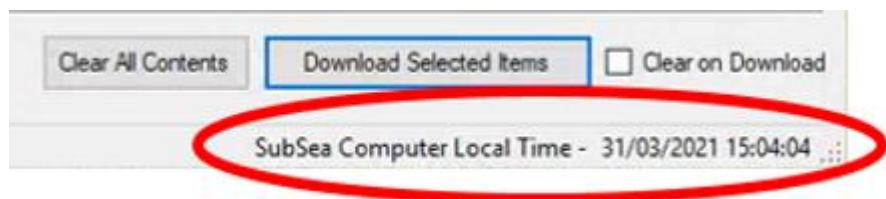
Select 'File' and then click on 'Sync SSC to Local PC Time'.



The App will then report that the SSC time is now synchronised to the local PC.



This can be confirmed by noting the adjusted time in the bottom right hand corner.



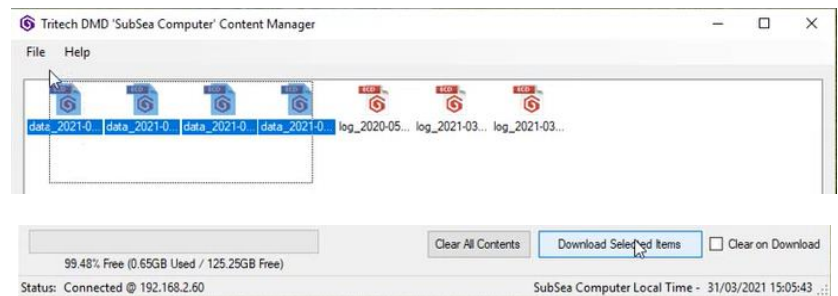
Managing & downloading the stored log file content

There are multiple methods for selecting, downloading and deleting recorded log file content:

You can individually click on items and select to either 'Download' or 'Delete'.



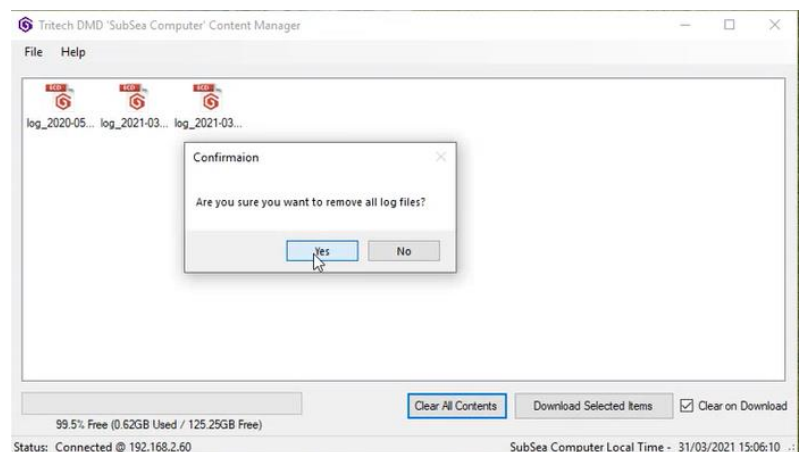
You can select multiple items and click 'Download Selected Items' the App will then ask you to Browse for a download folder location before commencing the download. Once downloaded the items will remain upon the SD card in the SSC.



Should you wish the items to be permanently deleted from the SSC SD card simply ensure the 'Clear on Download' box is checked before clicking 'Download Selected Items'



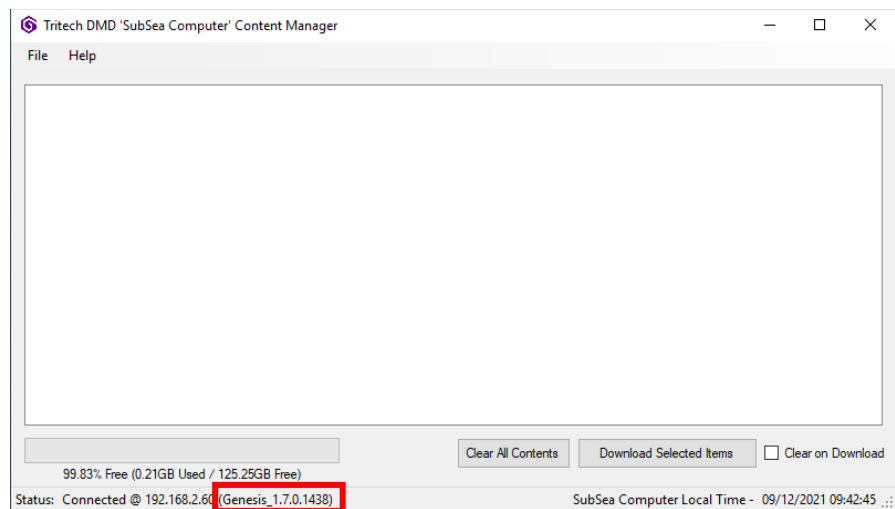
If you wish to delete all the log file contents permanently from the SSC SD card, this can be done by selecting the 'Clear All Contents' button.



Updating the Genesis software version on the SSC

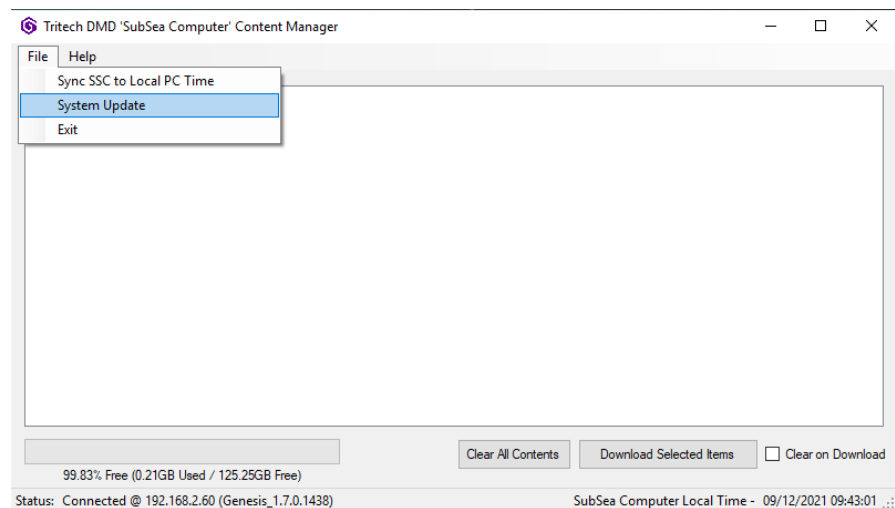
Connect the content management cable to the SSC and launch the software to connect with the SSC.

The current version of Genesis software installed on the SSC will be displayed in the status message highlighted by the RED box.



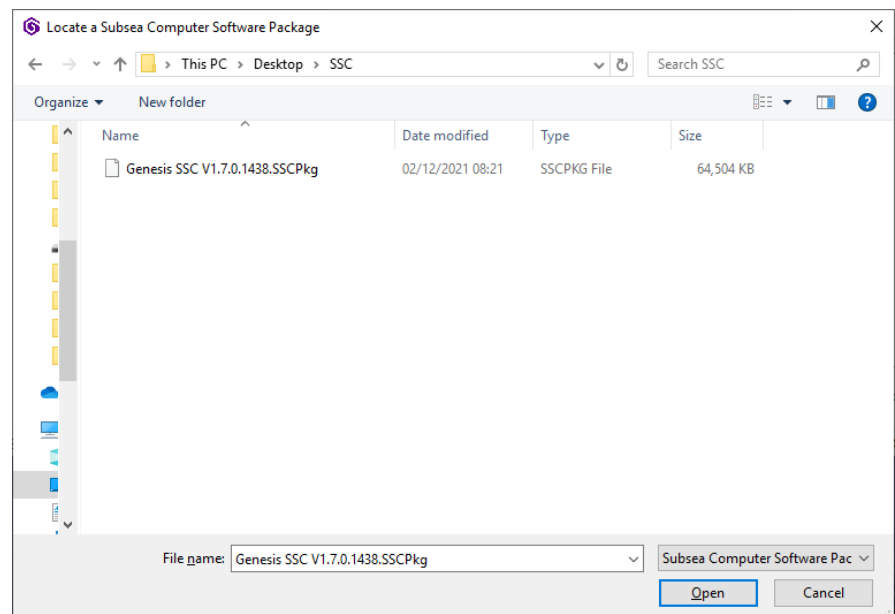
Click on **File** and then on **System Update**.

This will open a file explorer window which will ask to locate a 'Subsea Computer Software Package'.

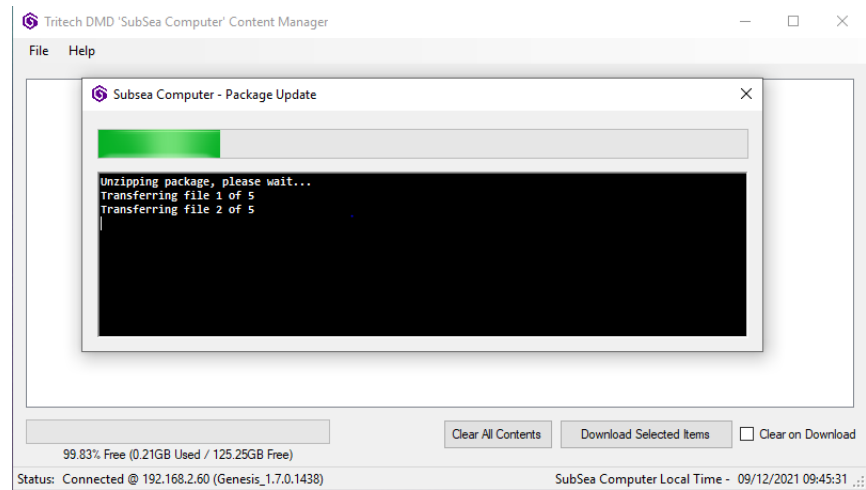


The file will have the filename extension **.SSCPkg** and will include the Genesis version it contains. In this example the Genesis version is V1.7.0.1438 and the full filename is Genesis SSC V1.7.0.1438.SSCPkg

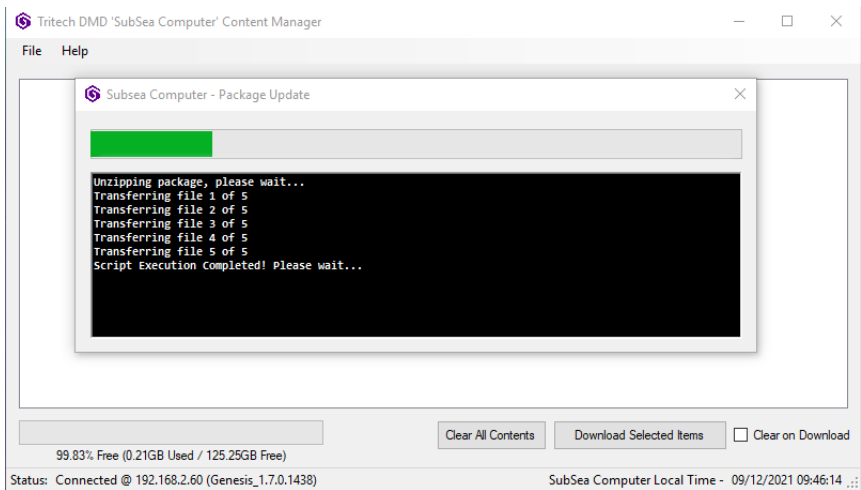
Point the file explorer window to the location of the **.SSCPkg** file then click on **Open** to begin the file installation



The installer will start unzipping and transferring the files to the SSC

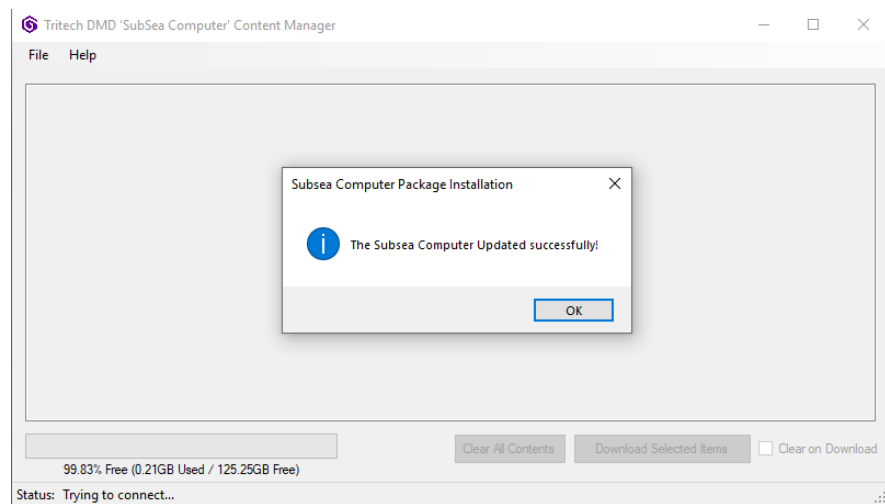


When this process has concluded the message ‘Script Execution Completed! Please wait...’ will be displayed



After a wait of around 15 seconds the message ‘The Subsea Computer Updated successfully!’ will be displayed.

The SSC will now have been updated with new Genesis software version.



General System Operation

Sonar Operational Notes

When using a dual frequency 1200ik multibeam sonar there are some operational factors which must be considered in order to make best use of the dual channel capability of the sonar.

Dual Frequency Options



720 kHz Low Frequency Operation

The sonar has a 120° horizontal field of view at +/- 10° about the horizontal axis (20° in total). In this mode of operation the sonar can image targets up to its maximum range however the definition of targets will be lower than when used in its higher frequency mode.



1200 kHz High Frequency Operation

The sonar has a 120° horizontal field of view at +/- 6° about the horizontal axis (12° in total) which is a slightly reduced vertical beam-width when compared with the lower frequency channel. This mode will produce higher definition images compared with the lower frequency mode. In high frequency (1200kHz) mode, the user has the option of switching to using just a 65° sector which will double the update rate when compared to utilising the full 120° sector scan.

High frequency (HF) 1200 kHz will work best up to 40m range scale providing the user with higher resolution images than if operating on the lower (LF) 720 kHz channel. Due to acoustic principals the effectiveness of 1200 kHz operation drops of significantly at range. When operating in auto frequency mode the sonar will automatically switch to LF operation above 40m range.

For more details on Genesis operation see the QS guide on our website here:

<https://www.tritech.co.uk/media/products/software-manual/gemini-1200ik-genesis-software-quick-start-guide-gemini.pdf>

System Storage Specifications & Recommendations

The equipment should, whenever possible, be stored in its original transportation cases until ready for operation. During storage, each box must not be used for any purpose for which it was not intended (work platform, table, steps etc.).

After unpacking and during storage all equipment must be kept in a dry, non condensing atmosphere, free from corrosive agents and isolated from sources of vibration.

After use and prior to storage the underwater items should be thoroughly washed down using fresh water and allowed to dry naturally prior to storage. Although the anodised aluminium components are very resistant to corrosion, using fresh water is a simple way of minimising the chance of corrosion. If required items may be cleaned using a non abrasive cloth and mild non abrasive detergent. Do not clean with solvents !

Do not undertake maintenance of the units, outside the scope of that defined within this manual, unless instructed to do so by Trittech International Ltd technical support. Wherever possible, avoid any prolonged exposure to extreme climatic and weathering conditions to reduce any aging effects on surfaces, cables and connectors.

If a unit needs to be packed for storage or shipment you must, whenever possible, use its original packing material and/or case.

Temperature limits -10°C to 35°C (operating), -20°C to 50°C (storage)