Diver Mounted Display (Tethered)

Product Manual

0747-SOM-00002 Issue 02

Tritech

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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:

	Mail	Tritech International Ltd Peregrine Road Westhill Business Park Westhill, Aberdeenshire AB32 6JL, UK
	Telephone	+44(0)1224 744 111
	Email	support@tritech.co.uk
	Website	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 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.

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.

Introduction

General Overview

The DMD system has been designed to provide divers with the ability to navigate and carry out 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 monocle, 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
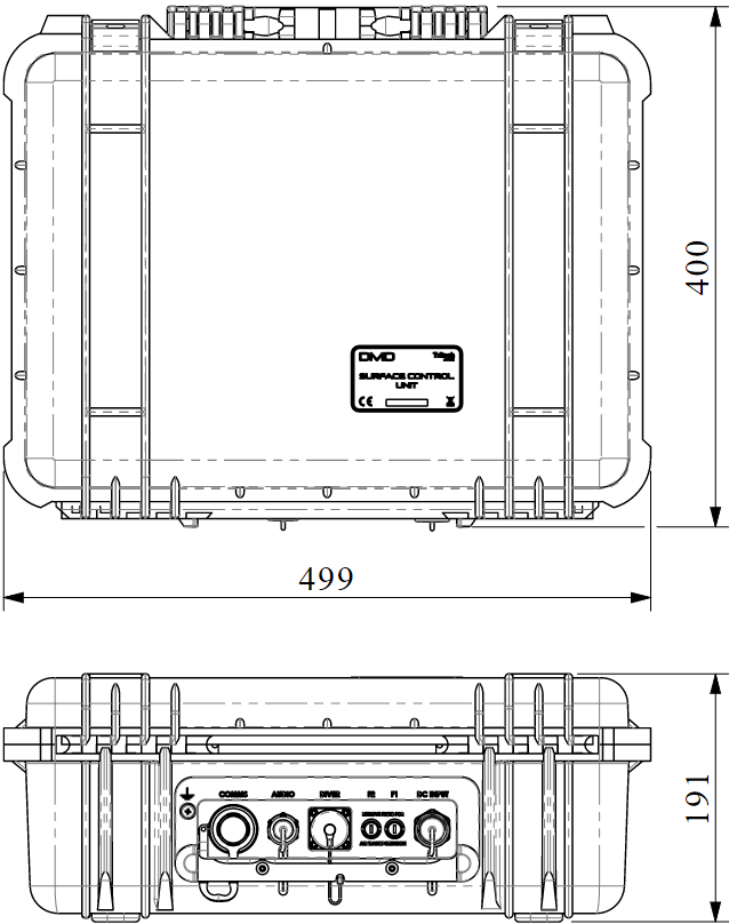
- 1200ik with inodive mounting plate
- 720ik with inodive mounting plate

Physical Dimensions 1200ik & 720ik
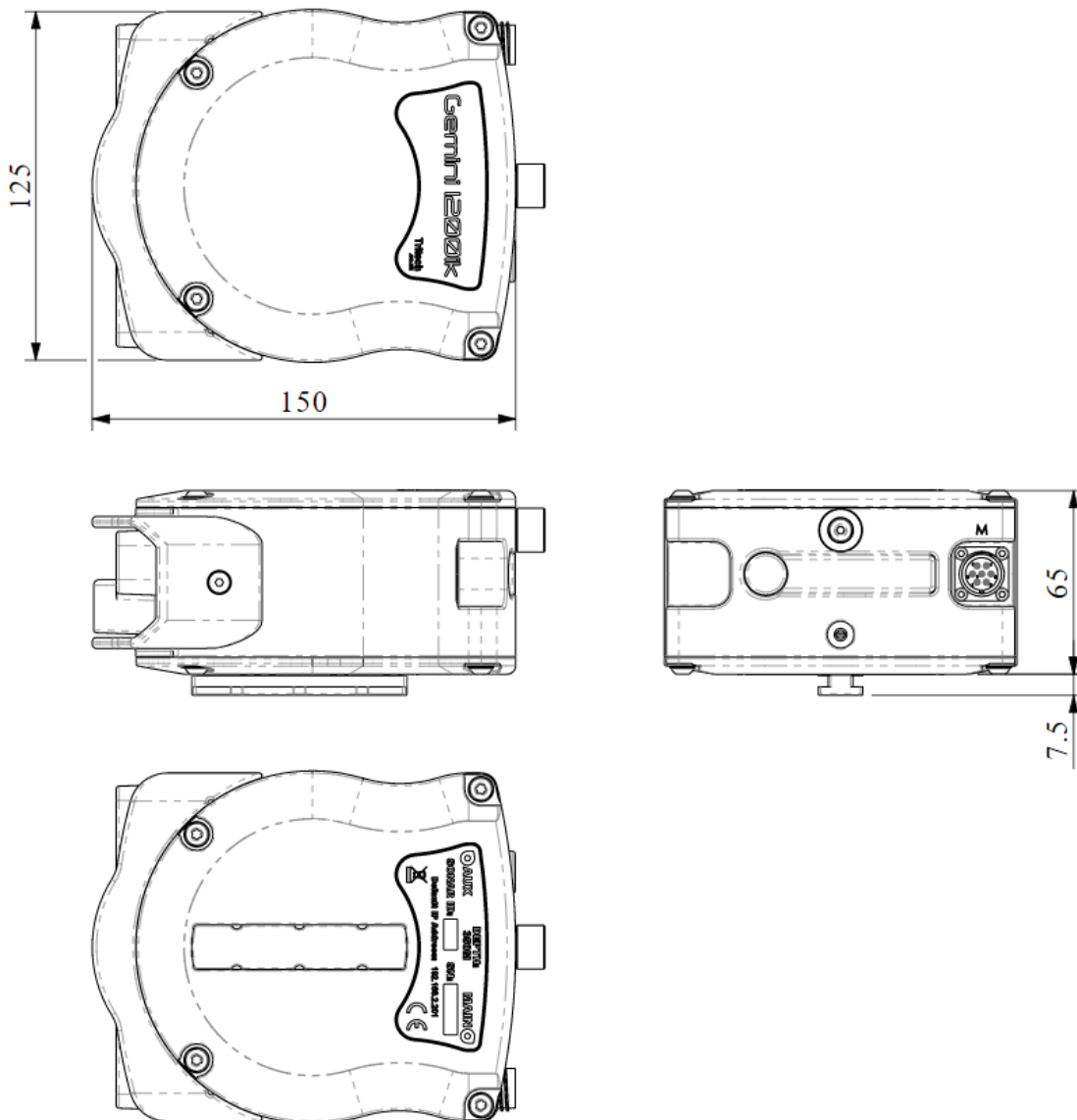
Please refer to the 1200ik & 720ik manuals available on our website www.tritech.co.uk for full sonar specifications
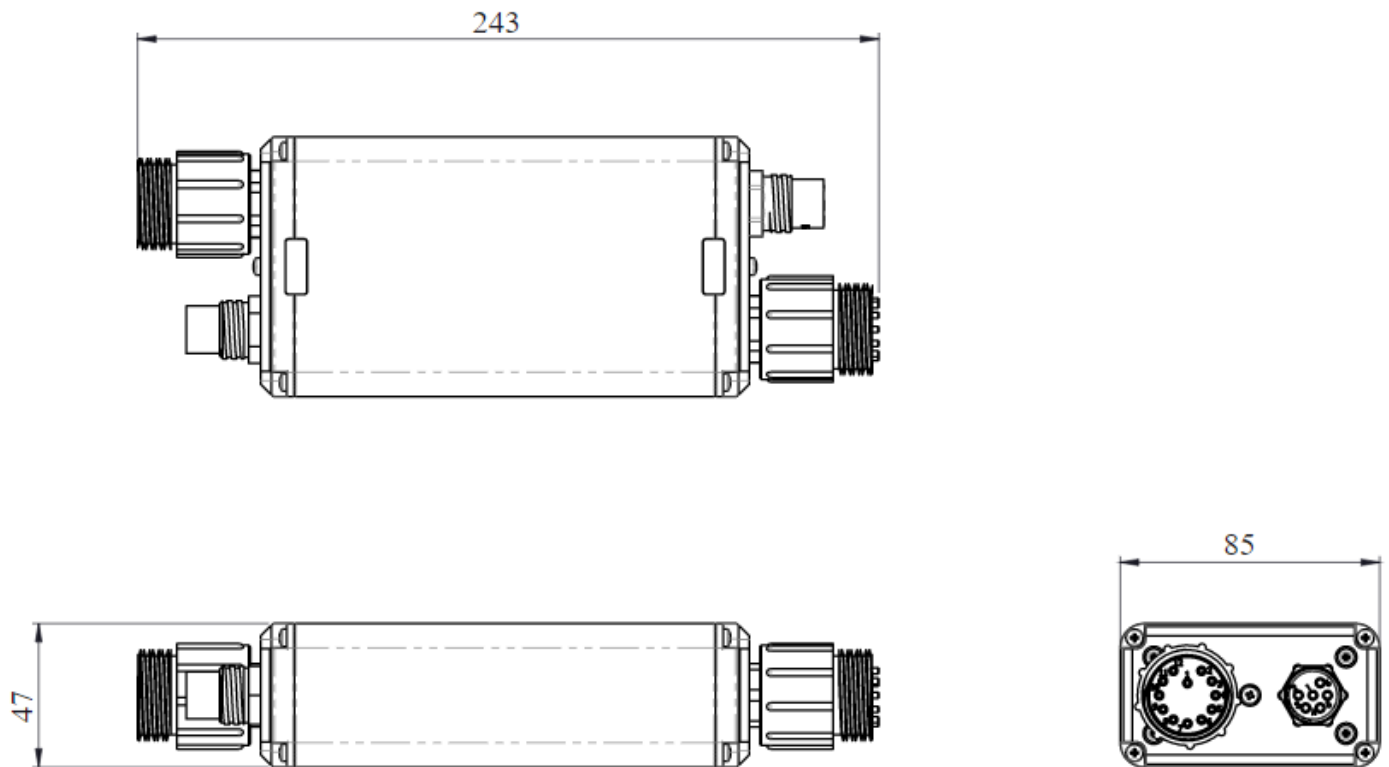
DMD SCU Specifications

Surface Control Unit (SCU) (only used with DMD-T)	SCU Rugged Case	Laptop - Toughbook 55
Power	Internal rechargeable power	Internal rechargeable battery
Duration of operation	>4hrs (for a dual battery system)	Up to 19 hours
IP rating	Weatherproof	IP53
Battery chemistry	Li-ion	Li-ion
Weight in air	8kg (plus laptop)	2kg

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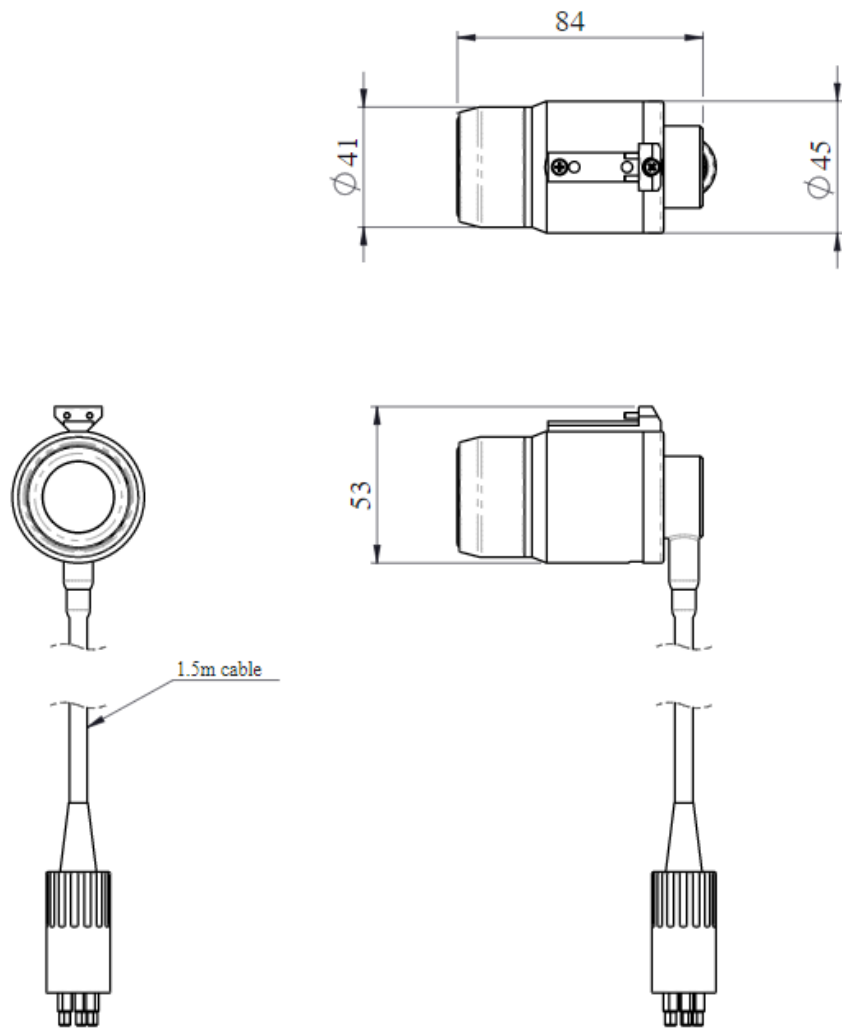
Monocle specification	
Power requirement	0.5W @ +5V DC
Depth rating	100m
Display input	RGB, HSYNC, VSYNC
Display resolution	SVGA (800 X 600)
Connector	SubConn Micro Circular series
Weight in water	0.09kg

Subsea Computer (SSC) Specifications

Subsea computer	
Power requirement *1	10W @ 20 - 42 VDC
Depth rating	100m
Connectors	SubConn Micro Circular series
Weight in water	0.54kg

*1Does not allow for attached accessories

Tether Specifications

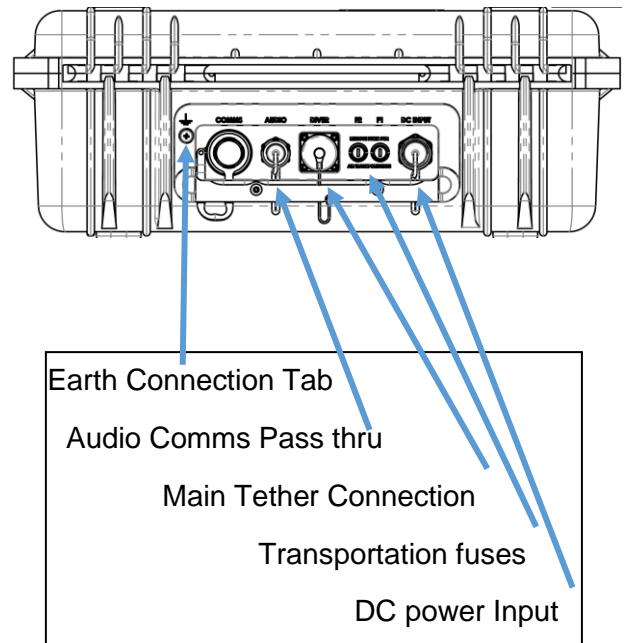| Tether (only used with DMD-T)	
Cable length	100m
Connectors	SubConn Micro Circular series
Weight in water	0.073kg(per meter)

Hardware Installation & Configuration

The full DMD system is contained within 4 separate rugged deployment transit cases
These are

- DMD SCU
- DMD Instrument Deployment Case
- DMD Diver to Surface – Deployment Case
- DMD Sonar Deployment Case

DMD Surface Control Unit (SCU)

The DMD SCU case is a self-contained rugged transit case featuring integrated connection points on its rear which provide all the surface connections required which power run and deploy the system onto a diver. Securely mounted within the DMD SCU are x2 Li-ion battery packs linked into an intelligent charging circuit.

Earth Connection Tab

Audio Comms Pass thru

Main Tether Connection

Transportation fuses

DC power Input

To comply with IATA shipping regulations the Toughbook laptop should not be retained within the DMD SCU when the unit is presented for international air transportation. The 'Air Transportation Fuses' at F1 & F2 on the rear of the SCU should be removed and stored separately (this will isolate the Li-Ion batteries). The Toughbook should be shipped separately within a purpose defined space contained within the DMD Instrument Deployment case

DMD SCU	
Input of the SCU	30V-55V ⎓ 3.3A
Output of SCU	42.5V ⎓ 2.5A
Output of External AC/DC PSU S12445 * *subject to change	48V ⎓ 3.13A
Internal Batteries (x2)	Capacity 5500mAh \ Energy 198Wh

Charging Instructions

The internal batteries will automatically charge with the application of input power. The battery charging will occur regardless of the SCU power button being in the ON or OFF position. A full charge cycle will take 5 hours.

Charging Status LED (Amber)

This will be illuminated during the charge cycle of the internal batteries. The LED will be OFF when the batteries are fully charged.

Charging Warning LED (Red)

This will be illuminated if the charge cycle is paused due to the temperature of the batteries being outside their charging temperature range of 0°C to 45°C or if a battery fault is detected.

Battery Charge Status during operation

During SCU operation, the charge status (%) of the batteries is provided to Genesis software.

Comms

Connect a Toughbook USB port to the SCU COMMS port at the back panel via a USB (A-type) to USB (B-type) cable.

Comms LED (Green)
This indicates communication activity between the SCU and the DMD system below the water (subsea computer).

Diver Audio

Pass through of 2 wire diver coms to a separate diver coms box (not provided)

F1   F2

The shipping fuses should be removed to isolate the batteries for air transportation.

Shipping Fuses re-instatement
Following the re-instatement of the shipping fuses, the charge status (%) reported to Genesis will be incorrect until the batteries are fully charged or fully discharged.
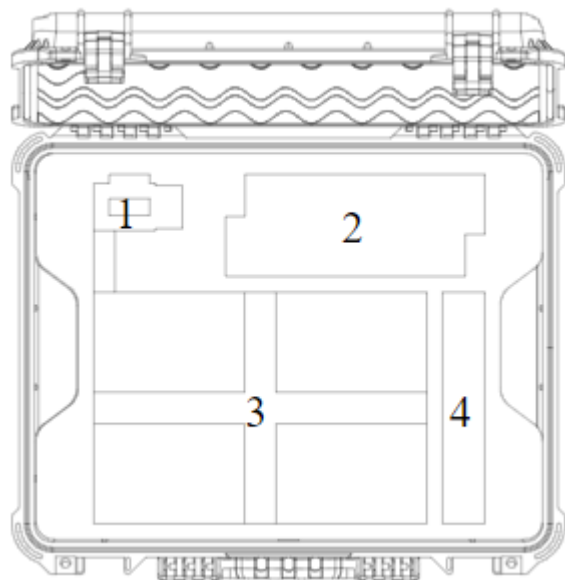

Connection Panel on rear of DMD SCU
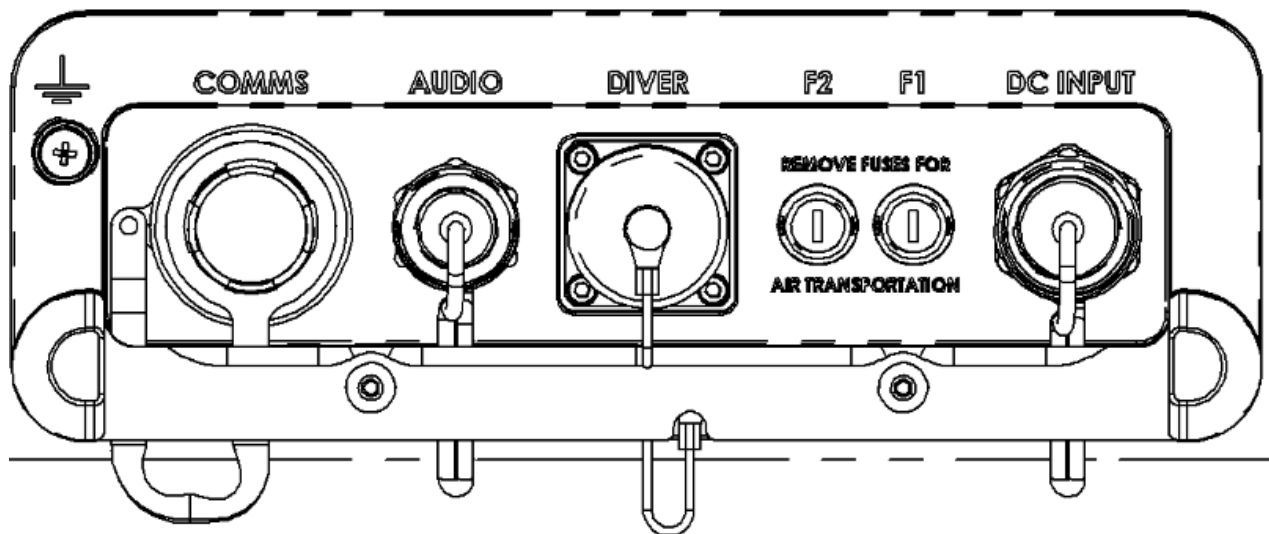
DMD Instrument Deployment Case

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.
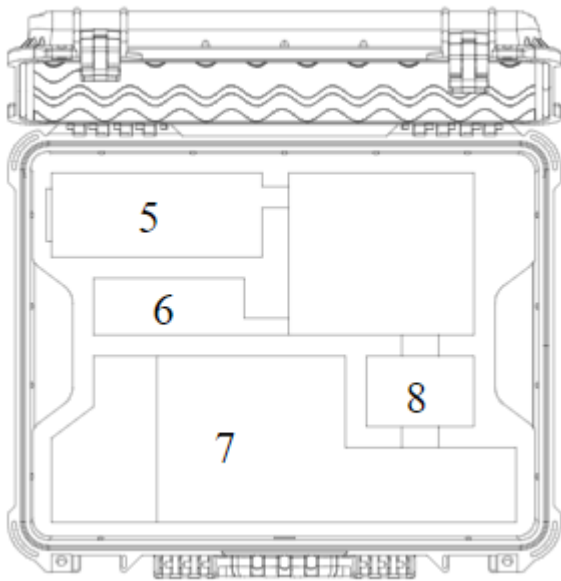
The case consists of three removable trays illustrated and described below.

| Tier 1 TOP LEVEL	
1	12148 DMD Monocle
2	12384 Subsea Computer SSC (with 12469 sleeve)
3	12412 1.5M DMD sonar cable 12422 1.5M Subconn MCOM6M with Diver COMMS cable (Female blanking plug (MCDC6F) fitted) *12055 Dive mask / Helmet accessory rails x2 *12363 Inodive Monocle Clamping slide *12049 Sonar ½" Clamping Slide (Inodive) *12051 Sonar Clamping slide with Spigot (Inodive) 12275 Monocle mounting rod 12467 Monocle Locking Pivot Assembly 12521 Double Ended rigid snap hook
4	09992 USB cable

* 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 MIDDLE LEVEL	
5	12445 SCU Power Supply unit
6	Toughbook Transformer
7	00025 Mains lead for SCU Mains Lead for Toughbook 12420 Topside Diver Audio Cable 12504 Subconn MCDC12F 12505 Subconn MCDC10M 09174 Subconn MCDC6M 12506 Subconn MCDC8M 12507 Subconn MCDC10F 10071 Subconn MCDC8F 11541 Subconn MCDC6F
8	12523 Accessories Kit Box (DMD SCU Air Transportation fuses & monocle buffer O'ring)
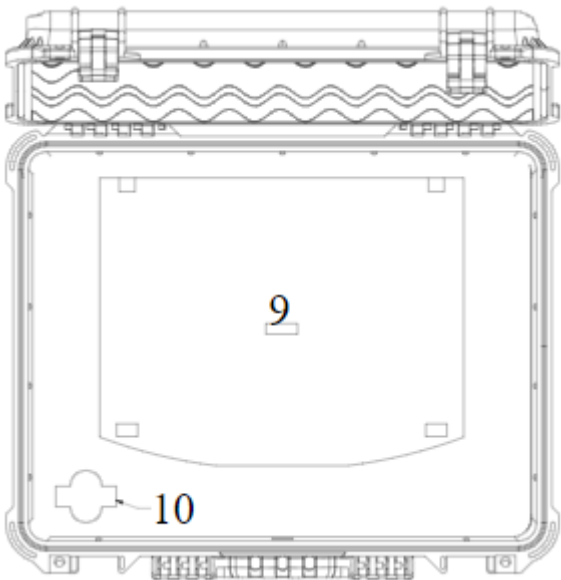
Tier 3 BOTTOMLEVEL	
9	12441 Panasonic Toughbook Laptop
10	09684 USB Pen Drive

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.
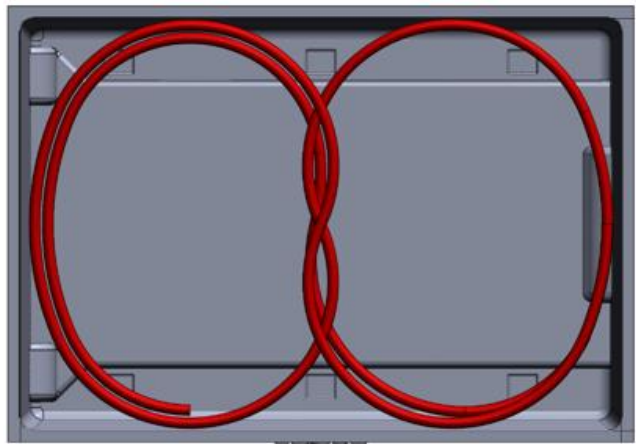
| ITEM	DESCRIPTION
1	Gemini 720ik or 1200ik
2	Spare Pocket Space
3	Cable Stowage Space
4	2mm Allen Key
5	CD Case Stowage Space
6	Document Space
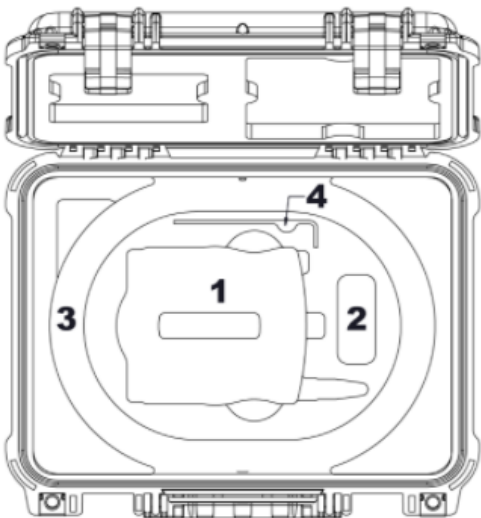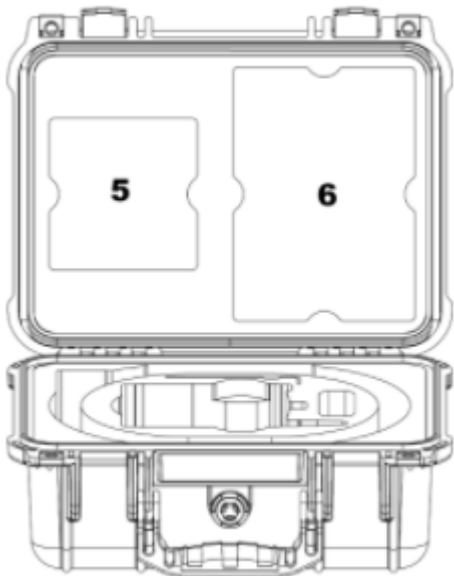
DMD Diver to Surface - Deployment Case

The DMD Diver to Surface Deployment case is a large rugged transit case used to store and transport the main diver to surface umbilical.


The umbilical can be coiled within in a 'figure 8' configuration which makes deploying straight from the case simpler.

Surface Connector

Subsea Connector
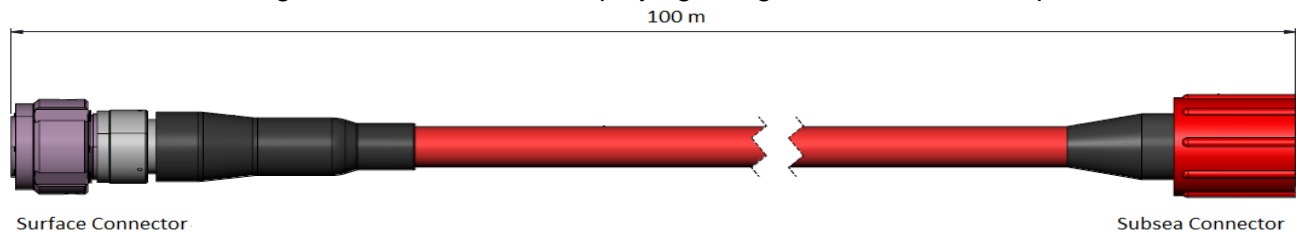
Cable Tether Attributes	APPROX.
Nominal Overall Diameter	13.5mm
Nominal Radial Thickness Of Outer PU Sheath	1.3mm
Weight Of Cable In Air (APPROX.)	216 kg/km
Weight Of Cable In Seawater (APPROX.)	69 kg/km
Weight Of Cable In Freshwater (APPROX.)	73 kg/km
Ambient Operating Temperature Range	-20 to 80 °C
Minimum Recommended Static Bend radius	122 mm
Minimum Recommended Dynamic Bend radius	176 mm
Maximum Hydrostatic Working Pressure	2500 PSI

System Connections – SUBSEA


MCDC6M (4) MUST BE FITTED IF S12422 (3) IS NOT USED
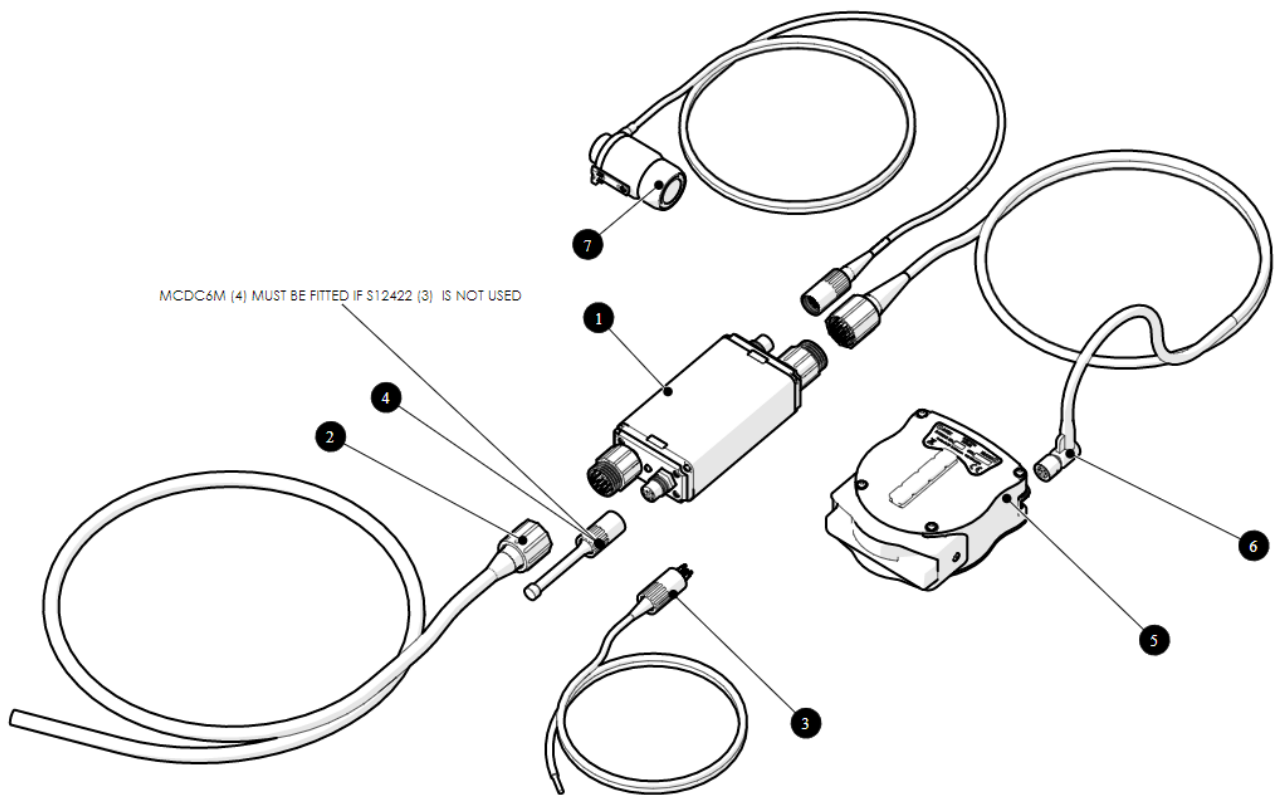
The diagram above shows the cable connections required at the SSC before the system is powered on and deployed

> ⚠️ Particular care should be taken to ensure that the blanking plug item 4 is fitted if not utilising the diver comms pass-thru option on the SSC. **Submerging the unit and powering ON without the blank fitted will result in damage to the SSC not covered under warranty.**

| ITEM NO.	QTY	PART NUMBER	DESCRIPTION
1	1	12384	DMD SUBSEA COMPUTER
2	1	12300	DMD DIVER TO SURFACE CABLE
3	1	12422	SUBCONN MCOM6M DIVER COMS CABLE
4	1	09174 & 08059	SUBCONN MCDC6M DUMMY PLUG & MCDLS-F LOCKING SLEEVE
5	1	VARIOUS	GEMINI IK SONAR, INODIVE FIXING
6	1	12412	IMPULSE MKS(W)-307-CCP TO SUBCONN MCOM10M CABLE ASSY
7	1	12148	DMD MONOCLE ASSEMBLY

System Connections – SURFACE
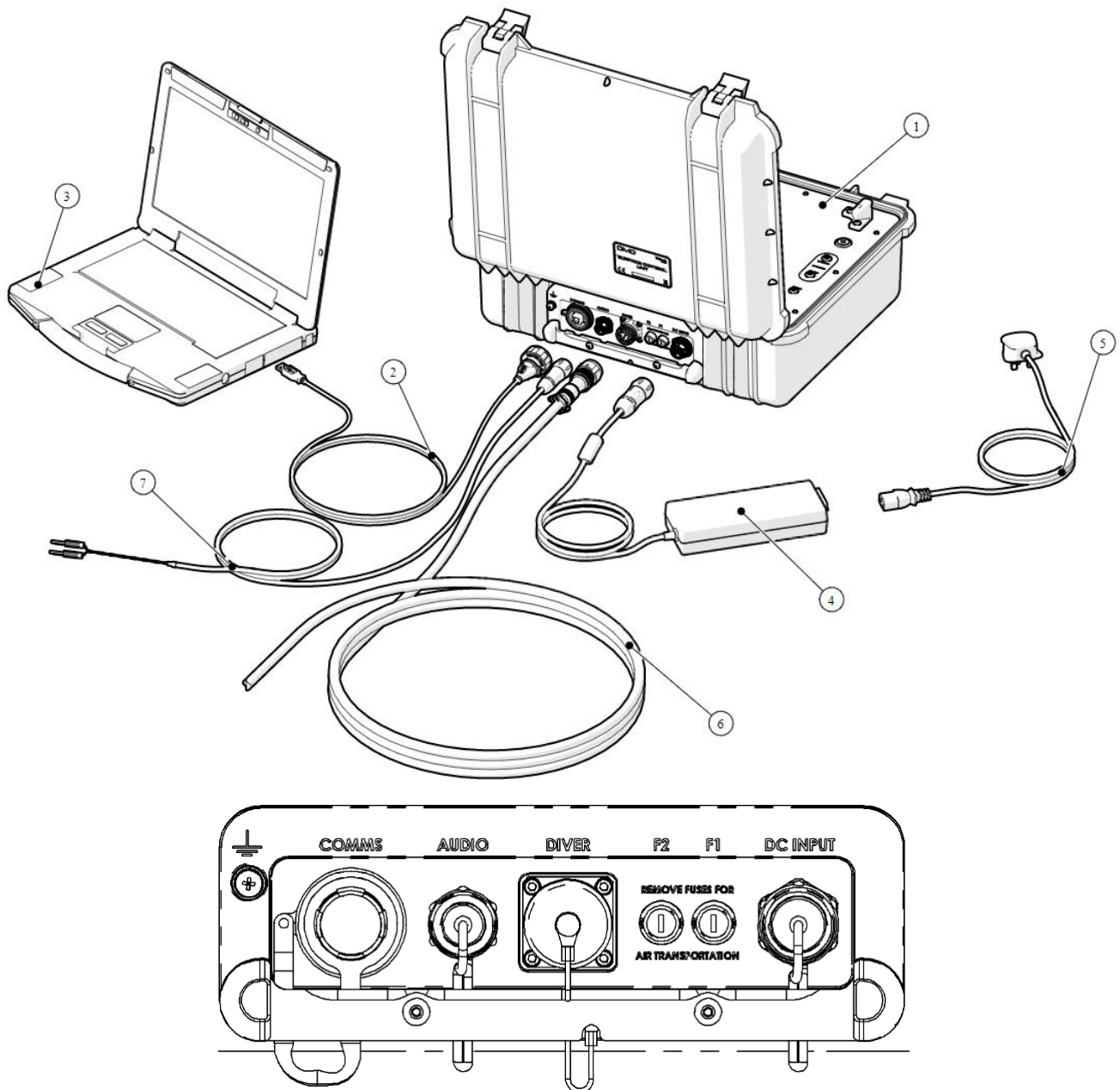
The diagram above shows the cable connections required at the DMD Surface Computer before the system can be powered on and deployed

ITEM NO.	QTY	PART NUMBER	DESCRIPTION
1	1	12341	DMD SURFACE CONTROL UNIT
2	1	09992	PX0840-B-2M00 IP68 USB CABLE
3	1	12441	PANASONIC TOUGHBOOK FZ-55
4	1	12445	DMD SCU AC/DC 48V POWER SUPPLY UNIT
5	1	VARIOUS	IEC320 C13 MAINS POWER LEAD
6	1	12300	DMD DIVER CABLE
7	1	12420	DMD SCU DIVER COMMS AUDIO CABLE

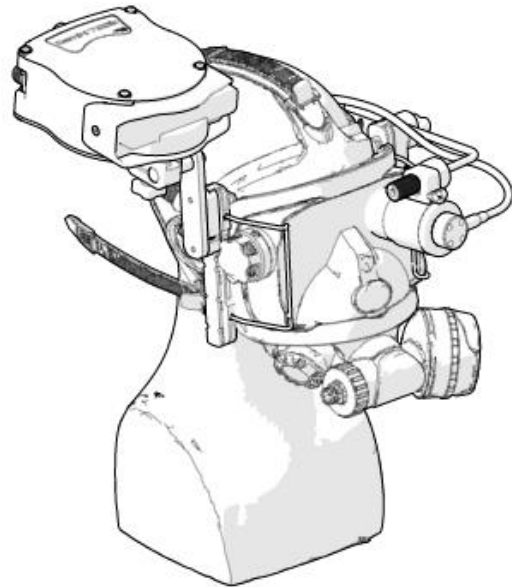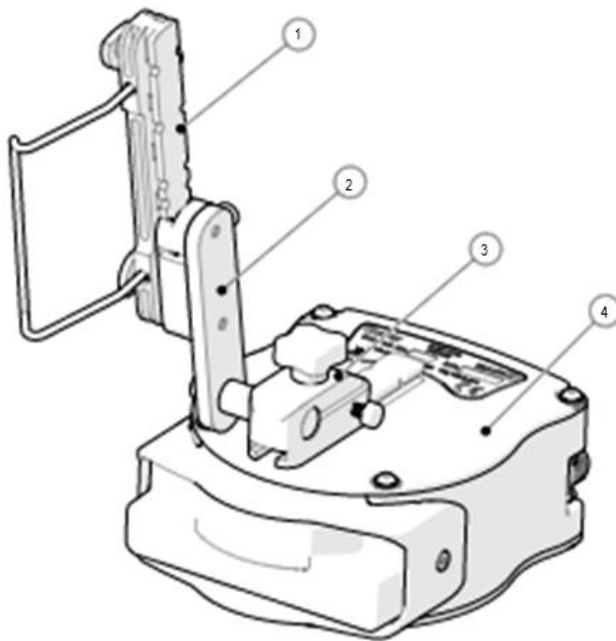## Assembly & Fitting of Sonar onto Mask (Using the OTS Accessory Rails)
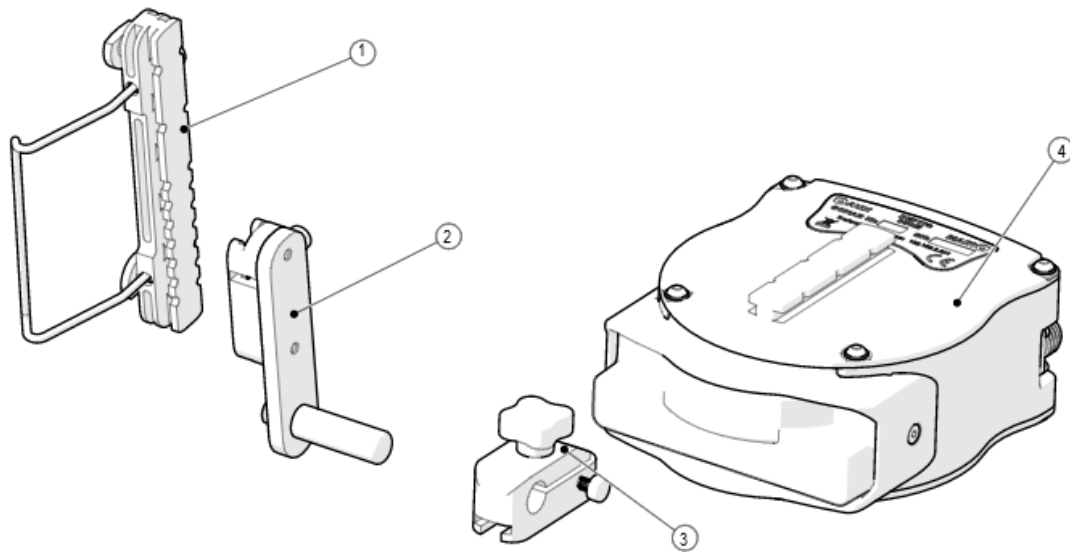
The diagram above shows the parts required to construct and mount the sonar onto the OTS Guardian diver mask

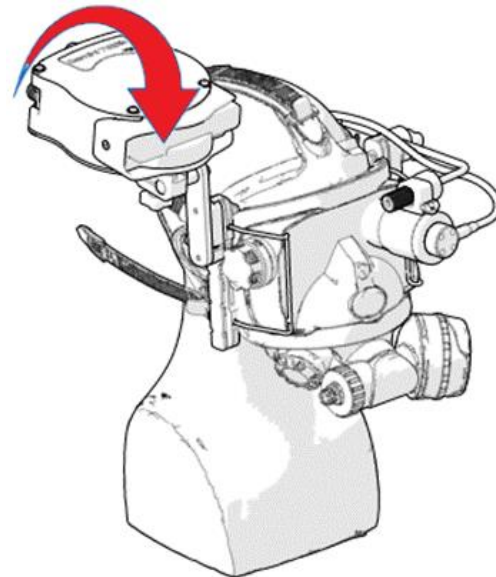| Item	Qty	Part No.	Description
1	1	**S12055**	OTS Guardian Accessory Rail
2	1	**S12051**	Spigot Assembly, 90 degree
3	1	**S12049**	Clamping Slide with 1/2" Hole
4	1		Gemini ik Sonar with Inodive Mounting

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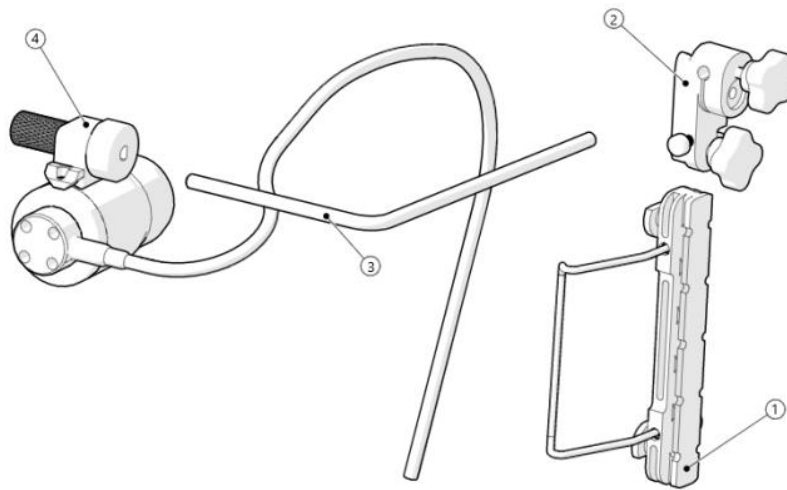
The diagram above shows the parts required to assemble and mount the Monocle onto the OTS Guardian diver mask

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 monocle is up against the diver mask turn the knob clockwise to lock the bar in place

- Loosen \ unscrew the knurled section of the monocle mount assembly [4] and loosen \ unscrew 2.5mm hex screw [5]. The monocle can now be slid onto the angled rod and the whole assembly mounted on the divers mask

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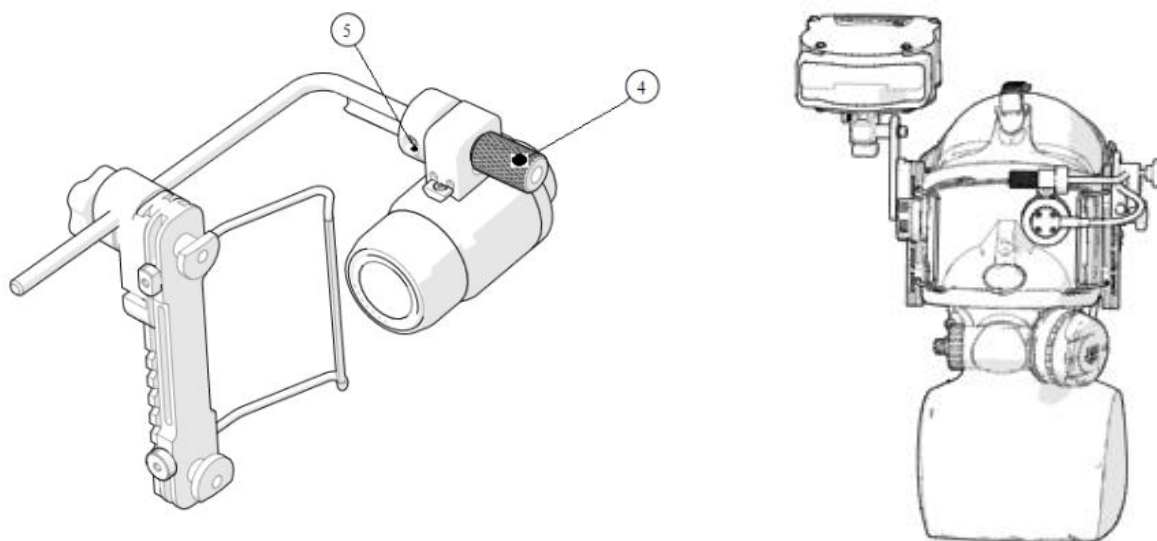
The monocle assembly is designed to allow it to be flipped up and out of the view of the diver if required. Simply hold the front & rear of the monocle between the thumb and index finger and rotate the assembly around the mounting bar. The monocle will click into final position either against the mask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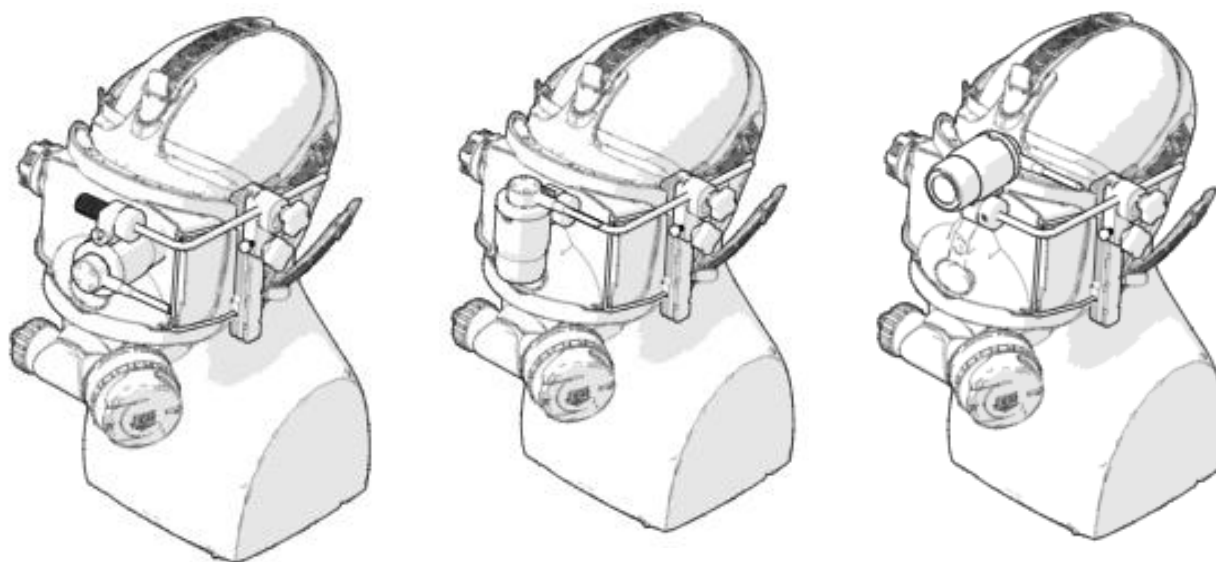
Monocle Orientation

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)

| LEFT EYE (Cable Exiting LEFT)	RIGHT EYE (Cable Exiting RIGHT)	NEUTRAL (Cable Exiting DOWN)
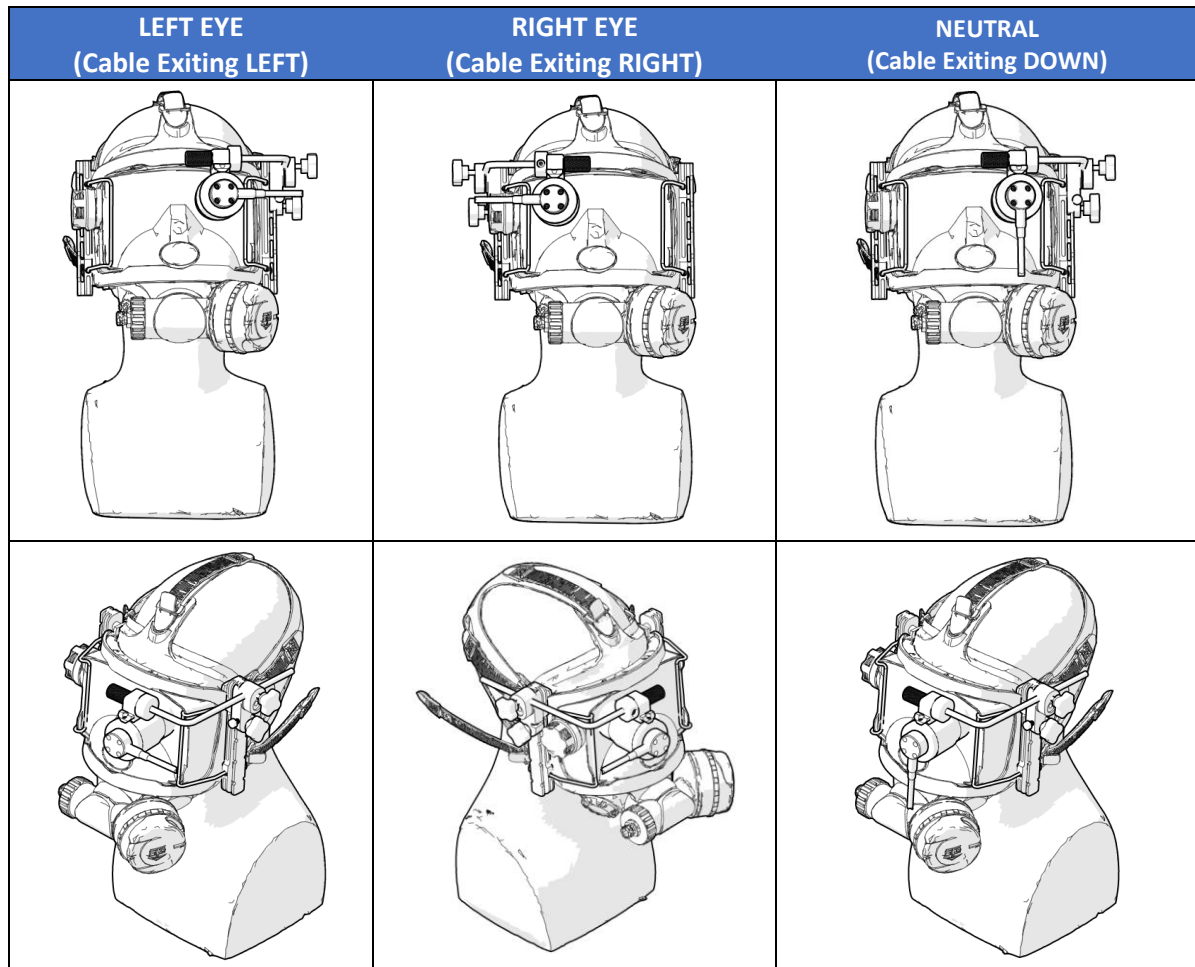
The monocle orientation is specified at the point of purchase and is fixed no attempt should be made to alter this in the field. Any attempt to do so may result in damage to the monocle. Should you require a different monocle orientation than originally specified please contact Tritech International for advice.

DMD System Operation

Switch ON & Start-Up Sequence

When all connections have successfully been made to both the surface & subsea equipment as per the manual sections 'System Connections – SUBSEA' & 'System Connections – SURFACE' the equipment can then be powered ON.
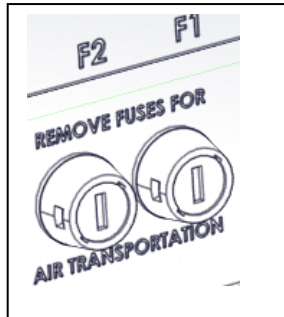

IMPORTANT – If the DMD SCU Air transportation fuses were previously removed for shipping purposes then these must be re-fitted. If not fitted the SCU will be unable to supply power via the Diver Cable to the SSC

Powering should be initiated in the following sequence:

- Power On the 'TOUGHBOOK' Laptop

    (Laptop can be powered via its own internal Lithium battery or connected to a mains supply using its dedicated charging adapter PSU)
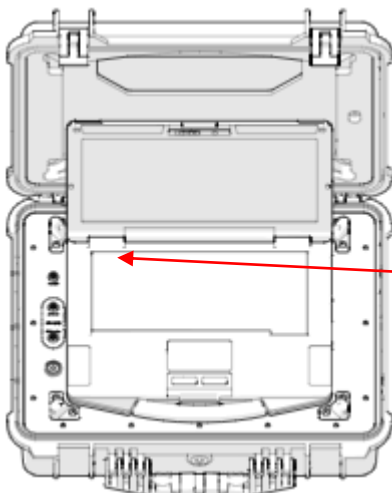
- Once the laptop has 'booted' to the desktop double click the Genesis (DMD) shortcut to launch the system software
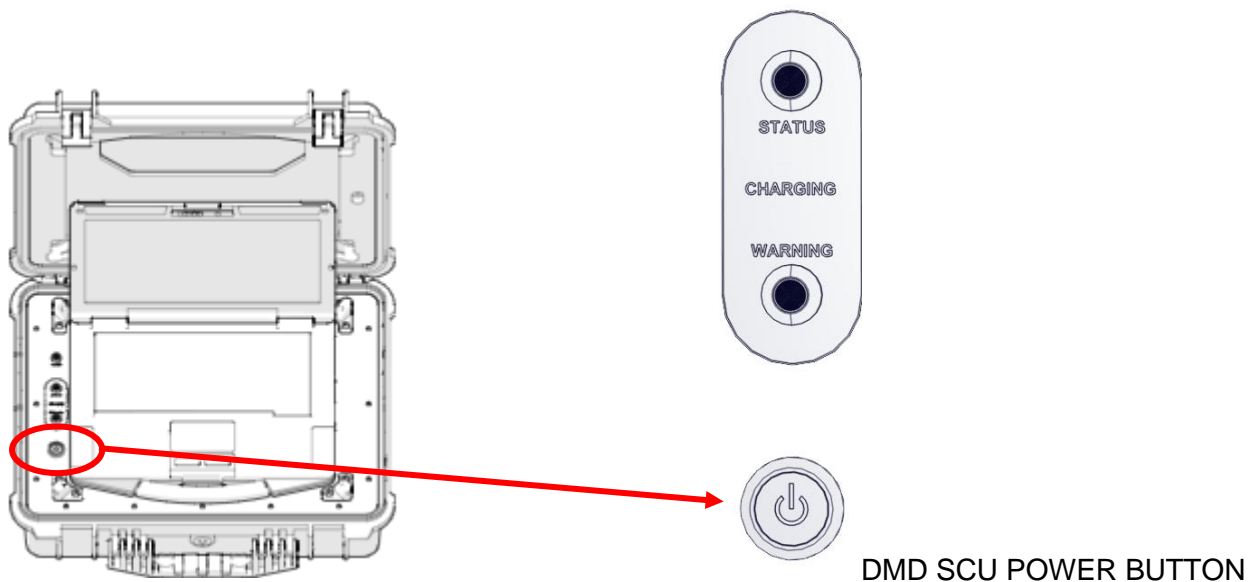

- The Genesis version splash screen will appear briefly followed by a plain Grey screen as seen below

1.7.0.1256
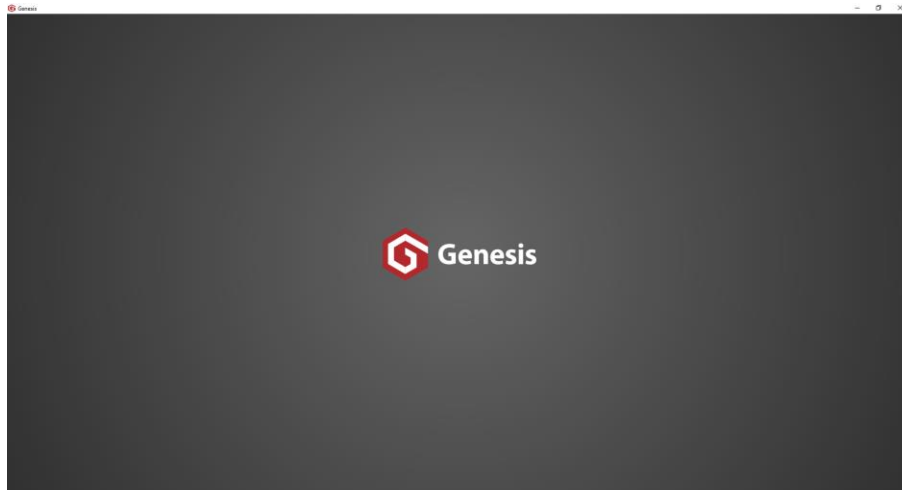
The software is now initiated and waiting for a connection with the SSC

- Power On the DMD SCU this will power up the SSC (Subsea Computer), the connected sonar head and DMD monocle

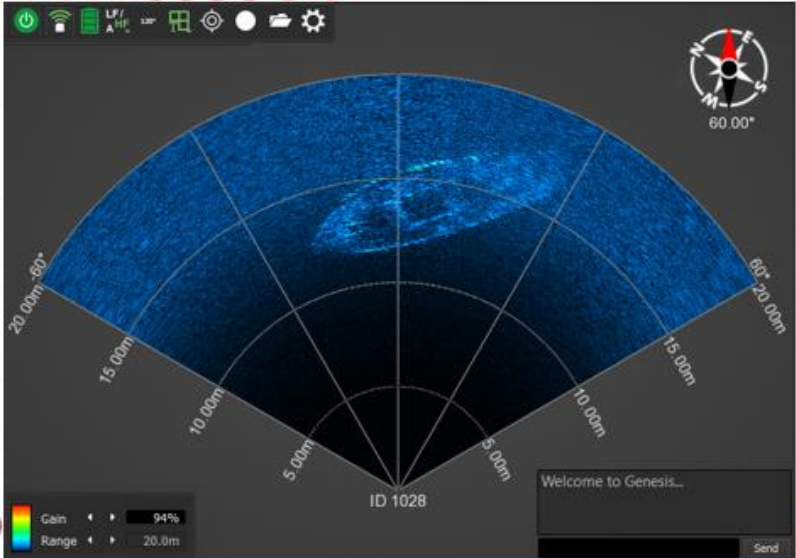STATUS

CHARGING

WARNING

DMD SCU POWER BUTTON

- Once the SSC has booted up it will establish comms with the DMD SCU
- The comms light on the DMD SCU will illuminate GREEN and the Genesis sonar display screen will become active

Software Display & Operation

On the Tethered DMD system the Genesis sonar display screen will appear slightly differently when viewed on the Divers display monocle or the Surface Operators laptop. This is because all inputs which alter the control and display of the sonar image must be made by the surface control operator, the diver has no direct control and simply views the sonar image.
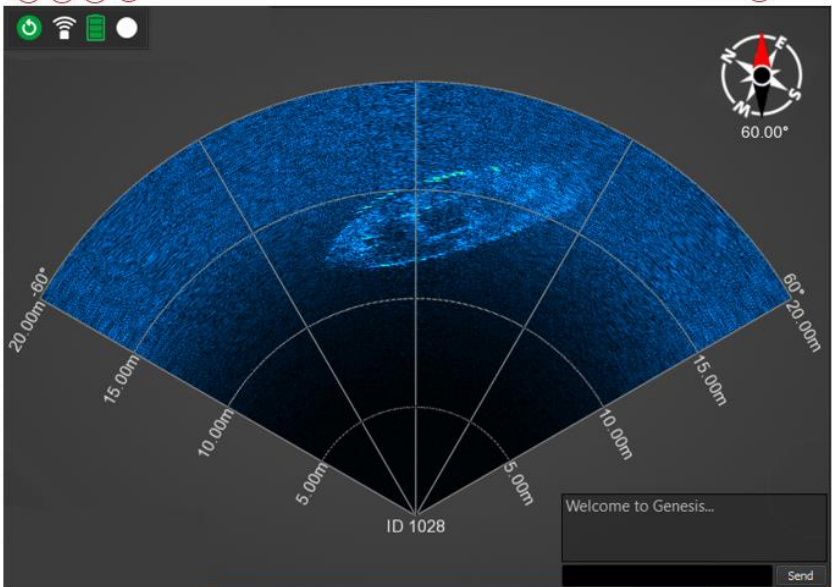
Surface Operators View on DMD SCU Laptop

Left labels		Right labels
Switches Power to the Sonar On/Off	①	Range Grid and Label display options off / label / grid / both ⑦
Switches the Sonar On/Off line	②	Go To Target Indicator (move the crosshair over Gemini window then drop it with a click to set a target position which is then sent down to the diver and shows up on their display as a go to indicator) ⑧
Battery Level Indicator	③	Record Button (begins & subsequently stops the recording of a log file within Genesis) ⑨
Operating Frequency Settings — Auto (dependant on operating range), High (1,200 kHz operation), Low (720 kHz operation)	④	Open Log File (replay previously recorded data) ⑩
120° or 65° pre-set scanning aperture	⑤	Settings (will bring up the settings panel which uses various tabs to simplify the settings) ⑪
Gain and Range Control	⑥ ⑥	Send Message (Type a message which will be sent down and displayed on their display) ⑫ ⑫

ID 1028

Gain 94%
Range 20.0m

Welcome to Genesis...
Send

60.00°

Divers View on DMD Monocle

Left labels		Right labels
Sonar Power On/Off Indicator	①	Compass Display ⑥ (Allows the diver to align a target to heading and use this as a bearing to navigate to the target)
Sonar On/Off line (White Off Line / Green On Line)	②	Compass Display ⑥ (The compass will only be enabled and displayed on screen if the Gemini multibeam sonar being utilised on the system is fitted with the optional AHRS sensor) ATTITUDE & HEADING REFERENCE SYSTEM MODULE
Battery Level Indicator	③	
Record Button (White Off/ Red Recording)	④	
Send Message (Messages received from surface displayed for diver to read)	⑤	

ID 1028

Welcome to Genesis...
Send

60.00°

Monocle Brightness

The brightness of the monocle can be adjusted to suit the ambient conditions of the dive location. For example if the dive zone is very dark with very little ambient light then it may be advantageous to reduce the monocle brightness to avoid glare affecting the diver's peripheral vision.

The adjustment of monocle brightness is made via the software GUI from the surface control computer.

The standard default setting is 50% and this can be adjusted either up or down via the arrow buttons.

Updating the Genesis software version on the SSC
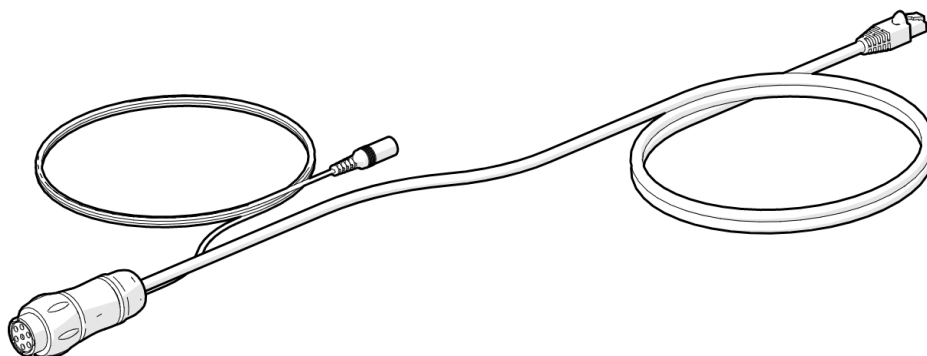
The Tethered system is supplied with a content management cable assembly. When plugged into the sonar port on the SSC this cable enables an Ethernet connection to be setup between the SSC and the users PC or laptop. By installing and using the 'Content Management Tool', a separate software utility, the user can then 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.

DMD SubSea Computer ...

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 te RJ45 plug on the Content Management Cable [3] into the Ethernet Network Adapter of your PC.
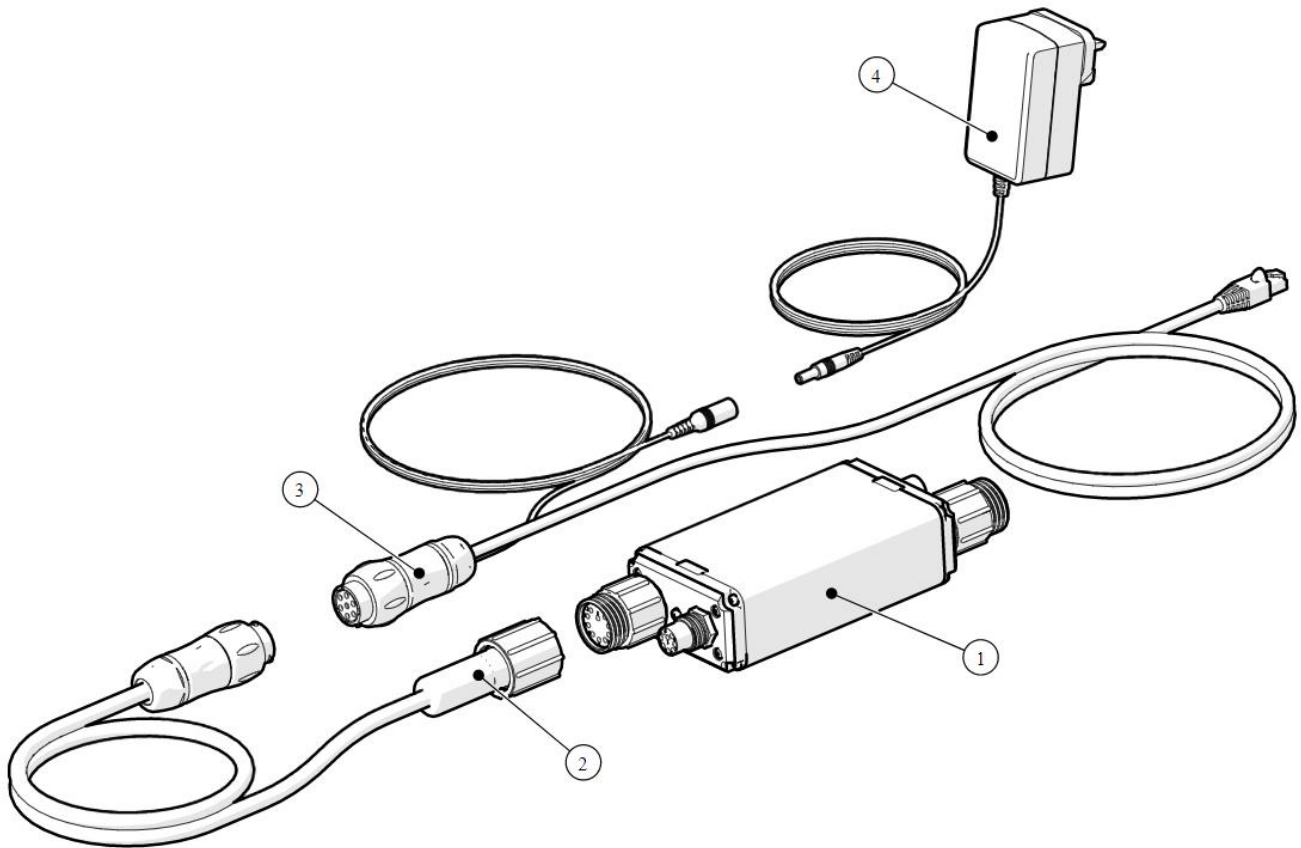
| Item	Qty	Part No.	Description
1	1	S12384	DMD Subsea Computer
2	1	S12585 (Part A)	Subconn MCOM10M to Souriau UTS1JC147P
3	1	S12585 (Part B)	Souriau UTS6JC147S to 2.1mm DC Fem & RJ45
4	1	S12588	Universal AC to 24V DC Power Supply (2.1mm)

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.
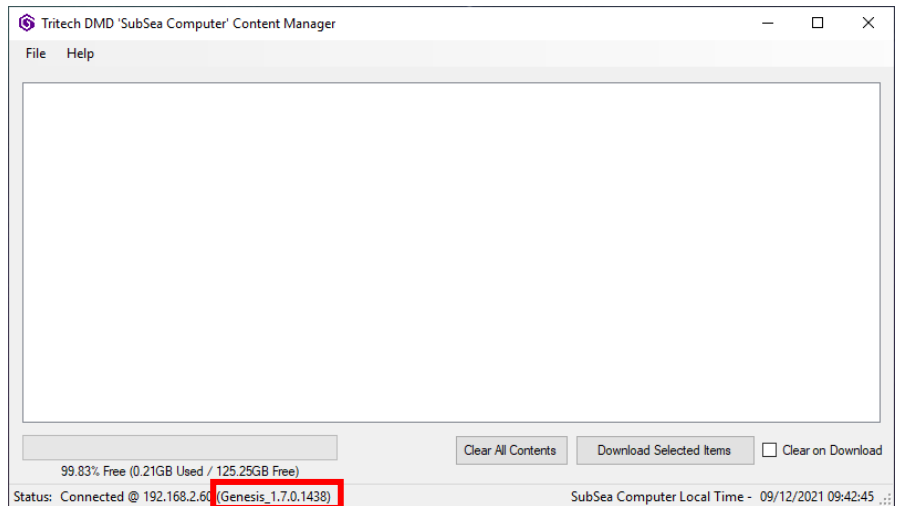

Click on **File** and then on **System Update.**

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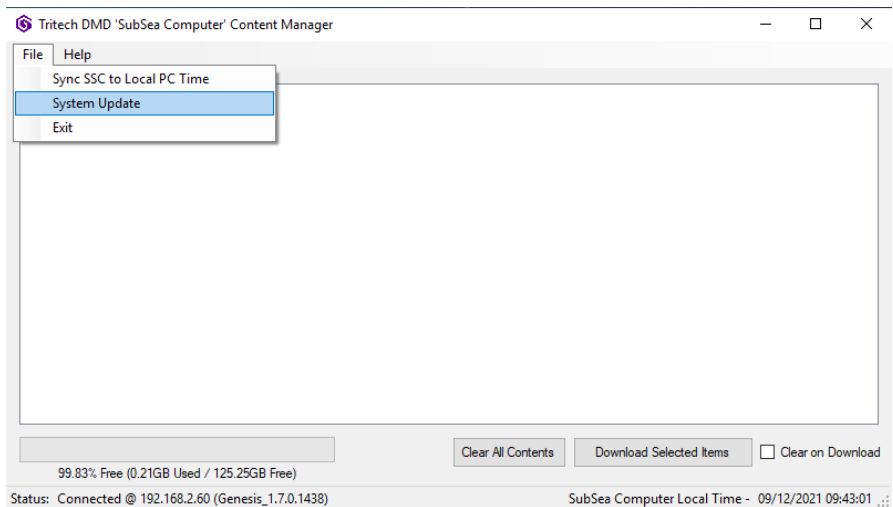

The file will have the filename extension **.SSCPkg** and will include the Genesis version it contains. In this example the Genesis version is V1.7.0.1438 and the full filename is Genesis SSC V1.7.0.1438.SSCPkg
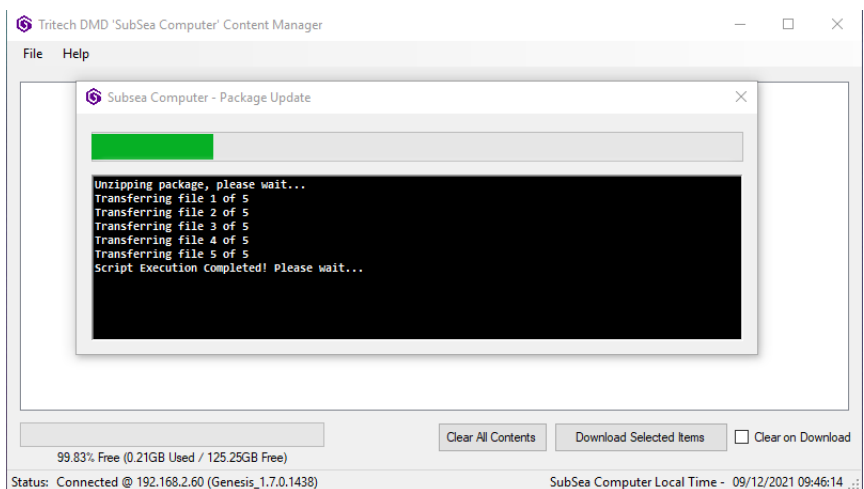
Point the file explorer window to the location of the **.SSCPkg** file then click on **Open** to begin the file installation
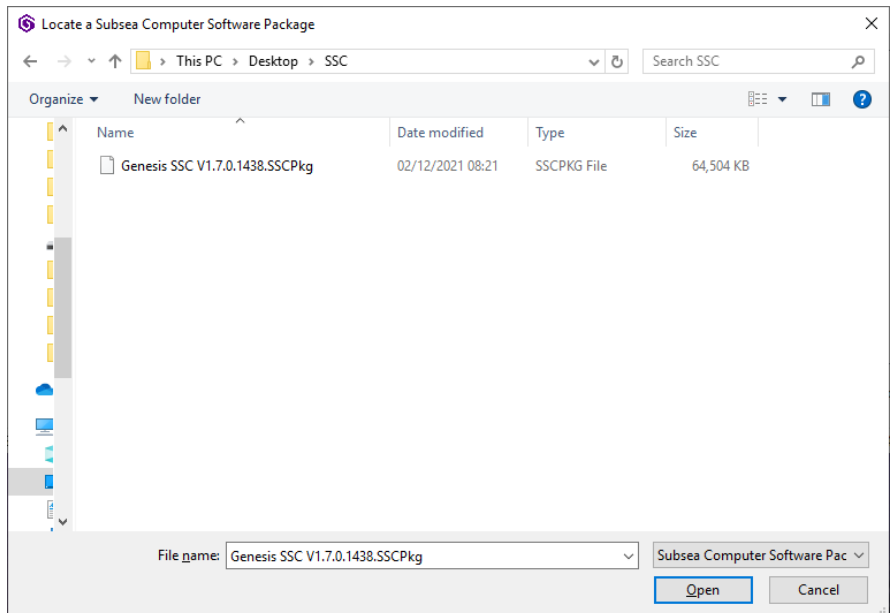
The installer will start unzipping and transferring the files to the SSC
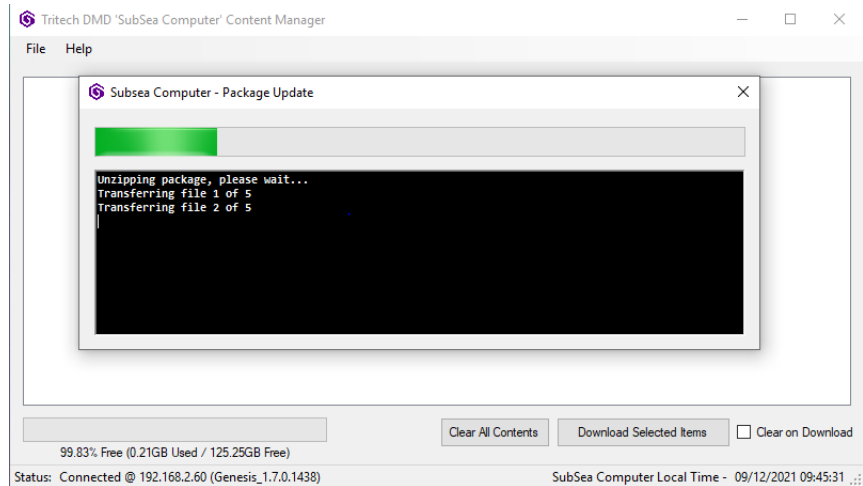
When this process has concluded the message **'Script Execution Completed! Please wait…'** will be displayed

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.
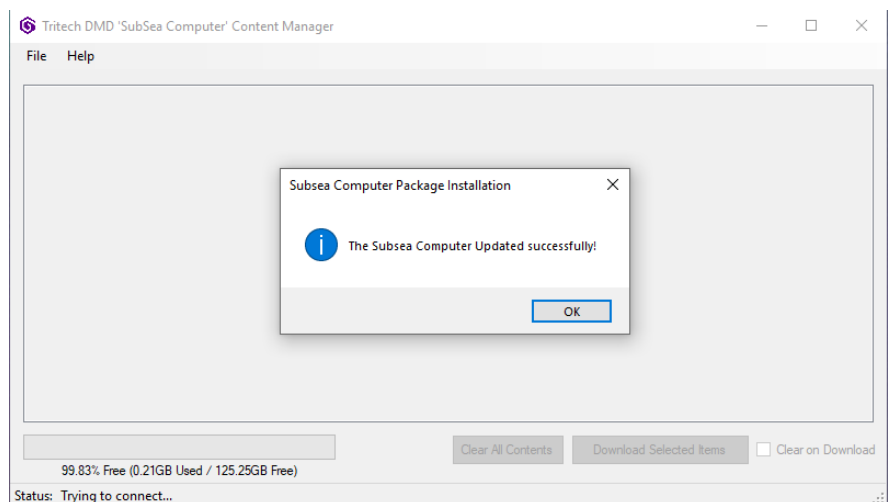
The Genesis software version must be the same revision number as loaded on BOTH the surface control PC and the Sub Sea Computer (SSC).

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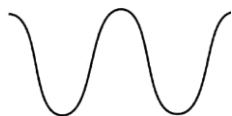
720 kHz Low Frequency Operation
The sonar has a 120° horizontal field of view at +/- 10° about the horizontal axis (20° in total). In this mode of operation the sonar can image targets up to its maximum range however the definition of targets will be lower than when used in its higher frequency mode.

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 !

If the unit is to be stored for long periods between operations it is advisable to remove the transportation fuses from the DMD SCU before stowage to isolate the lithium batteries.

There are no user-serviceable parts in the sonar head, Subsea Computer or monocle and no components requiring routine maintenance. Do not undertake maintenance of the units, outside the scope of that defined within this manual, unless instructed to do so by Tritech 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)