DIVER 6

Diving Safety Evolved

User Manual
2.3

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Section 1: Introduction

Welcome

Congratulations on the purchase of your Diver6 System. Dive command and control is vastly improved with the Diver6 System, a supplemental Diver and Dive Operations Mobile Support System, which can assist Dive Masters in monitoring and tracking their divers beneath the surface of the water, thus providing greater situational awareness. The Diver6 System is designed and intended for use only by certified Dive Masters and is not intended to, nor should it, replace independent dive and contingency planning.

Diver information is transmitted via an underwater modem to a receiving unit on the surface and then to a monitoring computer that records, calculates, and displays the various parameters using full 3D tracking. This means a Dive Master now has a replication of each diver's vitals, has full situational awareness of each diver, and can intervene, if required, in near real time.

The Diver6 System uses unique Dive Master tracking and monitoring software developed by Azimuth Inc., holds a database of dive/diver information, and simultaneously provides an audit trail for diving activity. All monitoring aspects of the dive are recorded and can be used for later analysis and audit.

Dives are currently monitored for air pressure(s), depth, water temperature, and position. This means the Dive Master knows a diver's position (either absolute or relative to the dive tender), the diver's depth and descent/ascent rates, and the diver's remaining air time. Decompression tables are included in the software for reference only. No decompression calculations are currently implemented.

Initial Checking of the Diver6 System on Arrival

On arrival the Diver6 System needs to be checked and accepted by the user for completeness and that all components function as described. These checks need to be completed in a workshop or clean environment and need to be performed prior to the system being used in the water. Failure to complete these checks may void the product Warranty.

The user has a period of 30 calendar days from delivery date to complete the initial checkout of the Diver6 System. It is during this time that the user has the opportunity to identify any manufacturing faults and return faulty components for direct replacement with new components (at no cost to the user).

Please refer to sections below for full guidance on how to set up the Diver6 System and verify the functionality of all components.

Checking Contents

Each portable six Diver6 System is typically comprised of the following items (your Diver6 System may have been customized and as such, the contents of your Diver6 System need to be checked against the packing slip in the shipping documents of your system):

Topside Case

Layer	Content
Lid Storage Pouch	Topside Modem Cable (x1)
	Power Data Cable (x1)
Top	Tablet computer with the Diver6 System software (x1)
	Pelican Carry Case 1095 for the tablet computer (x1)
	Power supply for the tablet computer (x1)
Bottom	Topside Modem (x1)
	Topside Battery Unit (x1)
	Topside Battery Charger (x1)
	Desiccant Canister (x1)
	Upper Topside Modem Mount (x1)
	Lower Topside Modem Mount (x1)

Diver Case

Layer	Content
Lid Storage Pouch	User Manual (x1)
Top	Diver Modems with Slide Mounts (x6)
Bottom	Diver Modem Charger (x6)
	Tools & Spares Kit (x1)
	Desiccant Canister (x1)

Disclaimer

The Diver6 System is a **SECONDARY ADVISORY SYSTEM ONLY** that is used by surface personnel to assist in the monitoring and tracking of dive operations. All dive planning and contingencies for dive operations must accommodate the likelihood of a total Diver6 System failure or environmental conditions that limit the performance of the Diver6 System. All dive supervision, planning, and contingencies must be made totally separate to, and without any reliance on, the features and tools of the Diver6 System.

The Diver6 System is not a replacement for good training and common sense.

Dive Masters using the Diver6 System to monitor a dive must:

1. Read, understand, and agree to the disclaimer above and the disclaimer displayed when the Diver6 System was initially loaded, and

2. Certify that they have dive operational procedures in place that take account of any failure of the Diver6 System during a dive operation, and

3. Certify that they will use the Diver6 System as a **SECONDARY ADVISORY SYSTEM** only.

The developers, manufacturers, and suppliers of the Diver6 System are not liable for any claims arising from the malfunction of any individual component or the entire Diver6 System.

By using the Diver6 System the user agrees with this disclaimer and the disclaimers displayed in the Diver6 System Software. If there is any doubt about the limit of liability for the Diver6 System, the user must not use the Diver6 System.

Warranty

The Diver6 System hardware is warranted to be free from defects for a period of:

1. 30 calendar days from delivery date to check that all components of the Diver6 System are functioning. During this period any valid warranty claims for faulty components will be replaced with new components at no cost to the user.

2. 365 calendar days from the delivery date:
   a. The Monitoring Computer
   b. The Topside Modem
   c. Data Cable
   d. Battery Chargers
   e. Topside Battery Unit
   f. Transit Case (both the Topside and Diver Cases)

3. 90 calendar days from the delivery date:
   a. Diver Modems
   b. Topside Battery

Warranty Exclusions/Limitations

1. The Warranty does not include water damage to components other than those components that are designed to be immersed in water. The components that are designed for immersion in water are:
   a. Topside Modem
   b. Diver Modems
   c. The section of data cable from the plug that connects to the Topside Modem to within one meter (3 feet) of the Topside Battery Unit. The portable battery unit is not designed for immersion.

2. The Warranty does not include incorrect use of any component of the Diver6 System.

3. The entire Diver6 System Warranty is void if the user uses tools or equipment on any component of the Diver6 System, other than those as prescribed in this manual.

4. The Warranty does not include damage in transit.

5. The Warranty does not include the shipping costs and any applicable taxes for returning the Diver6 System or components of the Diver6 System to Azimuth for assessment and/or repair. ALL shipping costs are the responsibility of the User.

6. If any component of the Diver6 System is opened or dismantled, the entire Warranty for the Diver6 System is void.

7. The Warranty covers full replacement of any faulty components with new components during the first 30 calendar days from delivery date. The balance of the Warranty covers the factory repair

and/or replacement of faulty components. If a valid Warranty claim is made and the faulty component is beyond repair the component may be replaced with a similar refurbished item or replaced with a new item at the sole discretion of Azimuth.

8. The Warranty is not transferable. Only the original purchaser has Warranty rights. If the Diver6 System changes ownership from the original purchaser the entire Warranty becomes void.

9. All Warranty claims must be in writing.

Procedure for making a Warranty Claim

The procedure for making a Warranty claim is:

1. Within five working days of the discovery of a fault to any component of the Diver6 System, the user must initially contact in writing:
    a. The local sales representative for the Diver6 System and/or
    b. Azimuth (see contact details below)

    If the fault has been present for more than five working days and the user has not contacted either the local agent and/or Azimuth in writing, then Azimuth may reject the Warranty claim made by the user.

2. On initial contact (as described in 1. above) the user must detail in writing the following:
    a. The serial number of the Diver6 System
    b. (If applicable) The serial number of the faulty component
    c. A description of:
        i. The conditions in which the Diver6 System Component was being used when the fault occurred.
        ii. A description of the fault.

3. On receiving the details of the claim as outlined in 2. above, Azimuth will respond within five working days with instructions relating to the Warranty claim (e.g. the component needs to be returned to Azimuth).

4. If a faulty component is returned to Azimuth, an initial inspection will be undertaken within five working days of receipt of the faulty component, then:
    a. If the fault is deemed to be a genuine Warranty claim, the faulty component will be repaired or replaced with a similar refurbished component or replaced with a new component in line with the Warranty conditions.
    b. If the fault cannot be repeated and/or simulated in the factory environment the component will be returned to the user and the user may become liable for the costs of the inspection.
    c. If the fault, at the sole discretion of Azimuth, is due to items outlined in the Warranty Exclusions/Limitations section above, the user will become liable for the cost of the inspection and/or the repair to the faulty component and/or replacement with a similar refurbished component and/or replacement with a new component.

5. In the event that your Diver6 System or any of your components required service or warranty repair and you are shipping from outside the United States, please contact Azimuth or your Diver6 retailer for return instructions.

Warranty Contact Information

For warranty questions, information and claims:

Contact	Details
Email	warranty@diver6.com or your local Diver6 System Agent
Phone	Your local Diver6 System Agent
Shipping	Azimuth Inc.
	136 Tower Lane
	Morgantown, WV 26501
	USA
	Attn: Diver6 System Warranty

Section 2: System Overview

How does it work?

The Diver6 System uses acoustic modems to transmit data between Topside and Diver Modems. The single Topside Modem is both an acoustic modem and also an Ultra Short Base Line (USBL) acoustic system that uses multiple transducers packed into a single housing to detect the range and bearing to the diver.

The acoustic component of the Diver6 System has the following signal path (Figure 1):
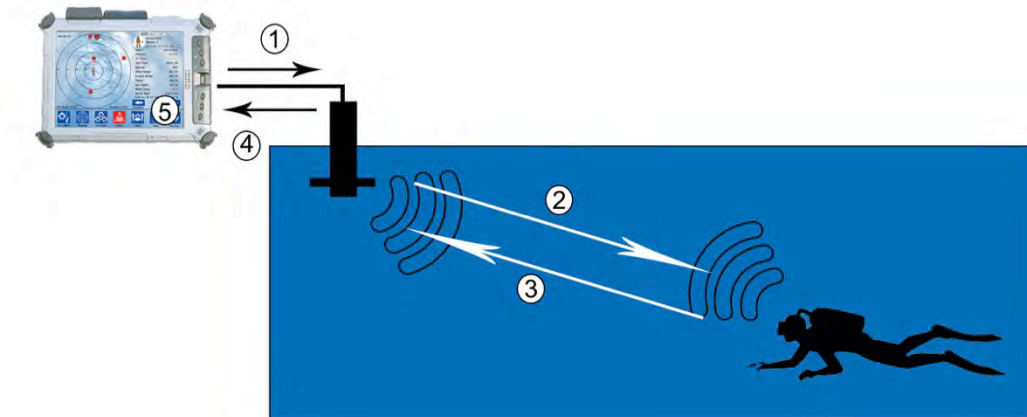
Figure 1: System Communication

1. The Diver6 System Software transmits a signal to the Topside Modem to query a Diver Modem. Each Diver Modem has an individual address (diver modem will show address on boot up via the LCD on the bottom of the modem).

2. The Topside Modem transmits an acoustic signal to the Diver Modem.

3. The Diver Modem then responds with a message to the Topside Modem. These messages may contain data (e.g. diver depth, battery voltage, cylinder pressure etc.).

4. On reception of the message from the Diver Modem, the Topside Modem can resolve the following:
   a. The distance between the Topside Modem and the Diver Modem (this is known as the slant range and is based upon the speed of sound in water).
   b. The compass bearing to the Diver Modem (this is based upon the angle of approach of the signal from the Diver Modem message).

5. Based upon the information received the Diver6 System Software then:
   a. Calculates the absolute geo-position by combining the relative position of the diver to the Topside Modem and the GPS position of the Topside Modem.
   b. Updates the status of the diver based upon the data received from the Diver Modem.

Expected Range

The expected range of the Diver6 System will be dependent upon the conditions of deployment. Extensive range testing of the Diver6 System has demonstrated the following ranges:

1. Over 1,000 m in "ideal" conditions
2. Over 800 m in a marina environment

Limitations on Range

The effect of thermoclines

One of the environmental constraints of acoustic diver tracking is the interference of thermoclines. A thermocline typically happens in calm waters where a layer of warmer water is sitting on top of a layer of colder water (Figure 2).

The interface between the warmer water and the colder water can (in certain circumstances) cause significant acoustic interference and restrict the range of the Diver6 System.

If the diver is below the thermocline and the Topside Modem is above the thermocline, part of the acoustic signal between the two can be bounced off the thermocline. This effect is known as an acoustic mirror.
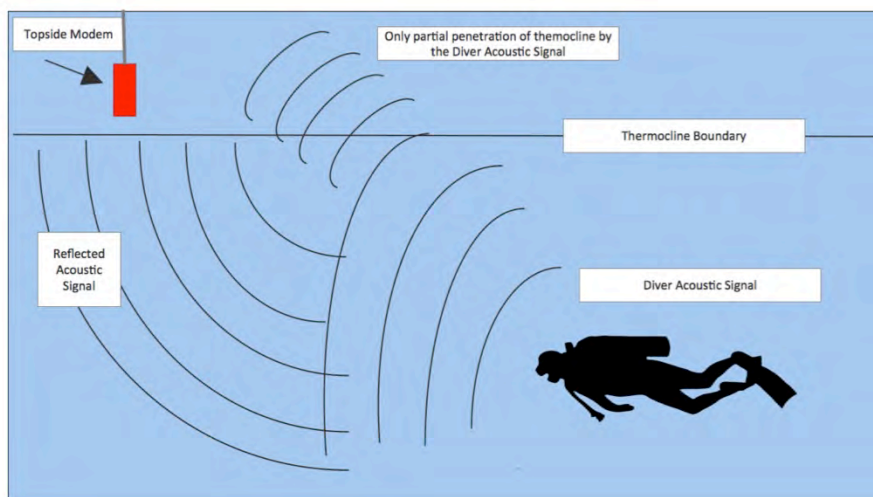
Figure 2: Thermocline Diagram

An acoustic signal that approaches the thermocline will partially travel through the thermocline with the balance of the acoustic signal being reflected. The signal is therefore dependent upon environmental conditions.

Thermoclines can significantly reduce the effective range of the Diver6 System: physical ranges in severe thermoclines have been reduced to about 60m. The best mitigation for this effect is to either lower the Topside Modem below the thermocline, or reduce the range between the Topside Modem and the diver.

If both the diver and the Topside Modem are on one side of the thermocline, the acoustic signal path will be better and possibly behave much in the same way as an unobstructed signal path. If either the Diver Modem or the Topside Modem is in the thermocline, then the acoustic signal can be absorbed within the thermocline.

Environmental effects

There may be reasons that the environmental conditions will affect range. For example:

- If the sea floor is hard packed sand and the water is calm without thermoclines, then the acoustic conditions will be close to ideal and extended ranges would be expected.
- If the seafloor is loosely packed marine sediment, the seas rough and significant ambient noise (boat traffic, oil rig noise, rain etc.) then the lower end of ranges would be expected.
- If the sea floor is hard rock with a large number of outcrops, then the range may be limited by multipathing (acoustic signal being reflected off the hard surfaces) or the Diver6 System may have a clear signal path and achieve extended ranges. It will depend upon the conditions.
- If the water is a stagnant lake with a severe thermocline, then it is possible that the range may be limited to very short distances well below the expected range.

Power Setting on the Diver Modem

The transmission power of the Diver Modem controls the volume (how loud) the Diver Modem transmits. The transmission power from the modem has four settings:

- Power Setting 8: ~2 W transmission, Transmit Source Level 175 dB
- Power Setting 7: ~1 W transmission, Transmit Source Level 172 dB
- Power Setting 6: ~0.5 W transmission, Transmit Source Level 169 dB
- Power Setting 5: ~0.25 W transmission, Transmit Source Level 166 dB

In general, the higher the power setting is the greater the range. The power setting on the Diver Modem can be changed "on the fly" in the Diver6 System Software (see Section 5 of this manual). The default setting for the Diver Modem is Power Setting 6 (0.5 W, 169 dB).

Please note that in order to achieve power level 8 on the Diver Modem, it needs to be immersed in water in order to achieve backpressure on the ceramic transducer in the modem.

Diver6 System Specifications

There are many components to the Diver6 System and only the main components are detailed here.

Topside Equipment

There are three main elements to the Topside equipment.

Topside Modem
The Topside Modem (Figure 3) is very robust with 316 stainless steel and acetyl copolymer construction. It is double O-ring sealed and uses low power (12-36 VDC). It uses a single transducer deploying ultra-short baseline acoustic tracking.

- Data Rate: receive and transmit 140 – 15,360 bps
- Processing: data redundancy, ½ rate convolutional coding multipath guard period selection
- MFSK and PSK modulation schemes
- Distances/Range: 1.25 nm (2km) common, greater distances possible
- Frequency: Band C (C) 22 – 27 kHz
- Transducer: Transmit Omni-directional (Toroidal pattern)
- USBL Beamwidth:
  - Receive – azimuth 360 degrees
  - Vertical +/- 50 degrees
- Range Accuracy: 0.3 meters
- Size:
  - Diameter: 4.5" (114.3mm)
  - Length: 15" (381 mm)
  - Weight: 12.2 lbs. (5.6 kg) and 6 lbs. (2.7 kg)

Figure 3: Topside Modem

Topside Battery Unit
The topside battery (Figure 4) unit supplies the system with power to the Topside Modem and data communication to the computer.

- BB-390B/U Sealed NiMH Rechargeable Battery
- 24V – 4.9 Amp-Hours
- Output Protected (5A PTC Resettable Fuse)
- ON/OFF Toggle Switch
- Ruggedized Water Resistant Enclosure

Figure 4: Topside Battery Unit

Topside Monitoring Computer

The Xplore XC6-DMSR (Figure 5) is the most comprehensive and fully featured rugged tablet PC in the industry with:

- Powerhouse performance: Intel® Core™ i7 Platform 620 UE processor (up to 2.13 GHz)
- Tool-free access to battery, SSDs, SIM, Micro SD
- AllVue™ Xtreme sunlight readable technology
- Industry's best SSD-single or dual with RAID option
- Intrinsically safe for explosion-prone environments
- Designed for in-field upgrades
- Cool Touch™ thermal management
- Full Microsoft® Windows® 8
- Comprehensive communications suite
- Fully rugged:
  - Multi-layered magnesium chassis
  - MIL-STD-810G and IP67 tested
  - Hazardous Location Certified
  - Salt Fog Spray tested to MIL-STD-810G, M509.5
- Display: 10.4" XGA (1024x768) rugged LED backlit display (1300 nits)
- Battery: Standard extended life 10-cell Li-Ion battery (68.5 WHr) - Up to 8.5-hr battery life.
- Dimensions: 11.2" (284.4 mm) x 8.25" (209.5 mm) x 1.6" (40.7 mm) (WxHxD)
- Weight: 2.4 kg
- Optional Peripherals: Desktop and vehicle docking systems
- On-board GPS (0.3-meter accuracy)

Figure 5: Xplore Rugged Computer

Please note that the computer manufacturer's specifications may change.

Diver Equipment

Diver Modem

This is a compact and low weight unit (Figure 6), 3.2 lbs. dry and 1.6 lbs. submerged. It has a rechargeable battery (similar to a cellphone) and has 12+ hours of battery life, depending on the transmission power setting and the number of packets transmitted.

There are various power settings – 0.25, 0.5, 1, and 2 W – and various range-to-diver distances that can be achieved (see notes on range above), depending on the situation:

- In open water – up to .62 miles (1000 m in ideal conditions)
- In cluttered water such as in a marina – up to 0.5 miles (800 m)

The specifications for the Diver Modem are:
- Size: 2.4" (61 mm) x 13.1" (333.7 mm) long
- Weight: 3.2 lbs. dry and 1.6 lbs. wet
- Battery Life: 12+ hours
- Modem Frequency: C Band 22-27 kHz
- Modem Bandwidth: 5 kHz
- Modem Baud Rate: modem set to 300 bps for maximum range and data reliability
- Range: up to .62 miles (1000 m)
- Enclosure: 316 SS and acetyl copolymer
- Depth Rating: 150 psi, 346' (105 m)

Figure 6: Diver Modem

Section 3: Getting Started

Getting Started

This Getting Started guide is designed to initially set up the Diver6 System. For more detailed information on operation of the Diver6 System please refer to:

- Section 4: Diver6 System Operation
- Section 5: Software
- Section 6: Maintenance
- Section 7: Trouble Shooting

There are three components that need to be set up for the Diver6 System to be operational. These are:

1. Fitting the Diver6 System Equipment to the diver's SCUBA set.
2. Plugging in the Topside Modem to the Battery Unit and Monitoring Computer and placing it in the water.
3. Configuring the Monitoring Computer and monitoring a Dive Job.

Diver

Each diver has his own Diver Modem. Optional equipment such as the Shearwater® pressure sensor and NERD or Petrel may also be available. The Diver Modem ID Number is available on the LCD screen on the bottom of the Diver Modem. After initial power up and boot of the Diver Modem the ID will flash 5 times.

Attaching the Diver Modem

The Diver Modem can be mounted on the air cylinder by using the slide mount. The slide mount is comprised of two components. The first component is the female side of the slide mount (Mount Base), which can be mounted to an air cylinder via a strap. The second component is the male side of the slide mount (Mount Slide), which is part of the Diver Modem.

The base is fitted under a cylinder strap on the buckle end of the cylinder strap (i.e. through only one thickness of strapping).

Please note that the Diver Modem Mount Base should have the curved end up (Figure 7). The mount base has been designed to allow only one thickness of the cylinder strap webbing to go through the slot. This is to ensure the Diver Modem is installed on the buckle end of the cylinder strap, so if the cylinder strap does loosen and come undone during a dive, there is less potential for the Diver Modem to slip out of the strap.
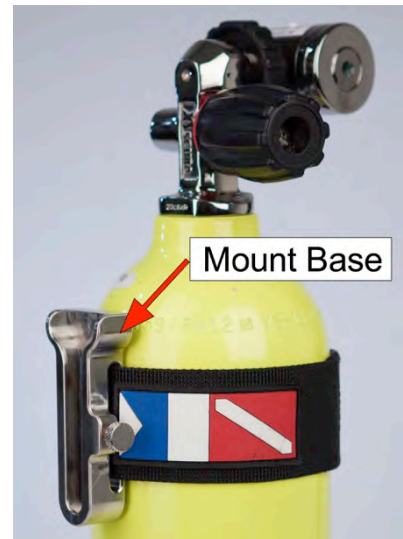
Figure 7: Quick Mount Release

Once the base of the mount is fitted to the dive cylinder, the slide mount with the Diver Modem can be fitted. When fitting the slide mount ensure that the locking pin "snaps" into place to lock the slide onto the base. If the locking pin does not "snap" into place, the Diver Modem can slide off its mount (Figure 8). To remove the Diver Modem, pull the locking pin out and slide the modem off the base. The locking pin can be set in the "open" position by retracting the pin and rotating the knurled knob 90 degrees.

The head of the Diver Modem (the black molding at the top of the Diver Modem) should be placed on the cylinder so the head is just clear of the top of the curvature of the cylinder. Both the Dive Master and the Diver must check that they are satisfied with the position of the Diver Modem. If there is a high entanglement potential on the dive, consideration should be given to lowering the Diver Modem to reduce entanglement potential. The Diver Modem can be placed low on the dive cylinder but performance may be diminished by the dive cylinder creating an acoustic shadow to the Topside Modem when the diver is in certain orientations.

The Diver Modem is turned on by pushing down on the stainless-steel power switch on the bottom of the modem. The LED will show three lines which indicate the modem is booting up. After that the Modem ID will flash 5 times.

Figure 8: Quick Mount with Modem

The Red dot on the LED will also flash when it receives an Acoustic Signal from the Topside Modem.

It is relevant to note that the Diver6 System can be tested through air over a distance of approximately 100 mm (4"). It does not need to be submersed in order to see if the equipment is working properly. To get it working, the Topside Modem needs to be placed adjacent to the Diver Modem. When operating the Diver Modem in air, DO NOT operate at full power. If the Diver Modem is operated at full power in air, it will shut down and reboot during the transmission cycle. The Diver Modem has been designed to operate at full power only while submersed.

Interference with Ocean Technology Systems (OTS) Through Water Communications

The Diver6 System operates on one of the frequencies of the OTS through water communications. When the OTS communications equipment is set to Channel #1 (Buddy Phone Frequency), the Diver6 System can be heard through the OTS equipment. Selecting another channel on the OTS equipment allows both the OTS and the Diver6 System to be used at the same time.

Topside Modem

The steps to install the Topside Modem are:

1. Connect the Topside Modem Cable to the top of the Topside Modem (Figure 9).

2. Install the battery into the Topside Battery Unit. Connect the Topside Modem Cable to the Battery Unit. Connect the Data Cable with the USB connection to the Battery Unit. Turn on the Battery Unit via the switch (Figure 10).

> ⚠️ **THE TOPSIDE BATTERY UNIT AND BATTERY SYSTEM ARE DESIGNED FOR USE IN A RUGGED ENVIRONMENT. HOWEVER, THEY ARE NOT DESIGNED TO GET WET AND/OR IMMERSED DUE TO BATTERY VENTING REQUIREMENTS.**

3. Connect the USB cable to the monitoring computer (Figure 11).

Bluetooth Connection (Wireless Topside Communication)

The system can be set up to have a wireless connection between the Topside Modem and tablet computer. A Bluetooth module and dongle are provided with the system for this type of connection (Figure 12). The Bluetooth address is located on the underside of the Topside Battery Unit connect panel.

1. Connect the Bluetooth module to the Power Data connection on the Battery Unit.
2. Connect the USB dongle to the tablet computer.

> ⚠️ **If the USB dongle has been configured and connects to the Bluetooth module, the red LED will appear solid indicating a paired connection. If the LED is flashing, this indicates the USB dongle has not established a connection to the Bluetooth module.**
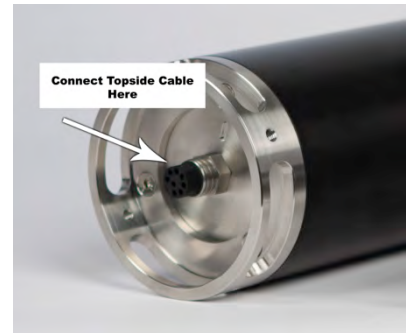
Figure 9: Topside Cable Connection

Figure 10: Topside Battery Unit Connections

Figure 11: Computer USB Connection

Figure 12: Bluetooth Module and USB dongle

Diver6 User Manual

Topside Modem Mount Instructions

Assembly Instructions for Topside Modem Mount:
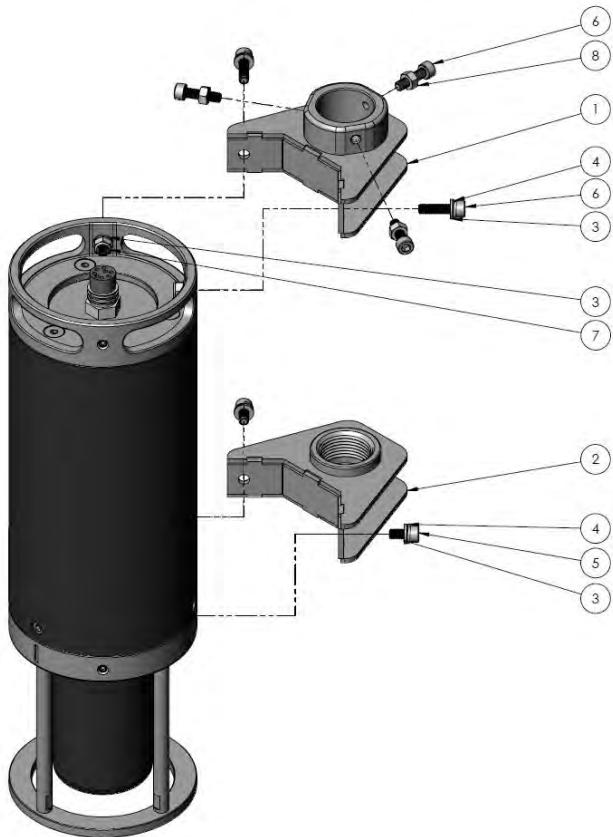
ITEM NO.	PART NUMBER	DESCRIPTION	Default/ QTY.
1	P01BC00A14M	Topside Modem Upper Mount	1
2	P01BD00A14M	Topside Modem Lower Mount	1
3	90965A170	M6 Flat Washer, 6.4mm ID, 12.0mm OD, 316 SS	6
4	92153A426	M6 Lock Washer, 11.8mm OD, 1.6mm min Thick, 316SS	4
5	92290A318	M6 Socket Head Cap Screw, 12mm Length, 1mm Pitch, 316SS	2
6	92290A311	M6 Socket Head Cap Screw, 1 mm Pitch, 22 mm Long, 316 SS	5
7	94205A250	M6 Nylon-Insert Locknut, 10mm Wide, 6mm High, 316 SS	2
8	94150A345	M6 Hex Nut, 1mm Pitch, 10mm Width, 5mm Height, 316 SS	3

1) Decide the location for the mount (Front, Rear, or Side) on the Topside Modem.
2) Remove the 2 set screws from the upper section and from the lower section of the Topside Modem in the desired location. Use the 3mm hex L-key. Note: All tools and hardware are provided in the Tools & Spares Kit.
3) Attach the lower mount using the M6 x 12mm screws, lock washers and flat washers (2 of each). Use the 5mm hex L-key.
4) Attach the upper mount to the modem using M6 x 22mm screws, lock washers and flat washers (2 of each). Use the 5mm hex L-key.
5) Install the nylock jam nut and washer (2 of each) on the M6 x 22mm screw. Use the 5mm hex L-key and 10mm combination box wrench.
6) **Insert a 316 Stainless Steel 1" NPT Pipe (not provided) thru the upper mount and screw into the lower mount. Non Ferrous metals, fiberglass, or rigid PVC are suggested. Ferrous metals will affect the magnetic compass.**
7) Secure the pipe to the upper mount by installing the M6 x 22mm screws and jam nuts (3 of each). First tighten the screws then tighten up the jam nuts. Use the 5mm hex L-key and 10mm combination box wrench.

Software

The Diver6 System Software is pre-installed on the tablet computer and can be run immediately by clicking on the icon in the task bar (Figure 13). Also pre-installed is Adobe© Acrobat Reader to easily view the dive logs post deployment.
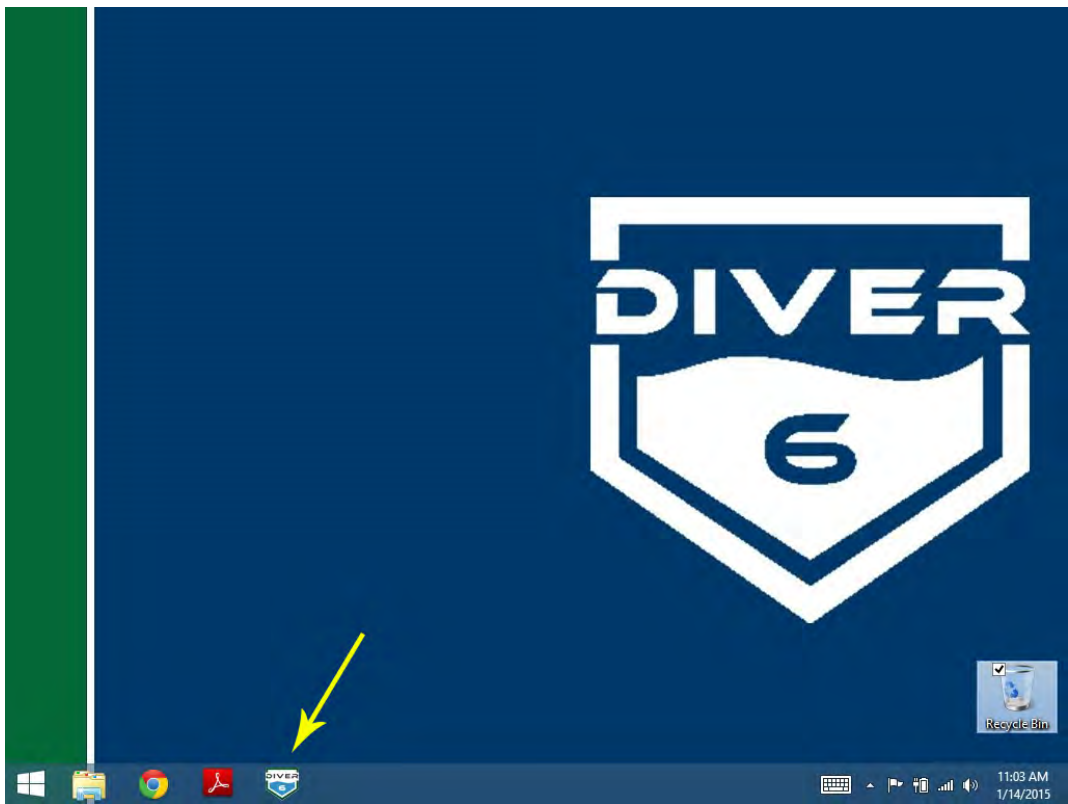
Figure 13: Diver6 Desktop

Default Setup

Item	Comments
Computer Name	Diver6tablet
Default Username	diver6
Default Password	diver6543
Installed Software	Current version of Windows OS (with updates at time of OS Build)
	Diver6 System Software
	Acrobat Reader

Getting Started Guide Summary

The Diver6 System has been designed with extensive input from subject matter experts in the diving community. The setup and deployment have been designed to have minimal impact on diving operations. The Diver6 System is a **Secondary Advisory System** only and does not replace Standard Operational Procedures, therefore the notes below are offered as a guide to getting the best out of the Diver6 System. This section is a summary only with more details given in Section 4.

Diver

The following actions are recommended for the Diver6 System Diver deployment.

Pre-deployment

Equipment	Action Summary
Diver Modem	- Check that the Diver Modems are fully charged. - Make sure the charger's circular plug is properly lubricated. The rubber around each of the six male contacts should appear greasy. To properly lubricate the circular plug use Dow Corning #4 (provided in Tools & Spares Kit) and a cotton swab to lightly grease the rubber shoulders, and sleeves around each male contact. - Fully insert the circular plug from the charger into the circular connector on the Diver Modem. - Wipe off any excess lubrication that oozes out. - Plug the charger into the wall outlet (110 VAC). - Once the modem is fully charged (LED on the charger turns solid green), unplug the charger from the wall outlet. - Unplug the charger's circular plug from the Diver Modem connector. - Below is a list of charging states and errors: Solid Yellow = Standby Slow Blink Yellow = Pre Charge Fast Blink Green = Rapid Charge Slow Blink Green = Maintain Fast Blink Yellow = Error Solid Green = Ready (Fully Charged) Blinking Yellow and Green = Wait - Check operation by verifying the Diver Modem is on. Red dot on LED will be visible. - Check Diver Modem acoustic signal by running the diagnostic tests (see Section 5). - Attach the base of the Diver Modem Mount to the SCUBA equipment and check the functionality of the mount.

Deployment

Equipment	Action Summary
Diver Modem	• Make sure the O-ring on the connector is free of defects and is lightly lubed with O-ring lube. The O-ring should have a slightly greasy appearance with no lube visible. A small tube of Christo-Lube (or similar) has been provided for this purpose. If the O-ring needs replaced use the plastic O-ring pick to remove the defective O-ring, discard and replace with a new O-ring. A small tube of O-ring lube, a plastic O-ring pick, and spare O-rings are provided in the Tools & Spares Kit. • Make sure the connector O-ring is installed in the O-ring groove. Then install the screw-on cap to protect the connector from seawater. • Turn on the Diver Modem by pushing the button on the bottom of the modem. Attach the Diver Modem to SCUBA Equipment. • NOTE: If using a Diver6 Accessory that plugs into the connector, the rubber shoulders of the contact pins need lightly lube with silicone grease. A tube of Dow Corning #4 Grease is provided for this purpose in the Tools & Spares Kit.

Post-deployment

Equipment	Action Summary
Diver Modem	• After use, wash the Diver Modem with fresh water only and remove all traces of salt water and debris (do not use abrasives and/or detergent) and allow to dry. • Charge the Diver Modems and once charged, place into the carry case for storage.

Topside Modem

The following actions are recommended for the Diver6 System Topside deployment.

Pre-deployment

Equipment	Action Summary
Battery Unit/Cable	• Check the charge of the battery. • Check the cable for defects (abrasions, cuts/nicks, etc.). If the cable is damaged **DO NOT USE!**
Topside Modem	• Check the Topside Modem for damage. If the Topside Modem is damaged **DO NOT USE!** • Check the operation of the Topside Modem with the monitoring computer and a Diver Modem.

Deployment

Equipment	Action Summary
Battery Unit/Cable	• Make sure the battery and cable are placed out of the way of Dive Operations and in an area that is as dry as possible.
Topside Modem	• For more comprehensive notes on the Topside Modem deployment see Section 4. • With the cable and mount secure, deploy the Topside Modem in the water in such a way as the Topside Modem has a clear line of sight with the diver's operation area.

Post-deployment

Equipment	Action Summary
Battery Unit/Cable	• After use, wash **THE CABLE ONLY (NOT THE BATTERY/BATTERY UNIT)** with fresh water only and remove all traces of salt water and debris (do not use abrasives and/or detergent) and allow to dry. • Charge the Topside Battery and once charged place into the carry case for storage.
Topside Modem	• Visually check the Topside Modem for damage during transit. • After use wash with fresh water only and remove all traces of salt water and debris (do not use abrasives and/or detergent) and allow to dry. • Once dry place the Topside Modem into the carry case for transit.

Software

The following actions are recommended for the Diver6 System Software deployment. For more comprehensive notes on using the software, see Section 5.

Pre-deployment

Equipment	Action Summary
Tablet Computer	• Ensure the tablet is charged or is connected to a power supply. • If an Internet connection is required, ensure that it is set up properly.
Software	• If required, create a Dive Master account. • Verify application settings to ensure comms with Topside Modem and GPS device (if available). • Log in as Dive Master and configure any divers and appropriate alarm settings.

Deployment

Equipment	Action Summary
Software	• Configure dive plan and start the dive. • Monitor dive. When a dive is completed, mark it as such by clicking the **Complete Dive** button.

Post-deployment

Equipment	Action Summary
Software	• Log out as Dive Master and quit the software.
Topside Modem	• Safely disconnect the USB cable from the computer.
Tablet Computer	• Copy or review any dive log files. • Shut down the Tablet Computer. • Charge the Tablet Computer if necessary and once charged place into the carry case for storage.

Section 4: Diver6 System Operation

Introduction

This section gives detailed guidance to the deployment of the Diver6 System. The manufacturers and developers of the Diver6 System have taken care not to present this section of the manual as if it is a Standard Operating Procedure. This approach has been taken as the Diver6 System is a **Secondary Advisory System** only and does not replace existing SOPs associated with Dive Operations. It is anticipated that the notes/guidance given in this section of the user manual will be used to assist end users to develop their own SOPs for deployment, maintenance, and support for the Diver6 System.

This section assumes that the user has read **Section 3: Getting Started**. This section provides more detailed guidance on the Installation / Deployment and Recovery of the Diver6 System hardware. For details on Software and Maintenance please refer to Sections 5 and 6.

Topside Equipment

Topside Modem Positioning

As outlined in Section 2 there are a number of factors that influence the acoustic performance of the Diver6 System. The placement of the Topside Modem can influence the ability of the Diver6 System to monitor and track divers.

This section considers the placement of the Topside Modem in the following deployment scenarios:
1. Swimming Pool
2. Pier / Wharf
3. Marina
4. Boat

The notes provided here assume that the Topside Modem is used. The Topside Modem is provided with a hard mount. The mount is comprised of two components, the lower and upper mounts. The lower mount has threads to accept 1" NPT Stainless Steel Pipe. The upper mount has provisions for three set screws and jam nuts.

Swimming Pool

The Diver6 System performance in a pool environment is sometimes challenging, as the acoustic signals tend to bounce off the hard walls of the pool and give rise to multi-path signals. Care is needed when setting up for use in a swimming pool:

1. Where possible place the Topside Modem away from the wall (1.0 m – 3 feet) to provide a better acoustic signal path. One way of doing this is to use the handle of a pool vacuum cleaner or similar apparatus and place it over a corner of the pool with the transducer connected mid-way across the corner (Figure 14).

2. Be aware of any acoustic shadow conditions where a diver can be hidden by an obstruction and not visible to the Topside Modem.

3. Please note that tracking will jump around a little due to multi-path signal (the acoustic signal bouncing and splitting when it encounters a hard surface). The Diver6 System can usually cope with this.

4. It is a good idea to turn the power setting down on the Diver Modem to setting level 5 (0.25 W) when operating in a swimming pool – this will limit the signal strength and therefore the extent of the multi path interference (i.e. the relatively weak bounced signals have less of a chance to dominate the data signal).

5. The Topside Modem should be placed at a depth of approximately 0.6m (2 feet) and should always (where possible) be at a lesser depth than the diver.

6. Try to set up the Diver6 System in an area where:

   a. It is clear of where the divers will be entering and exiting the water.

   b. It is close to, but not on top of, where the Dive Master will be stationed - an area where the Dive Master can run the dive operation and also easily access the Diver6 System monitoring computer.

   c. It is somewhere other observers can see the Diver6 System in operation, the diver in the water as well as the screen of the tablet computer.
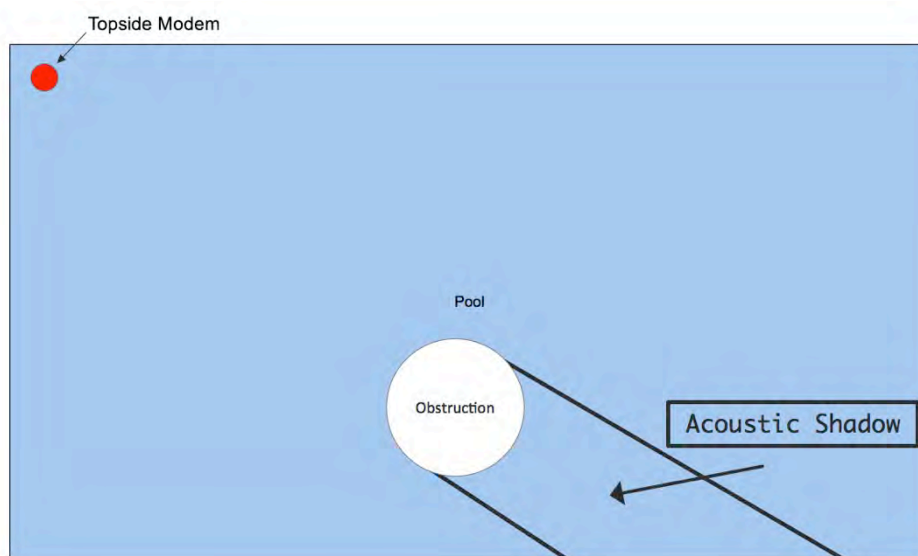
Figure 14: Pool Environment

Pier / Wharf

Deployment of the Diver6 System from a pier / wharf is straightforward and common practice for first responders (e.g. Police, Fire, Search and Rescue).

The Topside Modem placement off a pier needs careful consideration. The Topside Modem needs to be clear of obstructions so as not to cause an acoustic shadow between the diver and the Topside Modem (Figure 15).

1. Place the Topside Modem clear of hard walls. Some piers have a concrete structure that has a vertical face well below water level and the Topside Modem needs to be placed either below the bottom of this by about 300 mm (1 foot) or 1.0 m (3 feet) clear of the wall.

2. Place the Topside Modem clear of piles. The best position is midway between piles. In most conditions the Topside Modem can see around piles but placing it in a location where it has an unobstructed view of the diver will produce the best results.

3. Use a rigid mount to secure the Topside Modem to the pier or wharf. This will reduce the amount of swing that the transducer has and therefore increase the accuracy of the tracking.

Figure 15: Pier and Wharf Operation

Marina

Using the Diver6 System in a marina environment is very similar to that of a pier / wharf environment but has a higher likelihood of boat movements through the operational area. Therefore, all the notes associated with pier/wharf demonstrations also apply here.

Care is needed in the location selection of the Topside Modem (Figure 16, Figure 17). Also refer to previous sections about acoustic shadow. In a marina environment, there is a significant amount of clutter that can interfere with the Topside Modem. The best place to set up the Topside Modem is:

1. On the intersection of a marina finger when the diver is swimming up and down a marina. This way the Topside Modem can see down the length of the marina.
2. On the end of a marina finger when the diver is swimming down adjacent marinas.
3. If the dive operation is off a boat and a diver is swimming down marinas, then try to position the boat (and therefore the Topside Modem) in the center of the lane between marinas.
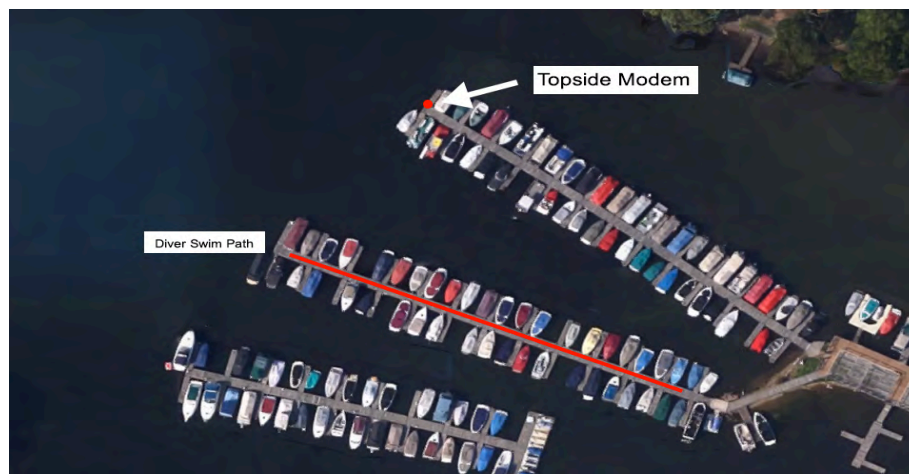

Figure 16: Marina Environment – Topside Modem Position 1

Figure 17: Marina Environment – Topside Modem Position 2

Boat

Using the Diver6 System off a boat is more difficult than a stationary structure such as a pier/wharf/marina etc. as the Topside Modem tends to swing around when dangled off the boat. When using the Diver6 System from a boat, the Topside Modem Mount should be utilized (Figure 18). It is relevant to note that the more stable the Topside Modem, the more accurate the tracking component will be.

There is a heading mark on the base and top of the Topside Modem that needs to be placed at zero degrees relative to the bow of the boat. With this arrangement, limited maneuvering of the boat can be performed without the need to lift the transducer. The coxswain's view in the software is referenced to this index mark (Figure 19).

Careful consideration is needed for the Topside Modem placement. It needs to be:

1. Clear of the boat propellers. For this reason, it is not a good idea to mount the Topside Modem over the stern of the boat. If the Topside Modem is deployed over the stern of the boat, it must be lifted before the boat goes into gear.

2. Clear of the keel of the boat by about 150-300 mm (6-12 inches) and away from propeller entanglement.

An alternative to the mid-ship's deployment is off the bow of the boat using the anchor fairlead. This option is less desirable as any forward movement of the boat will result in the Topside Modem hitting the hull of the boat. A fixed mount is highly recommended to prevent the Topside Modem from spinning in the water and causing in accuracies (Figure 20).

Figure 18: Topside with fixed mount

Figure 19: Topside Heading Tick Mark

Figure 20: Topside Modem Fixed Craft Placements

Topside Equipment Deployment Actions

The following are the recommended actions to check the operation of the Topside Equipment pre, during, and post deployment. Although some of the deployment actions are noted in **Section 3: Getting Started**, they are repeated in this section for completeness.

Topside Equipment Pre-Deployment Actions

Equipment	Action Summary
Battery Unit/Cable	• Check the charge of the battery. • Check the cable for defects (abrasions, cuts/nicks etc.). If the cable is damaged **DO NOT USE!** • Check the plug end of the cable for damage (i.e. no bent or broken pins). If the plug is damaged **DO NOT USE!**
Monitoring Computer	• Check the charge on the battery. • Check computer operation by turning it on and running the Diver6 System Software. • Check Diver database and equipment configuration. Where possible configure the computer for the planned tasks at hand.
Topside Modem	• Check the Topside Modem for damage. If the Topside Modem is damaged **DO NOT USE!** • Check the operation of the Topside Modem with the monitoring computer and a Diver Modem.

Pre-Pack for Deployment	• Once all the Diver6 System Equipment has been checked and found to be fully operational, pack the Topside equipment into its carry case ready for deployment. Check the following is packed:
	   o Topside Battery
	   o Topside Battery Unit
	   o Topside Modem Cable
	   o Power Data Cable
	   o Topside Modem
	   o Monitoring Computer

Topside Equipment Deployment Actions

Equipment	Action Summary
Battery Unit/Cable	• Make sure the battery and cable are placed out of the way of Dive Operations and in an area that is as dry as possible.
Topside Modem Deployment	• Attach the cable to the Topside Modem. NOTE: The shoulders of the male pins on the cable plug should appear greasy. Please lightly grease the rubber shoulders of the pins with silicone grease. A tube of Dow Corning #4 is provided in the Tools & Spares Kit for this purpose. Please lube the shoulders with the cable detached from the Topside Battery Unit. • Based upon the Dive Operations area select a location to deploy the Topside Modem (see notes above for guidance on placement). • With the cable and mount secure, deploy the Topside Modem in the water in such a way as the Topside Modem has a clear line of sight with the diver's operation area. It is recommended that a safety line (rope, stainless steel cable) be connected to the Topside Modem in the event the modem would get disconnected from its fixed mount.

Topside Equipment Post Deployment Actions

Equipment	Action Summary
Battery Unit/Cable	• After use wash **THE CABLE ONLY (NOT THE BATTERY/BATTERY UNIT)** with fresh water only and remove all traces of salt water and debris (do not use abrasives and/or detergent) and allow to dry. • Visually check the battery unit/cable for damage. • Charge the Topside Battery and once charged place into the carry case for storage.
Monitoring Computer	• Charge the monitoring computer battery. • Check computer operation by turning it on and running the Diver6 System Software. • Optionally, copy the Dive Record Sheets onto an external storage device.
Topside Modem	• Visually check the Topside Modem for damage. • After use wash with fresh water only and remove all traces of salt water and debris (do not use abrasives and/or detergent) and allow to dry. • Once dry place the Topside Modem into the carry case for transit.

Diver Equipment

The following actions are recommended for the Diver6 System Diver deployment. As with the Topside Equipment some of the deployment actions are repeated from **Section 3: Getting Started** of this manual.

Diver Equipment Pre-Deployment Actions

Equipment	Action Summary
Diver Modem	• Check that the Diver Modems are fully charged. • Check operation by verifying the Diver Modem is on. Red dot on LED will be visible. • Check Diver Modem acoustic signal by running the diagnostic tests (see Sec 5). • Attach the base of the Diver Modem Mount to the SCUBA equipment and check the functionality of the mount.

Diver Equipment Deployment Actions

Equipment	Action Summary
Diver Modem	• Make sure the O-ring on the connector is free of defects and is lightly lubed with O-ring lube. The O-ring should have a slightly greasy appearance with no lube visible. A small tube of Christo-Lube (or similar) has been provided for this purpose. If the O-ring needs replaced use the plastic O-ring pick to remove the defective O-ring, discard and replace with a new O-ring. A small tube of O-ring lube, a plastic O-ring pick and spare O-rings are provided in the Tools & Spares Kit. • Make sure the connector O-ring is installed in the O-ring groove. Then install the screw-on cap to protect the connector from seawater. • Turn on the Diver Modem pushing the button in the bottom of the modem. • Attach the Diver Modem to SCUBA Equipment. • NOTE: If using a Diver6 Accessory that plugs into the connector, the rubber shoulders of the contact pins need lightly lube with silicone grease. A tube of Dow Corning #4 Grease is provided for this purpose in the Tools & Spares Kit. • As with all sealed SCUBA equipment, when not in use keep the Diver Modem dry to prevent the Diver Modem from overheating in direct sunlight. If the Diver Modem heats up too much the internal pressures may build to the point where internal O-rings are compromised. This could result in water damage to the Diver Modem.

Diver Equipment Post-Deployment Actions

Equipment	Action Summary
Diver Modem	- After use, wash the Diver Modem with fresh water only and remove all traces of salt water and debris (do not use abrasives and/or detergent) and allow drying. - Charge the Diver Modems and once charged, place into the carry case for storage. NOTE: Before plugging the charger into a power source, please verify that the rubber shoulders of the male contact pins on the plug are lightly lubed with silicone grease. The shoulders should have a greasy appearance. A tube of Dow Corning #4 Grease is provided for this purpose in the Tools & Spares Kit.

Section 5: Software

Software Summary

The Diver6 System software is a supplemental Diver and Dive Operations Mobile Support System, which can assist Dive Masters in monitoring and tracking their divers beneath the surface of the water providing greater situational awareness. The Diver6 System is designed and intended for use only by certified Dive Masters and is not intended to, nor should it, replace independent dive and contingency planning.

The Diver6 System software gives the Dive Master the ability to create a dive plan that assists in the monitoring and tracking of diving operations. All monitoring aspects of the dive are recorded and can be used for later analysis and audit. The Diver6 software provides up to date information on the divers in the water allowing the Dive Master to make faster, safer, and more accurate decisions.

The Diver6 software creates a folder called "diver6" in the User's documents directory. This folder will contain the database and all dive logs organized by date/time stamped folders.

System Requirements

The Diver6 System software will run on both Windows and Macintosh OS X platforms.

Windows	Mac OS X
Windows 7 SP1 Windows 8.1 Windows 10	Any Intel-based Mac running OS X 10.9.5 or later.
Recommended	**Recommended**
Windows 10 2 GB RAM	Mac OS X 10.9.5 or later. 2 GB RAM

Optional Hardware

The Diver6 System software can interface to optional hardware devices including the Petrel, the Near Eye Remote Display (NERD), and tank pressure sensors by Shearwater® Research Inc. (http://www.shearwaterresearch.com). In certain circumstances, the Diver6 System will have increased functionality and additional software features as they become available. These changes will be documented in the appropriate sections below.

Using the Software

Upon each execution of the Diver6 System software, an advisory screen is presented (Figure 21). Read and click the Agree button to accept the conditions presented and continue using the software. Clicking the Disagree button will terminate the execution of the software. If the computer has an Internet connection, clicking on the Diver6 or Azimuth logo will open a web browser to the appropriate web site. The Diver6 System software supports different languages and will display a popup list of currently supported languages at the bottom of the screen. To obtain the most recent language database file, use the "Check for Updates" button.
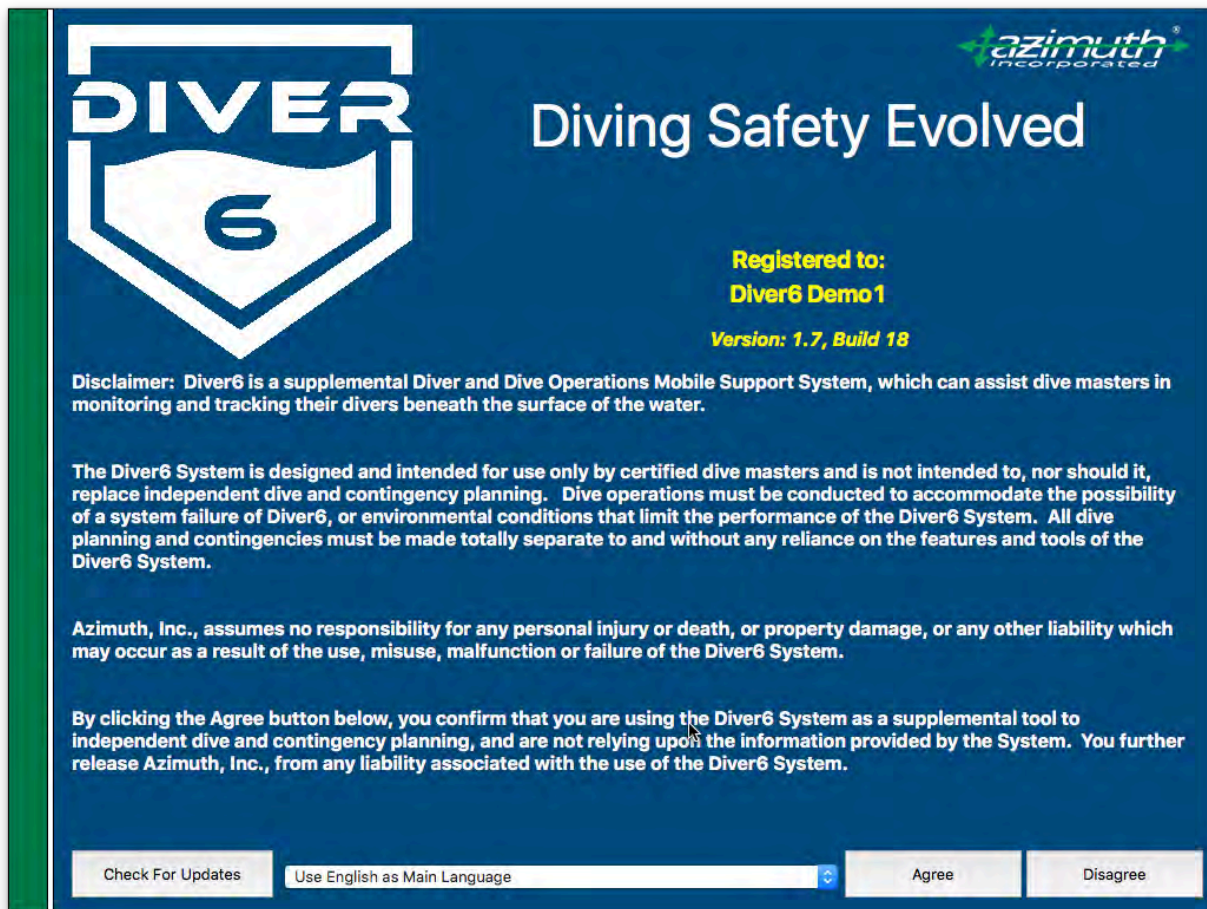

Figure 21: Advisory Screen

Software Update

When the Advisory Screen is presented, the user can manually check for a newer version of the software or obtain the most recent language database file. When the "Check for Updates" button is pressed, the software will attempt to connect to the update server and check for a newer version as well as download the most recent language database file. If the computer does not have an Internet connection, a message indicating so will be displayed (Figure 22).

If an Internet connection exists, the language database file will automatically be downloaded. Then, a message box will be displayed indicating the status (either being up to date (Figure 23) or that a newer version is available). If a newer version is found, a window displaying the information about the update will appear. The user may install the update or skip it for now (Figure 24). This check may be done anytime from the Advisory screen.
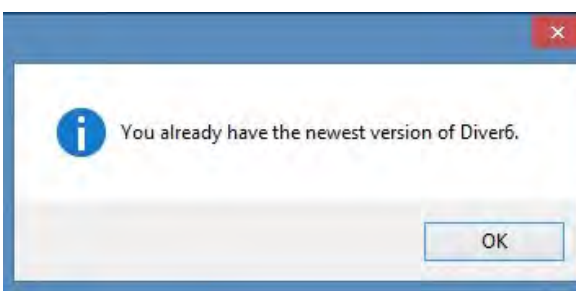

Figure 22: No Internet Connection Screen

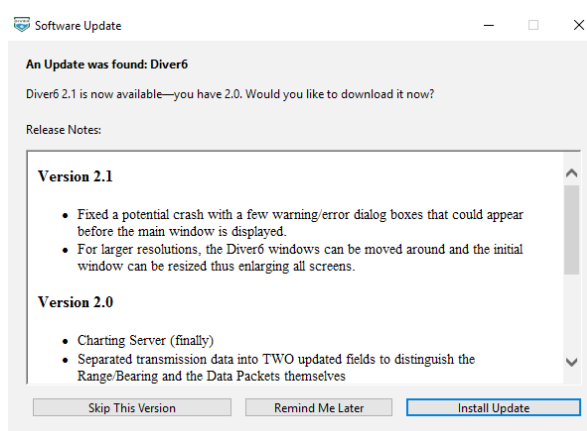**Figure 23: Newest Version Screen**

Figure 24: Software Update Screen

Registration

Upon delivery of your system, the software is automatically registered with a name and registration number. The registration information is included as part of your Diver6 System in the event that the software is installed on a different computer or the Diver6 database is erased. This information can also be obtained from the Diver6 web site at http://www.diver6.com using the registration name and the Diver6 system serial number (Figure 25).

When new **major** software versions are released, a new registration number will be required. After purchasing and downloading the new software, an email with the new registration will be sent within 24 hours. **Note that the new software should NOT be installed until you have received your new registration number or you will render the software unusable.**

Figure 25: Registration Screen

Dive Master Log In Screen

After agreeing to the advisory screen and entering any required registration information, the main Dive Master log in screen is presented. Initially, a message indicating that no Dive Masters have been created yet will be displayed as shown (Figure 26).

From this screen, the user can log in as a Dive Master and proceed to the main menu or manage (create, edit, and delete) Dive Masters by clicking on the **Manage Dive Masters** button. To end the program, click the **Quit** button.
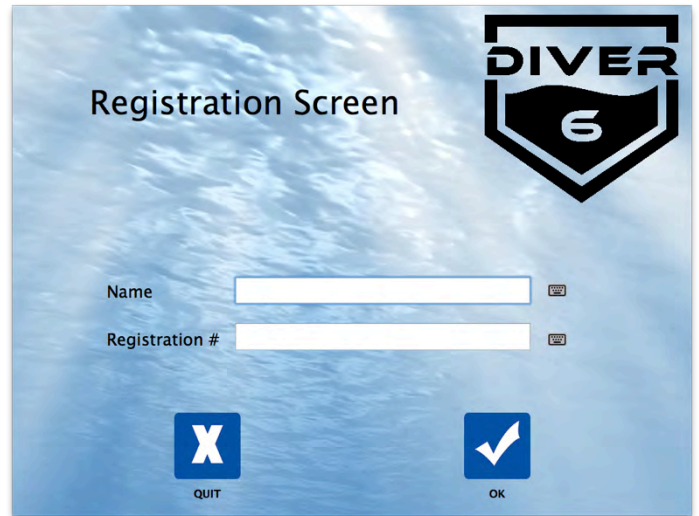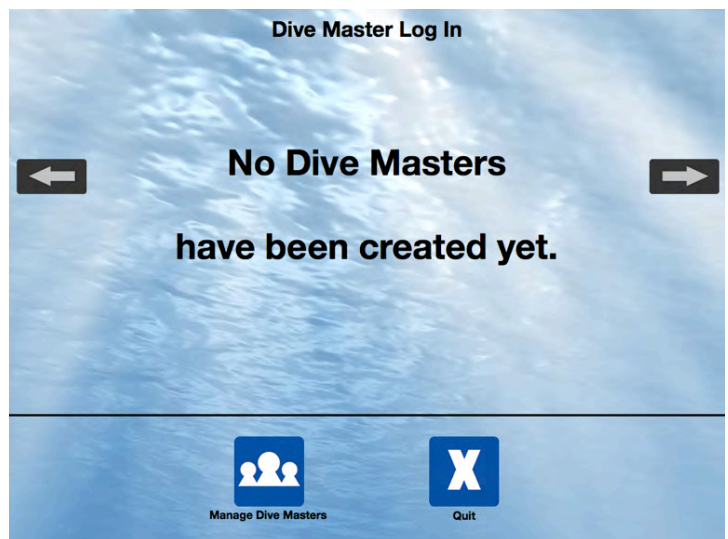

Figure 26: No Dive Master Screen

Logging In

 After clicking on a Dive Master's picture (Figure 27) a password field will be presented (Figure 28). Clicking the **Back** button will take the user back to the main Dive Master Log In page should the user decide not to log in as that chosen Dive Master. Otherwise, enter the Dive Master's password in the field using either a physical keyboard or a virtual one (provided by the operating system). The virtual keyboard can be manually activated by clicking on the small keyboard icon to the right of the password field. Once the password is entered, either press the **Return** key on a physical keyboard or click the **Login** button. If the password is correct, the user will then be taken to the Main Menu.

The Dive Master Log In Screen can display up to ten (10) Dive Masters at once. If your system has more Dive Masters, the left and right arrow buttons allow the user to switch pages and a page indicator appears near the top of the screen.
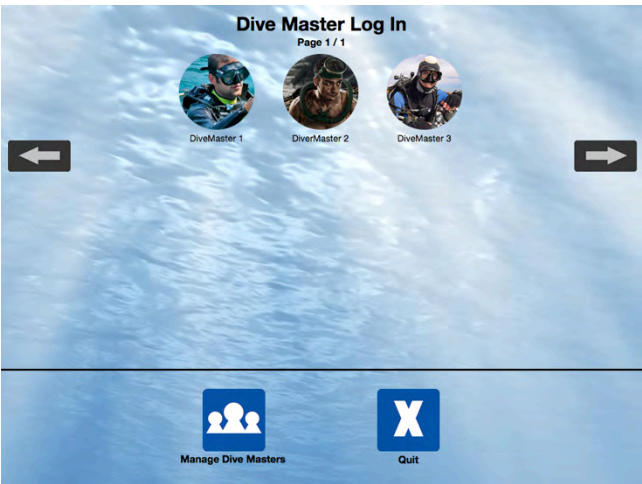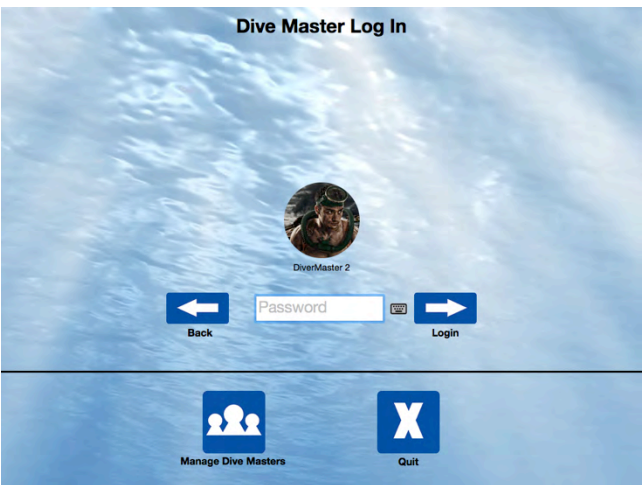

Figure 27: Dive Master Log In Screen

Figure 28: Dive Master Password Screen

Manage Dive Masters

This screen (Figure 29) allows a Dive Master to create, edit, and delete Dive Master accounts. Existing Dive Masters (up to six at a time) will be shown on the left side of the screen. Page up and page down buttons will become active when more than six Dive Masters are available.

When clicking on any Dive Master icon, the associated data will be displayed on the right side of the screen. The **Edit Dive Master** and **Delete Dive Master** buttons will also activate. The Dive Master data will be read only until the **Edit Dive Master** button is pressed.
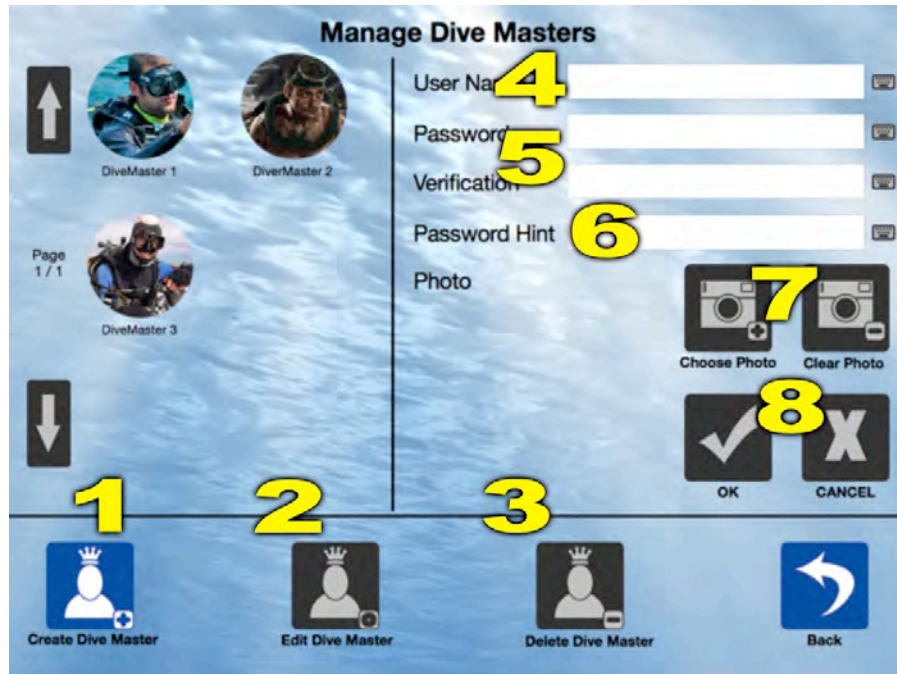

Figure 29: Manage Dive Masters Screen

1. **Create Dive Master** – Allows the user to create a new Dive Master. The user will then be able to insert a new username, password, password hint, and photo.
2. **Edit Diver Master** - Allows the user to edit an existing Dive Master. The password for that Dive Master account will be requested before any editing is allowed.
3. **Delete Dive Master -** Allows the user to delete an existing Dive Master. A confirmation box will be presented to confirm this action. **Note:** No password is required for this operation.
4. **User Name** - The name given to a Dive Master.
5. **Password / Verification** – A two-step verification for the Dive Master account password.
6. **Password Hint** – Dive Masters can enter a hint to remember their password. The hint will be shown on the Dive Master login screen after three failed attempts.
7. **Choose / Clear Photo** – The Choose Photo button accesses any onboard/attached camera to take or choose photos (See **Choose Photo** for Details). The Clear Photo button clears the current image. The photo area also provides drag and drop support allowing JPEG and PNG files to be dropped on this location.
8. **OK / Cancel** - The **OK** button will save the changes and the **CANCEL** button will revert to the original data.

Choose Photo

Any onboard/attached camera can be used to take an image of the Dive Master, diver, or a destination.

The camera viewfinder in the upper left allows the user to focus on the subject and capture the image. This image will appear in the Photo Profile in the lower right. Each time an image is taken, the Photo Profile will update with the latest image.

The Choose Photo Screen provides the following operations (Figure 30, Figure 31): (controls will vary on Windows and Apple products)

<p align="center">**Figure 30: Windows Photo Screen**</p>

1. **Select Device** – onboard/attached camera devices appear in this box.
2. **Digital Zoom** – the ability to zoom the image in and out (Windows only).
3. **Brightness** – controls the brightness level of the image (Windows only).
4. **Contour** – controls the contour / contrast of the image (Windows only).
5. **Sharpness** – controls the sharpness of the image (Windows only).
6. **Take Snapshot** – this button captures the image and places it in the Photo Profile in the lower right.
7. **Rotate Image** – rotates the image 90, 180, 270 degrees (Windows only).
8. **Choose File** – To use an existing image, choose this button and a file dialog box will appear.
9. **Rescan Ports** – This button will rescan the ports looking for addition cameras that may have been connected.
10. **OK** - Returns to the previous screen and save the image in the Photo Profile in the respective profile.
11. **Cancel** - Leaves the Choose Photos screen and makes no changes.

Figure 31: Macintosh Choose Photo Screen

Main Menu

When a Dive Master successfully logs in, the Main Menu screen (Figure 32) will appear. The Dive Master picture and name appear in the lower left area of the screen. Each of the main buttons is explained below. Note that some of these buttons will deactivate when a dive is being performed.
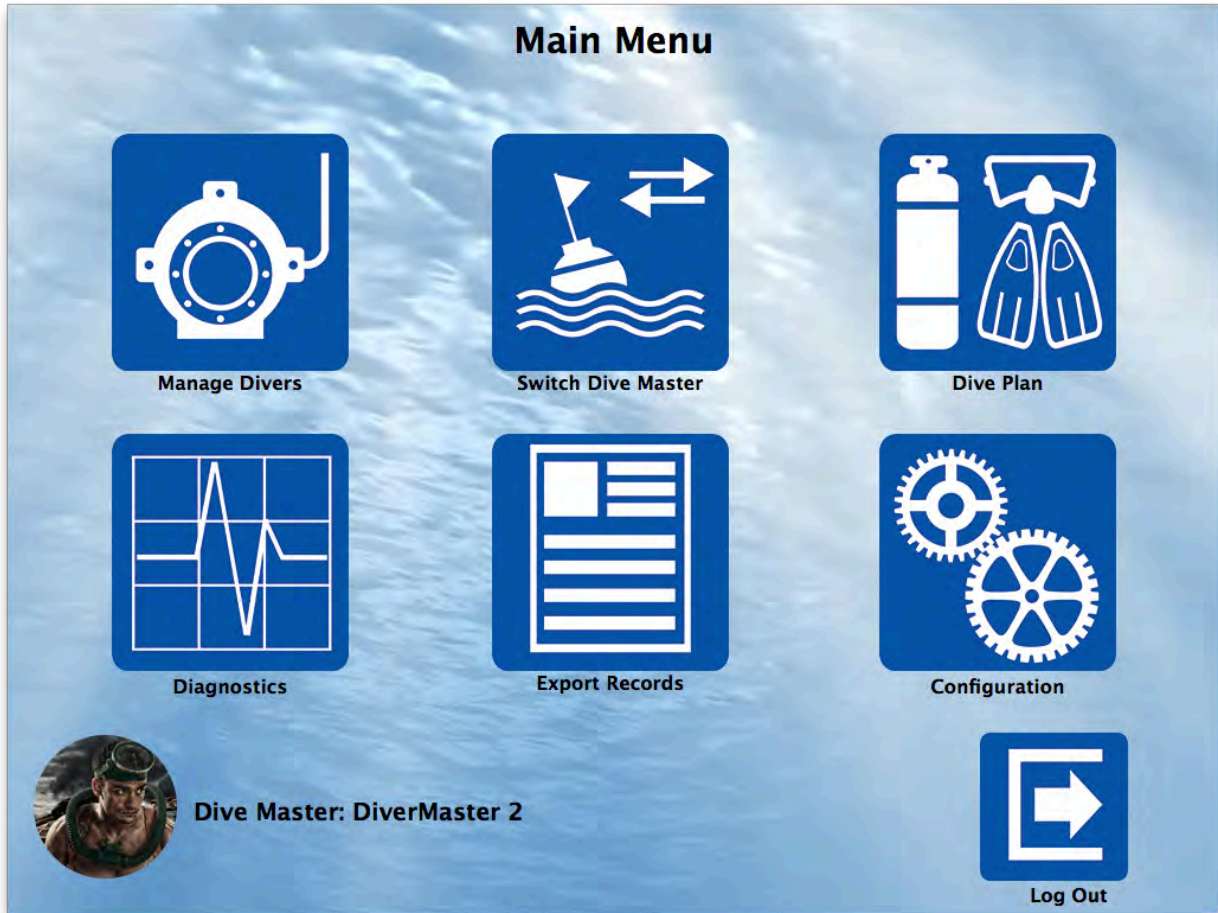

Figure 32: Main Menu

Manage Divers

Clicking the **Manage Divers** button will allow the Dive Master to create, edit, and delete divers as well as editing alarm conditions associated with a diver. Existing divers (up to six at a time) will be shown on the left side of the screen. Page up and page down buttons will become active with more than six dive divers are available (Figure 33).
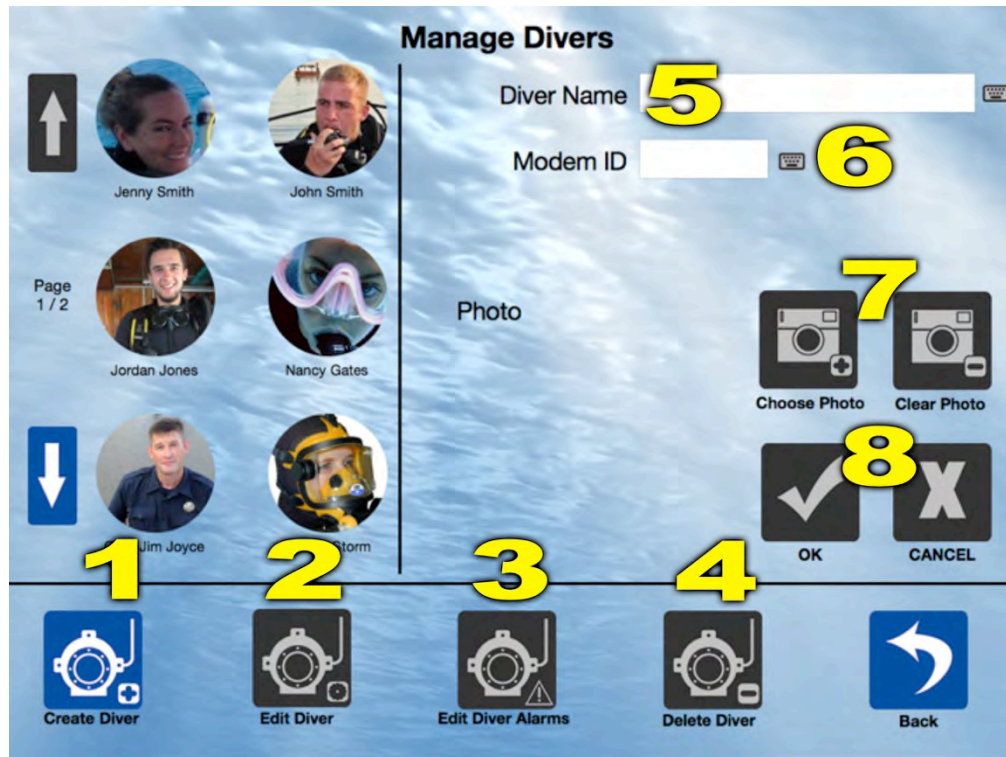

Figure 33: Manage Diver Screen

1. **Create Diver** - Allows the user to create a new diver. The user will then be able to insert a new username, password, password hint, and photo.
2. **Edit Diver** - Allows the user to edit an existing diver. The password for that diver account will be requested before any editing is allowed.
3. **Edit Diver Alarms** – The Dive Master can edit specific alarms for the selected diver.
4. **Delete Diver -** Allows the user to delete an existing diver. A confirmation box will be presented to confirm this action. **Note:** No password is required for this operation.
5. **Diver Name** - The name given to a diver.
6. **Modem ID** – The ID of the diver modem. (Displayed on the LED on the bottom of the modem).
7. **Choose / Clear Photo** - The Choose Photo button accesses any onboard/attached camera to take or choose photos (See **Choose Photo** for Details). The Clear Photo button clears the current image. The photo area also provides drag and drop support allowing JPEG and PNG files to be dropped on this location.
8. **OK / Cancel** - The **OK** button will save the changes and the **CANCEL** button will revert to the original data.

When clicking on any diver icon, the associated data will be displayed on the right side of the screen. The **Edit Diver, Edit Diver Alarms,** and **Delete Diver** buttons will also activate. The diver data will be READ ONLY until the **Edit Diver** button is pressed. When the **Edit Diver** button is pressed, all fields can be edited, including the associated picture.

When the **Edit Diver Alarms** button is pressed, the Diver Alarms screen is displayed (Figure 34). For quick reference, the global alarm settings are displayed below the edit fields in the Diver Alarms screen. The **OK** button will save the changes and the **Cancel** button will discard any changes. Check any boxes for alarms you wish to set and then fill in the alarm value. The units displayed can be toggled between U.S. (Pounds per Square Inch (PSI), Feet, Fahrenheit) and Metric (Bar, Meters, Celsius) by clicking the **Toggle Units** button.

Diver alarms must be more restrictive than the global alarms (discussed in the Global Alarms section). While a global alarm applies to all divers, a diver alarm will apply to the selected diver only and can be set with more restriction. If invalid values are entered (i.e. less restrictive than global alarms), these fields will be highlighted in red when pressing the **OK** button and need to be fixed before the data will be saved. Diver alarms can be useful when a diver is not at optimal condition (recently dived, fatigued, dehydrated, etc.) and the Dive Master wants to watch this diver a little more closely.

For example, the default global alarm for Main Low Pressure is 50 bar (725 PSI). If this is satisfactory for the chosen diver, then nothing

Figure 34: Diver Alarm Screen

needs to be done. However, if you want to apply a little more restriction so the alarm is triggered sooner, you could set that diver alarm at 65 bar (943 PSI). This indicates that if that diver's tank pressure value drops to 943 PSI, the diver alarm will trigger. It is not until the diver's tank pressure value drops even further to 725 PSI that the global alarm will trigger, thus making the diver alarm a more restrictive early warning feature.

Switch Dive Masters

During extended dive operations, there may be a time when one Dive Master must leave and another one will take over. While a dive is currently in operation, the **Switch Diver Master** button will allow the current Dive Master to log out and another Dive Master to log in to continue monitoring the dive. When clicking this button, the current Dive Master's password must be entered first. Once correctly entered, the replacement Dive Master will have 60 seconds to log in. If the log in does not occur in time, the current

Dive Master will be logged back in as the dive continues to be monitored. This will ensure that both parties properly perform the handoff and responsibility is passed on to the new Dive Master.

Dive Plan

The Dive Plan screen (Figure 35) allows a Dive Master to configure the dive details and dynamically manage personnel in the operation. Note: Please make sure that your Topside and GPS comms are configured before you start.

Figure 35: Dive Plan Screen

Data Descriptions
1. **Dive Name (Optional)** – the name given to the dive
2. **Description (Optional)** – a description of the dive
3. **Location (Optional)** – the location of the dive
4. **Max Depth (Required)** – the maximum planned depth for this dive
5. **Water Type (Required)** – salt water or fresh water
6. **Available Divers** – the list of divers that can be used. Each time a diver is put in the water, the **Available Divers** list is filtered to remove any divers that would cause conflicts (e.g. divers with the same Modem ID).
7. **Active Divers** – divers currently in the water
8. **Monitor Dive** – displays monitoring screens to track and control all diving operations. See the Dive Monitoring section.
9. **Complete Dive** – completes the dive and generates the reports

Once the dive plan information is entered, double click a diver in the **Available Divers** column or select that diver and press the right arrow to add the diver to the water. As soon as the first diver is added, monitoring of the diver begins.

When the first diver is put in the water, the dive plan information fields remain but the Max Depth, Feet/Meters Radio Buttons and the Salt Water/Fresh Water checkboxes become disabled. This will allow a Dive Master to update the dive plan text details at any time before the completion of the dive (Figure 36). The diver put in the water is removed from the **Available Divers** list and moved to the **Active Divers** list. Each time a diver is put in the water, the **Available Divers** list is filtered to remove any divers that would cause conflicts (e.g. divers with the same Modem ID).

During the dive, divers can be added or removed from the dive as required. When a diver is removed from the water (the diver must be on the surface), a dive report is created as well as a record in the history database.

The **Complete Dive** button will first check that all active divers are on the surface. If so, the divers will be removed and dive reports (Figure 37) and database records are created. A final dive report is created with all diver reports combined as well as any notes documented during the dive (See the Notes section). In addition, a Comma Separated Value (CSV) file is created with date/time stamped data for each diver as updated information was received during the dive.

Figure 36: Dive Plan Screen

Figure 37: Dive Record

If all active divers are not marked as being on the surface, an alert dialog box will be presented stating so. This situation can occur if a diver surfaces quickly and his modem comes out of the water preventing any final acoustic communications notifying the software that the diver is actually on the surface. The Dive Master may therefore enter his password as a confirmation that all divers are on the surface and the dive is complete. (Figure 38) This feature is added as a convenience. The other method to accomplish this is to return to the monitoring screens and manually mark each diver as on the surface.

Diagnostics

The Diagnostics screen allows the Dive Master to perform simple diagnostics to ensure modems are set up and communicating properly. Be sure that the Topside Modem is connected and the port has been chosen in the Communications section of the Configuration page.

Test Topside Modem

This button will test the serial communications between the Topside Modem and the Diver6 computer. A successful test will display information pertaining to the Topside Modem. Some of this information may be required for warranty and repair situations. At the end of the test, a success or failure message will be displayed (Figure 39).

Test Diver Modem

Before running this test, ensure that the **Test Topside Modem** test has been run successfully. Enter the modem number to be tested and press the **Test Diver Modem** button. If communication is established with that modem, details from the modem are displayed. Otherwise, a failure message will be displayed.

In this case, the test may be performed again as necessary making sure the diver modem is powered on, has the correct modem ID and is in range of the Topside Modem (Figure 40).

Reset Diver Modem Max Depth

Before running this test, ensure that the **Test Topside Modem** test has been run successfully. Enter the modem number to be tested and press the **Reset Diver Modem Max Depth** button. Results are displayed similar to the Test Diver Modem results (Figure 40).
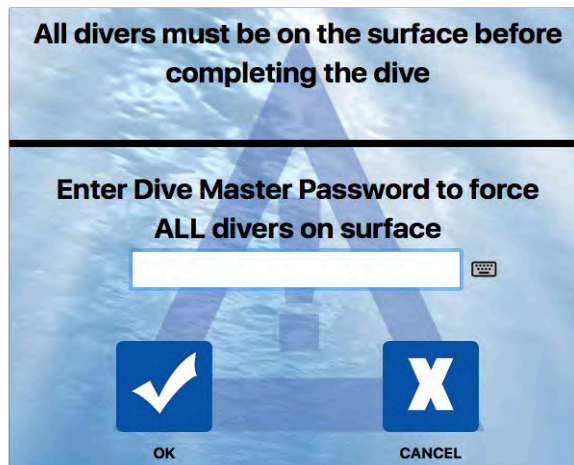

Figure 38: Complete Dive
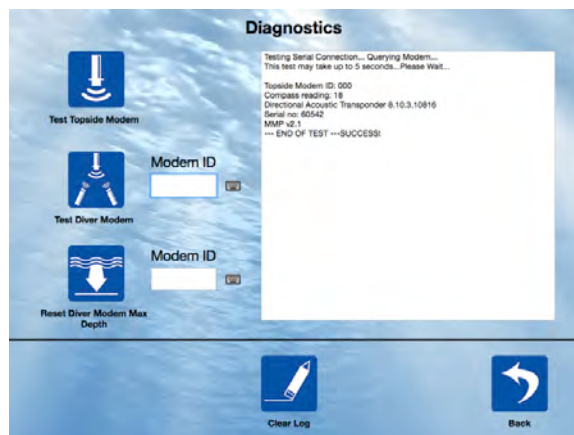
Figure 39: Diagnostic Screen – Topside Test
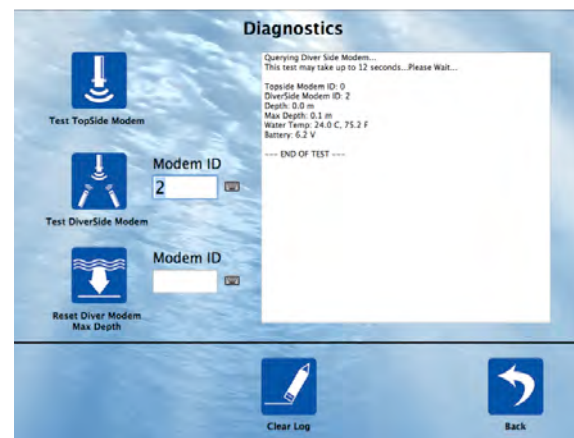
Figure 40: Diagnostic Screen – Diver Modem Test

Export Records

The Export Records screen (Figure 41) allows the Dive Master to export diver history (in a CSV file), export a selected dive record or all records. Selecting a specific diver will filter the data shown. In addition, date filtering (start and end dates) can be used to limit the data.

Figure 41: Data Export Screen

Configuration

The Configuration screen (Figure 42) allows the Dive Master to set up communication parameters, global alarms, change modem IDs, interfaces to other systems (data export), and perform dive log maintenance.

Figure 42: Configuration Screen

Communications

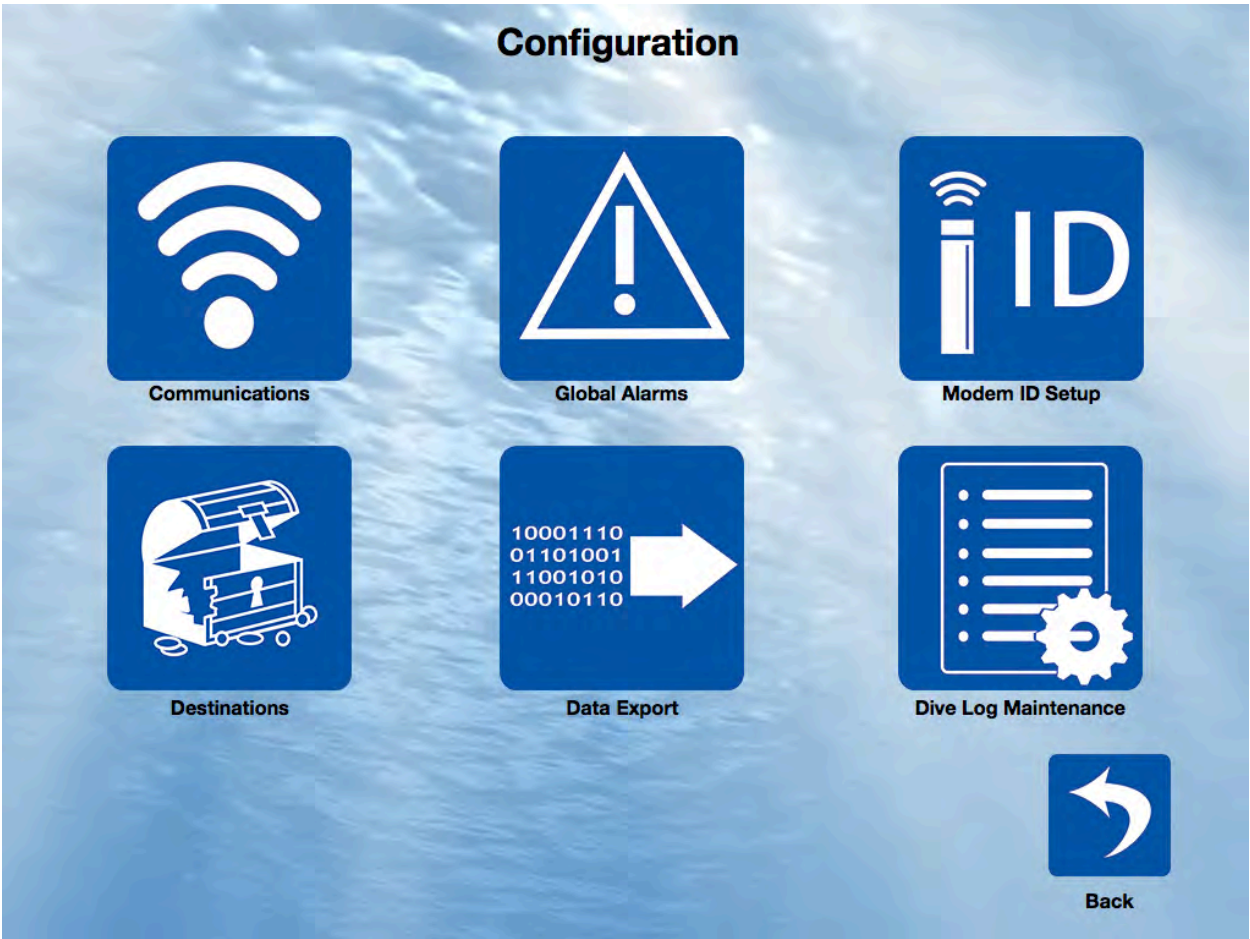The Communications screen allows the Dive Master to set up the communications port settings to the Topside Modem, a Global Positioning System (GPS) device an external compass. (Figure 43). The external compass can be very useful in a situation where the built-in compass might be influenced by the local environment. Magnetic mineral deposits, large iron or steel bodies, electrical engines or strong permanent magnets are just a few sources that can introduce errors to magnetic compass readings. The external compass port will override the built-in compass. If the external compass port is disconnected or data is not received within ten seconds (a timeout occurs), the software will default back to the built-in compass.

To configure a device, first select the appropriate device on the left side of the screen. Then, choose the settings for that device. If your device does not show up in the **Comm Port** popup list, first ensure the device is plugged in, turned on, and any drivers are installed. Click the **Rescan Ports** button and check the **Comm Port** popup list again to choose the correct device.

During the GPS test, the software will listen for the GGA or GLL National Marine Electronics Association (NMEA) 0183 sentence. If either string is received, a success message will be displayed. Otherwise, the failure message will appear.

During the Compass test, the software will listen for the HDG or HDM NMEA 0183 sentence. If either string is received, a success message will be displayed. Otherwise, the failure message will appear.

To verify the Topside Modem, GPS or Compass settings, click the **Test Connection** button. Status text will appear above this button indicating a success or failure.

To configure the Bluetooth connection (for wireless Topside Modem communication), be sure to connect the Bluetooth module to the Topside Battery Unit and the USB dongle to the tablet computer.
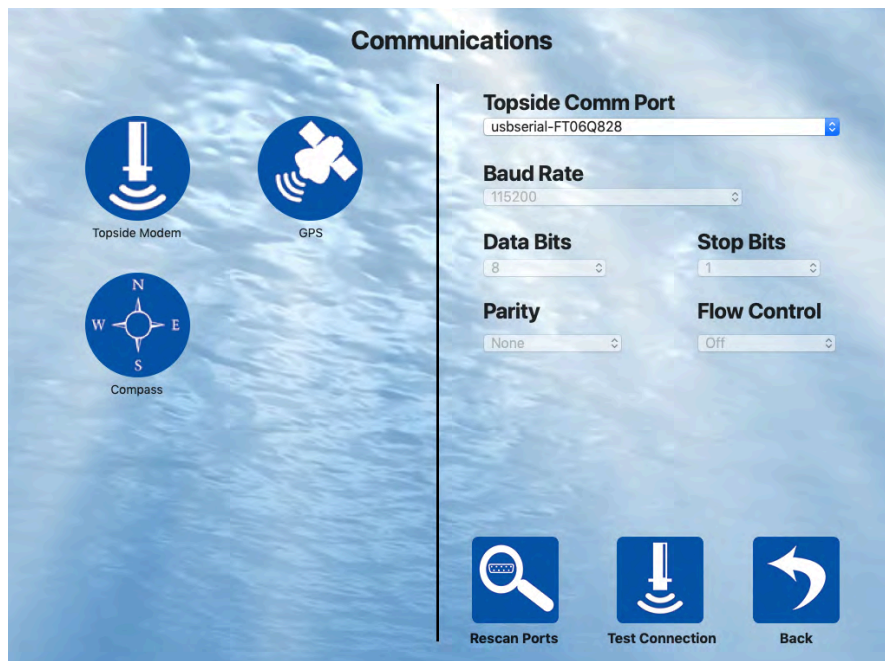

Figure 43: Communications Screen

Global Alarms

The Global Alarms screen (Figure 44) displays system wide alarms and are organized into categories. A default set of global values is provided and can be enabled/disabled by checking/unchecking the box beside the particular alarm. Pressing the **Reset Global Alarms to Factory Defaults** button will restore the values to their default states. The units displayed can be toggled between U.S. (PSI, Feet, Fahrenheit) and Metric (Bar, Meters, Celsius) by clicking the **Toggle Units** button. Clicking the **OK** button will save the changes and the **Cancel** button will abort.

When saving new global alarm values, the software will scan all diver alarms to update any out of range values and display a dialog box with all divers that were adjusted.

Figure 44: Communication – Global Alarms Screen

Alarm	Default Value	Triggered When
Main Low	725 psi	Falls below value
Remaining Air Time	10 mins	Falls below value
Max Depth Greater Than Plan	NO	Diver depth exceeds plan depth
Max Depth	164 ft.	Exceeds value
Ascent Rate	59 ft./min	Diver ascends to quickly and exceeds rate
Water Temp Min	50 F	Water temperature falls below value
Water Temp Max	77 F	Water temperature exceeds value
Acoustics	5 transmissions	Fails to receive a number of responses
Max Range	984 ft.	Exceeds value

Modem ID Setup

The Modem ID setup screen allows the Dive Master to acoustically change the ID of one modem at a time. This can be done while in the water or out of the water provided the diver modem is very close to the Topside Modem. Make sure that **ONLY ONE** diver modem is powered on, click the **Query Diver ID** button (Figure 45) and if a modem is found, the ID will be displayed in the text area on the right side of the screen. If more than one modem is powered on, the results are unpredictable.

Once found, enter the new modem number in the field and press the **Change Diver ID** button. If successful, results should be shown similar to Figure 46.

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NOTE: **The Modem will need to be rebooted before it can be used with the system. Recycle the power on the modem.**
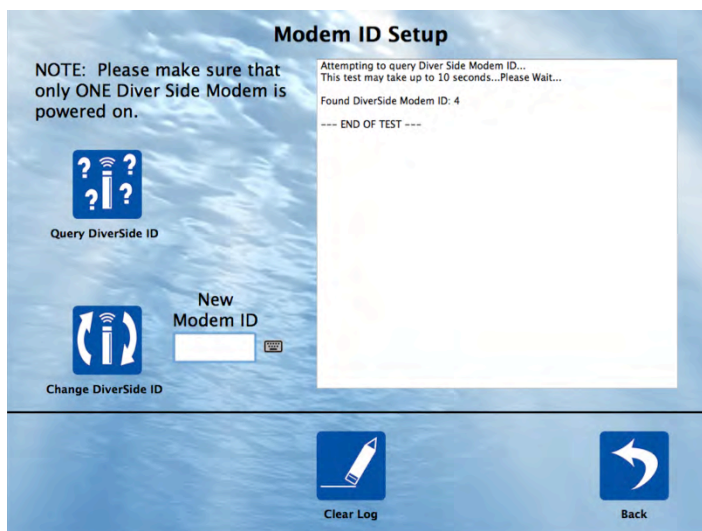
****

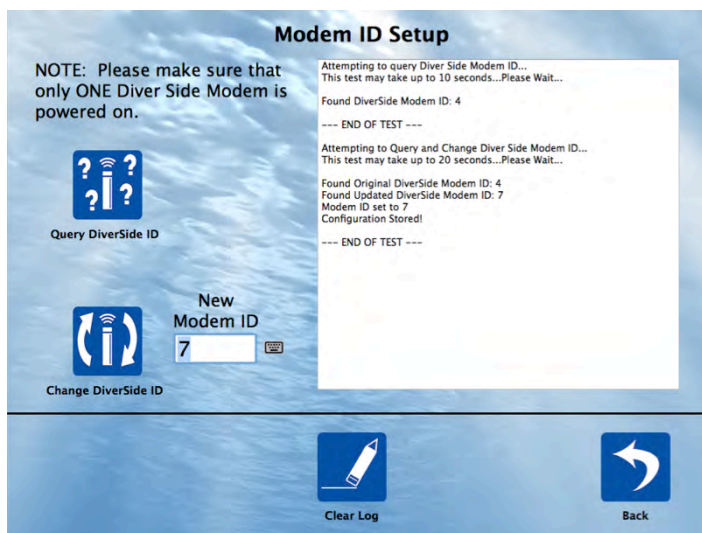Figure 45: Modem ID Setup – Query Modem

Figure 46: Modem ID Setup – New Modem ID

Data Export

The Data Export screen allows the Dive Master to set up data export capabilities for use with external systems.

The Multicast Network Settings section allows the Dive Master to choose a Broadcast Address and Port Number for a User Datagram Protocol (UDP) interface to allow diver data to be transmitted on the network. This allows other systems to easily import the information for data collection and processing. One such system is HYPACK® (www.hypack.com).

The format of the datagram is a comma delimited string of values for each diver with the following fields:

- Diver6 Prefix/Beginning of string ($DIVER6)
- Diver # (up to 3 digits)
- Diver Name
- Range (meters)
- Azimuth (degrees)
- Depth (meters)
- Water Temperature (Celsius)
- Maximum Depth (deepest diver has gone)
- Tank Pressure 1 (BAR) (or empty string if no data exists)
- Tank Pressure 2 (BAR) (or empty string if no data exists)

The GPX Export section allows the Dive Master to choose if GPX compatible track files are exported during dives. The Dive Master can turn off the exporting (Export None) or export craft only, diver only, or both craft and diver tracks. The GPX files can be opened by any application that supports the format (Figure 47).

Figure 47: Data Export

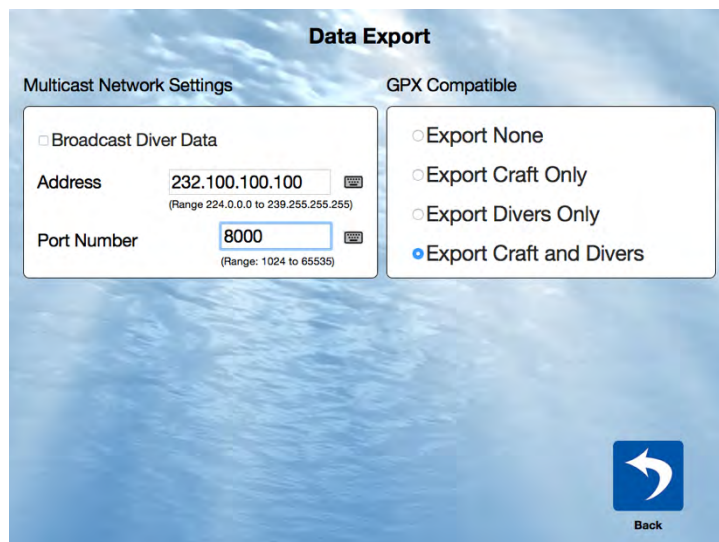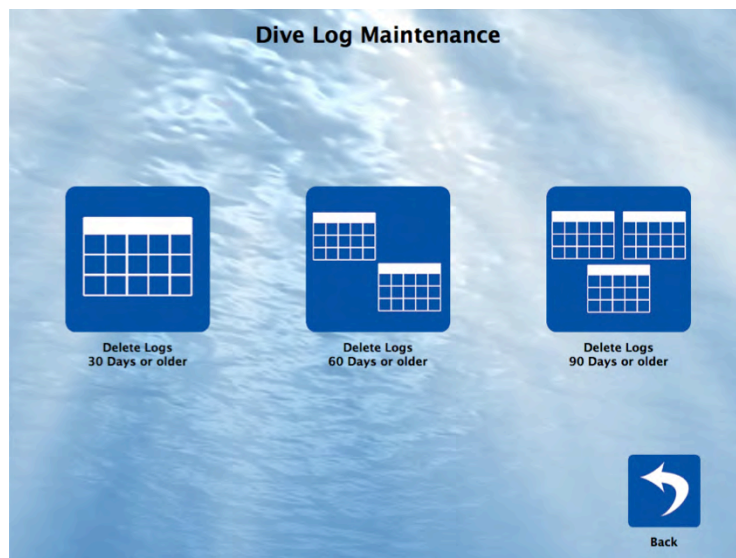**Figure 48: Dive Log Maintenance**

Dive Log Maintenance

Over time, a large quantity of dive logs may accumulate and take up an abundance of storage space. The Dive Log Maintenance screen (Figure 48) allows the Dive Master to delete files within specific time frames to help free up space. A confirmation box will be presented to ensure the Dive Master definitely wants to delete the files.

Destinations

The Manage Destinations Screen allows the Dive Masters to set up specific locations. Using the Shearwater® Petrel or NERD, the Dive Master can send a diver to a specific destination and the diver will receive range, bearing, and depth information to that location. New destinations can be created pre-mission or during the mission.

Clicking the **Destination** button will allow the Dive Masters to create, edit, and delete destinations. Existing destinations (up to six at a time) will be shown on the left side of the screen. Page up and page down buttons will become active with more than six destinations are available (Figure 49).
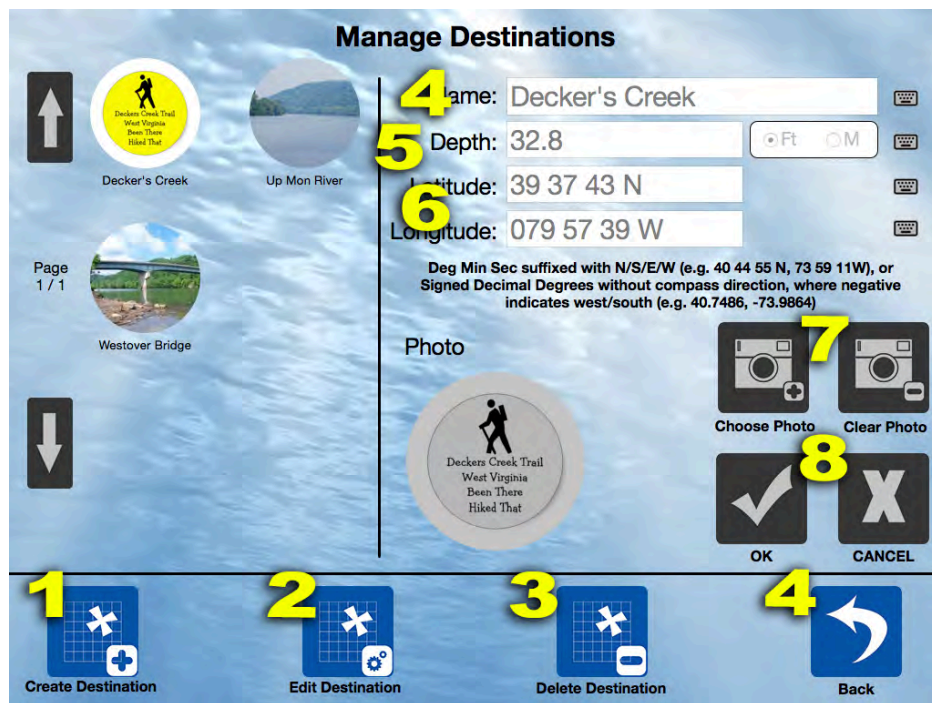
Figure 49: Destinations Screen

The Manage Destinations Screen has the following controls:
1. **Create Destination** - Allows the user to create a new destination.
2. **Edit Destination** - Allows the user to edit an existing destination.
3. **Delete Destination -** Allows the user to delete an existing destination. A confirmation box will be presented to confirm this action.
4. **Destination Name** - The name given to a destination.
5. **Depth** – The depth of the destination, click feet or meters.
6. **Latitude / Longitude** – Enter the coordinates of the destination (multiple formats are permitted).
7. **Choose / Clear Photo** - The Choose Photo button accesses any onboard/attached camera to take or choose photos (See **Choose Photo** for Details). The Clear Photo button clears the current image. The photo area also provides drag and drop support allowing JPEG and PNG files to be dropped on this location.
8. **OK / Cancel** - The **OK** button will save the changes and the **CANCEL** button will revert to the original data.

When clicking on any destination icon, the associated data will be displayed on the right side of the screen. The **Edit Destination** and **Delete Destination** buttons will also be activated. The destination data will be READ ONLY until the **Edit Destination** button is pressed. When the **Edit Destination** button is pressed, all fields can be edited, including the associated picture.

Dive Monitoring

The Dive Monitoring screens provide the Dive Master with detailed diver information, mapping, dive team view (multiple diver information at once), diver alarms, dive tables (for reference or manual calculations/lookups), notes (to document events during the dive), and the ability to return to the dive plan screen (Figure 50).
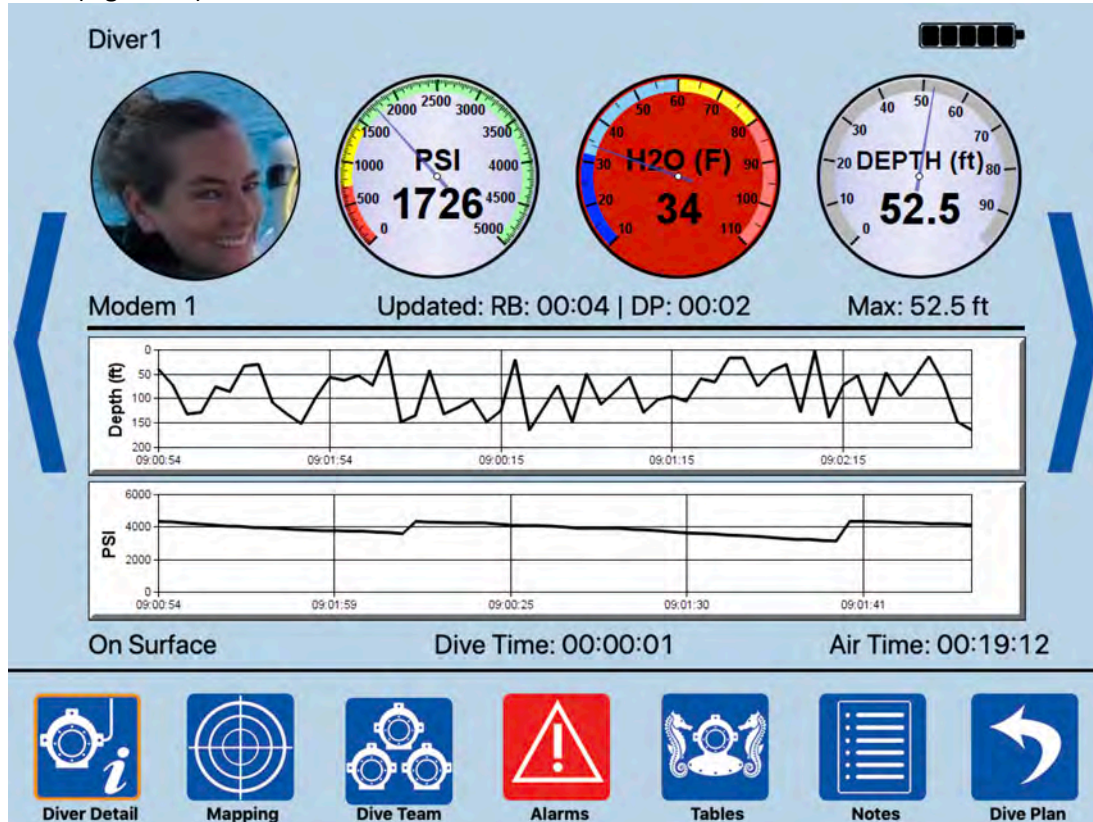
Figure 50: Dive Monitoring Screen

The main buttons at the bottom of the screen allow the Dive Master to see both detailed and summary information regarding the dive. At any time when input is required, these buttons will change to a question with buttons to respond to the question. This question must be addressed before the main buttons return (Figure 51).
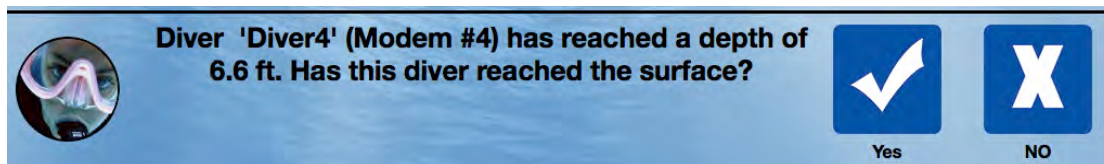
Figure 51: System Question Screen

With the basic Diver6 System, the only question that requires a response is "Has this diver reached the surface?" This will be asked after a diver has left the surface and returned to a depth of 2 meters (6.56 feet) or less. Depending on the dive, the Dive Master may answer "No" to this question if perhaps the diver returned to the surface to get a tool or swap out equipment.

Diver Detail

The Diver Detail screen (Figure 52) provides a large view of data for a single diver. Clicking on the various gauges and graphs will toggle the units (Bar vs. PSI, Ft. vs. Meters, Fahrenheit vs. Celsius). The large blue arrows at the sides of the screen allow the Dive Master to traverse the list of all divers.
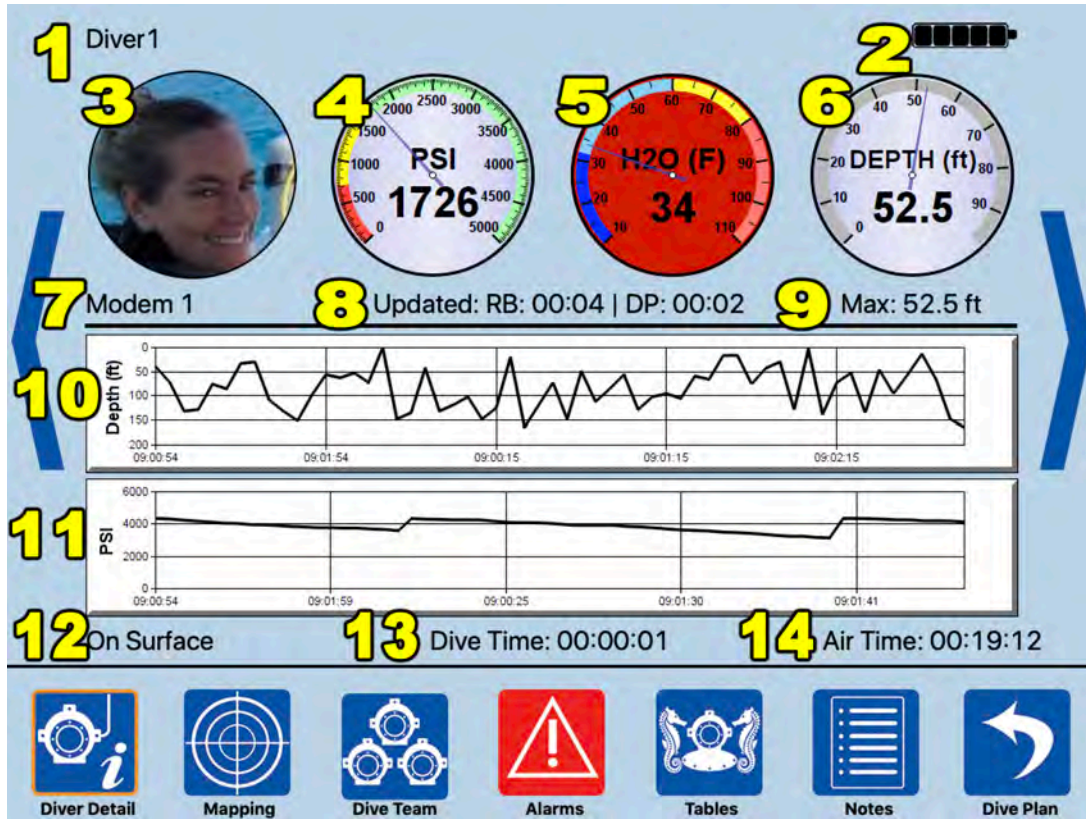
Figure 52: Diver Details Screen

Data Descriptions

1. **Diver Name** - name of the diver and any additional status (e.g. recall, assisting #, silent, etc.)
2. **Modem Battery Status** - power remaining in the diver modem
3. **Diver Photo** - picture of the diver
4. **Tank Pressure** - the current tank pressure
5. **Water Temp** - the current water temp
6. **Depth** - the diver's current depth
7. **Modem #** - the modem ID of the diver
8. **Last Update** - how much time has passed since Range & Bearing and Data Packet were last updated
9. **Max Depth** - the diver's max depth
10. **Depth History** - the diver's depth history
11. **Pressure History** - the tank pressure history
12. **Diver Status** - the current status of the diver (Left Surface, On Surface)
13. **Dive Time** - the diver's time in the water after leaving the surface
14. **Air Time** - the approximate air time left in the tank

On all screens (except the Mapping screen), the Diver Name will consist of the name and any additional status text (Recall, Assisting #, Silent, etc.) This helps provide additional information regarding each diver. Note that the diver name may be truncated to fit the status text on the screen.

The "Updated" text (*Updated: RB: mm:ss | DP: mm:ss*) appearing throughout the software provides information on the last time data was received from the particular diver modem. There are two different pieces of data that can be received. The "RB" indicates the Range and Bearing information and the "mm:ss" represents how many minutes and seconds ago that data was received. The "DP" designates the Data Packet which is generally received a few seconds after the RB data and is a much larger transmission. Keeping these two updated fields separate can help provide a better understanding of the diver's data. The Dive Master can easily determine if either transmission was missed thus allowing better decision making and analysis of the dive.

The status of the diver (On Surface or Left Surface), dive time, and remaining air time are displayed below the graphs. The Dive Time is calculated as follows. When a diver descends to 2.0 meters or lower and remains there for 30 seconds or more, the Status field is updated to **Left Surface**. Dive Time will then show a value when the original descent reached 2.0 meters (thus starting at 30 seconds). The Dive Master can manually change this status (See Dive Team Control section).

The Air Time remaining is calculated using up to the last five minutes of pressure readings. A rate per minute is then calculated and this rate is used to determine how long it will take to reach 725 PSI (or 50 bar). If the tank pressure has remained constant over a five-minute period, the Air Time will read "INF" indicating no air has been used and there is an "infinite" time remaining. If the diver does not have a tank pressure sensor, the string "--:--:--" will be displayed.

When clicking on the Dive Time the Dive Master can toggle between the current dive time and cumulative dive time. The current dive time is the time between when a diver leaves the surface and returns to the surface. A diver can surface multiple times during a dive, and not get out of the water. The cumulative dive time is the total time the diver has been in the water for this dive.

Note that gauges and text will turn red (alarm color) if any alarm condition exists for that particular item.

Mapping

The Dive Map screen provides several different ways to view the divers (Figure 53). First, a two-dimensional (top down) view of all divers and their corresponding ranges and bearings can be displayed. Options to this view will be discussed in the next section.
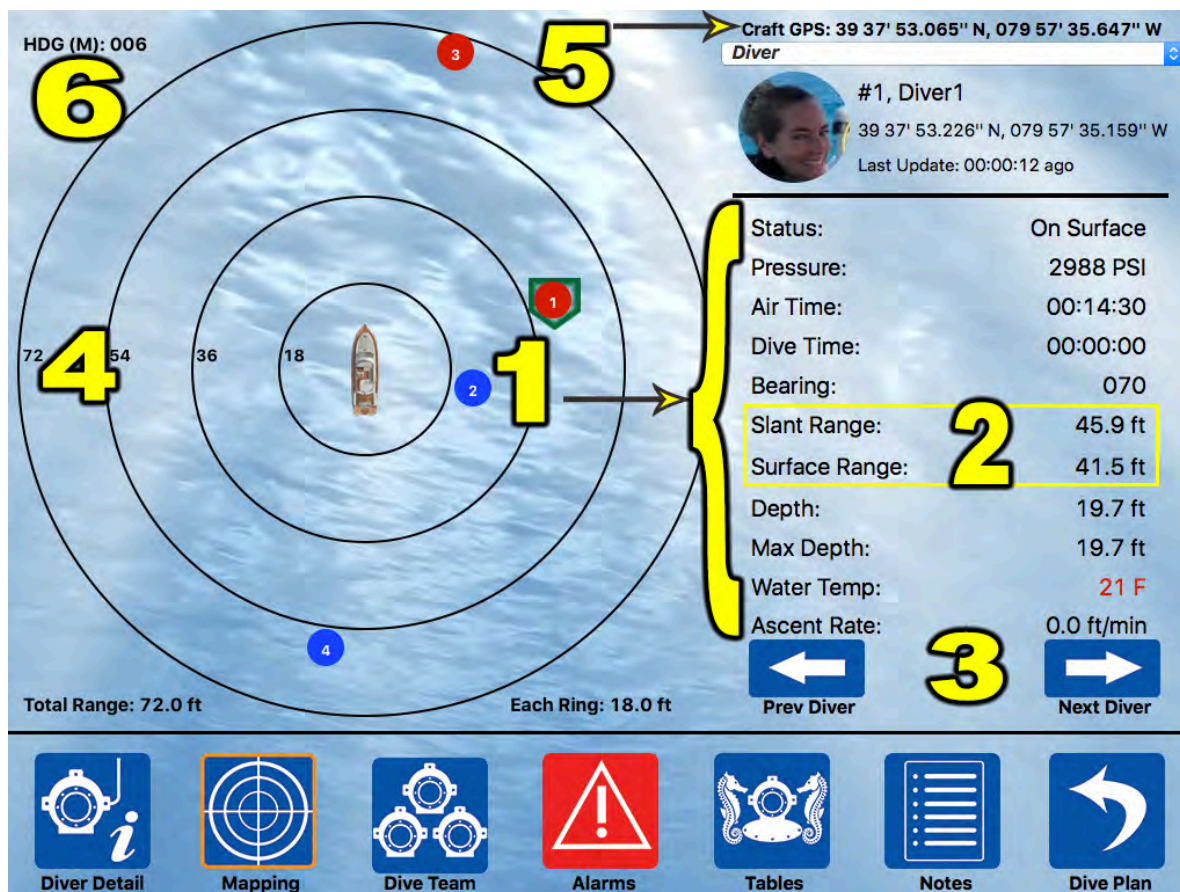

Figure 53: Mapping Screen

Data Descriptions

1. Selected diver information is shown on the right side of the screen. The selected diver will appear with a green badge surrounding the circle. **Diver icons appear as a blue filled circle if there are no alarm conditions for that diver.** Otherwise, the icon will be a red filled circle.
2. The **Slant Range** is the distance from the Topside modem to the diver modem. The **Surface Range** is used to describe the range from the craft where the diver will surface when heading straight up to the surface.
3. The Dive Master can cycle through the divers by clicking on the left and right arrows.
4. The range of the map is **dynamically adjusted** to include all divers in the view. In other words, as a diver gets further from the craft, the range of the map increases to ensure that all divers are shown on the screen. A textual explanation of the range rings is shown below the map.
5. The craft location is provided by the GPS. Clicking in this text area will toggle formats between decimal degrees and degrees, minutes, and seconds.
6. The magnetic heading is provided by the Topside Modem.

Mapping – Options

The various views (2D, 3D, Charts) as well as options for the 2D view (Rings, Compass, Destinations) can be quickly changed using the buttons after selecting **Options** from the popup list in the upper right area of the screen. These option buttons will change from white to yellow to indicate that option is enabled.

Range Rings

On the 2D view (Figure 54) range rings may be toggled on or off to clean up the screen.

This toggle button is disabled when the Dive Master is not viewing the 2D map.

Figure 54: Range Rings Screen

Compass

The magnetic heading provided by the Topside Modem can be toggled with the Compass button. This will display the compass overlay (Figure 55).

This toggle button is disabled when the Dive Master is not viewing the 2D map.

Figure 55: Compass Screen

Destinations

The Destinations button will toggle the display of vectors for divers being recalled to the craft or those that are being sent to assist another diver (Shearwater® capability) (Figure 56). In addition, it will show divers being sent to specific latitudes and longitudes marked as a yellow triangle.

This toggle button is disabled when the Dive Master is not viewing the 2D map.

Figure 56: Destinations Screen

3D

Pressing the 3D button will change the dive map to a three-dimensional view (Figure 57). To rotate the 3D image, simply click on the image and drag your pointing device (mouse, pen, finger, etc.) around. Again, the Dive Master can cycle through all divers by clicking the left and right arrow keys (under the diver popup selection) and the selected diver will appear surrounded by a green badge.
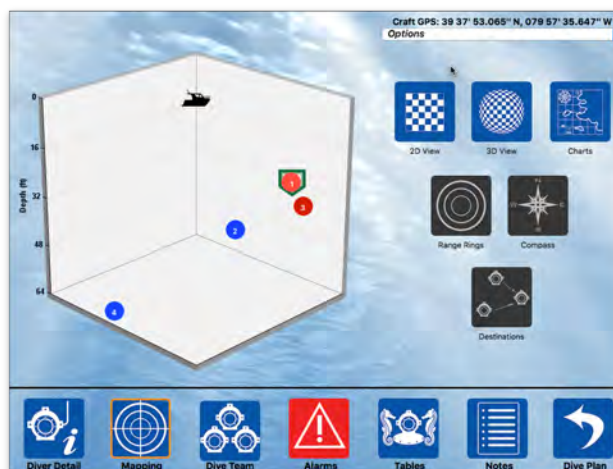
Figure 57: 3D Screen

Charts

Pressing the Charts button will display ENC charts centered at the current location of the craft GPS. Diver markers will appear at their current GPS locations as well (Figure 58). To change the zoom level of the map, the Dive Master can click the plus or minus buttons in the upper left corner of the map. The blue menu buttons at the top provide the Dive Master three options of lighting and three options of chart detail. For more information on loading charts and general chart maintenance, see the Chart Management Appendix.

Figure 58: Charts Screen

Diver6 User Manual

Diver Assist

The **Assist** menu popup selection provides information to the Dive Master to help direct one diver to another.

Figure 60: Diver Assist Screen

Figure 59: Go To Target Screen

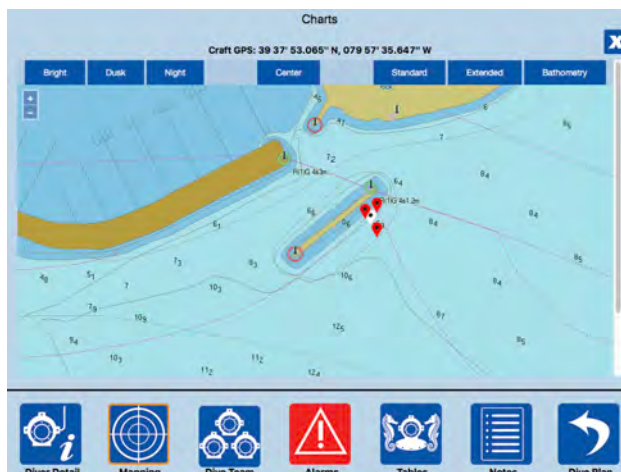1. If a diver needs assistance, the Dive Master can select that diver from the **Diver Requiring Assistance** popup list. In the Figure 60, Diver 2 has been chosen as the diver requiring assistance.

2. The list box below will show information for every other diver regarding his or her range, heading and depth to reach the selected diver. The **Dir** column indicates whether the diver needs to ascend or descend and the **Depth** column how many feet or meters to reach the same depth as the diver needing assistance. The list box indicates that Diver 4 (for example) is 91.7 feet away and Diver 4 needs to descend 26.2 feet to reach the same depth as Diver 2. As new diver data is acquired, this list will be updated to ensure the most accurate data is provided. This feature is useful in helping the Dive Master to determine the best diver to send to the one requiring assistance.

3. With additional equipment (Shearwater® NERD or Petrel), the lower portion of the screen provides additional functionality. The **Diver to Provide Assistance** popup list can be used to select the diver that will perform the assist. If that diver does not have the Shearwater® device, a red text alert will indicate so.

4. The **Diver Assist** button will become available when a Shearwater® NERD or Petrel is available. If pressed, a confirmation dialog will be presented to ensure the Dive Master wants to initiate the assistance. If the Dive Master confirms, the Diver6 software will send messages so the Shearwater® device can display the range and heading to reach the diver requiring assistance (Figure 59).

5. When a Diver using a Shearwater® device is issued an assist message, the diver will have the option to accept the assist or cancel the assist. If accepted, the diver will be given a range, bearing, and depth to the diver that needs assistance. Upon arrival, the diver can notify the Dive Master that the target has been reached. Under certain circumstances, a diver may not be able to provide assistance and can cancel the task thus sending a message to the Dive Master.

Recall

The **Recall** menu popup selection provides information in a list box describing how far the diver is from the craft and on what heading he or she should proceed to return to the craft (Figure 61). Again, this list will be updated as new diver data is acquired. If a diver is being recalled, the letter "R" will appear to the right of the heading in the list box.

Figure 61: Diver Recall Screen

Data Descriptions
1. List of divers with range, heading, and recall status. Select the diver to recall or cancel
2. **Cancel Selected** – will cancel the recall of the selected diver
3. **Recall All** – will recall all divers to the craft
4. **Cancel All Recall** – will cancel the recall message to all divers

Audio and Visual Cues for Recall

The diver modem will emit three long beeps separated by one second of silence each time it receives a recall message. If the diver is using a Shearwater® device, a message to return to the craft with range and heading will be displayed (Figure 62). Following this, the Diver6 software will send messages so the Shearwater® device can display the updated range and heading to assist the diver in returning to the craft. If the recall is canceled, the modem will emit a one second beep for five times to alert the diver that the recall has been canceled. Then, the modem will stop beeping and any Shearwater® device will clear the recall message from the display.

Figure 62: Recall Screen

Send

The Send menu popup selection provides the ability to send a diver to a specific latitude and longitude (Figure 63). For example, if there is a place on the sea floor that a salvage team is working, the latitude and longitude can be recorded as a destination. When divers need to return to that location, the send diver function can be used.

Note: Divers will receive range, bearing, and depth information to the location on their Shearwater® dive computers. Without the Shearwater® devices, the range and bearing information will be visible to the Dive Master. The information will appear in the lower right area of the screen.
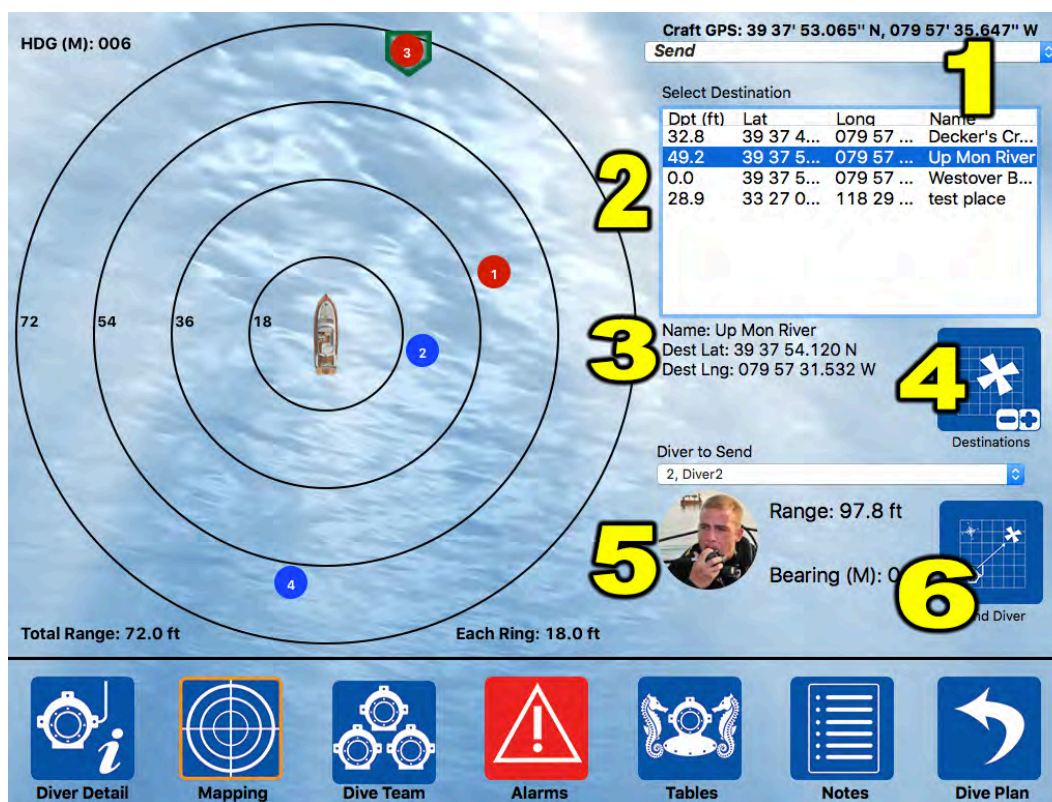

Figure 63: Send Destination Screen

Data Descriptions
1. **Send** – this popup provides the ability to send a diver to a specific destination.
2. **Select Destination** – the Dive Master can select a specific destination to send the divers.
3. **Details** – when a destination is selected, the information will appear here for better viewing.
4. **Destinations** – this button will allow the Dive Master to manage destinations (See **Destination** for more details).
5. **Diver to Send** – this popup allows a specific diver to be sent to the selected destination. The range and bearing to the destination will appear. When selecting the **Send All** option, no range and bearing information will appear.
6. **Send Diver** – this button initiates the send operation to provide the diver(s) (with a Shearwater® device) range and bearing information to the destination.

Mark

The Mark menu popup selection provides the ability to quickly add a selected diver's location (latitude, longitude and depth) as a saved destination (Figure 64). When divers need to return to that location, the send diver function can be used. To save a diver's location, first select the appropriate diver by either clicking on that diver on the 2D mapping area or by using the "Prev Diver" or "Next Diver" buttons. Then, enter a descriptive name in the "Marked Name" field and press the "Save" button. A confirmation dialog box will be displayed to ensure the Dive Master wants to save this destination.

Figure 64: Mark Screen

Charts

The Charts menu popup provides the capability to overlay historical dive data and activate current dive breadcrumb trails. These features indicate where divers have been on the current dive and where they have been on previous dives. The Dive Master can load multiple historical data files and then select in real time which dives to view. With breadcrumbs, the Dive Master can select all or individual divers to view in real time.

The History tab (Figure 65) allows the Dive Master to add historical dive data into the active dive. The "Load File" button will load historical dive data into the system. Dive Masters can load one or more data files for geographic analysis. Once loaded, the files can be selected for viewing by clicking the View check box. Files that are checked will be visible on the chart screen.

Figure 65: Historical Data Screen

The Breadcrumb tab (Figure 66) allows the Dive Master to show the breadcrumb trail of any active diver. Each time diver location data is acquired, this data is logged. The data can be overlaid on the active dive in the chart screen. The breadcrumb data of any active diver can be viewed by selecting the View check box. In addition to selecting individual diver data, the "Show All" button will enable all breadcrumb data on all current divers. The "Hide All" button will disable viewing of breadcrumb data for all current divers.
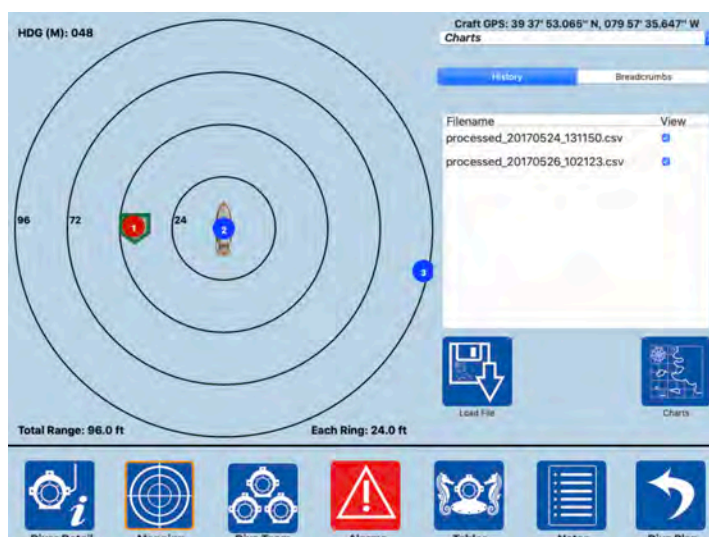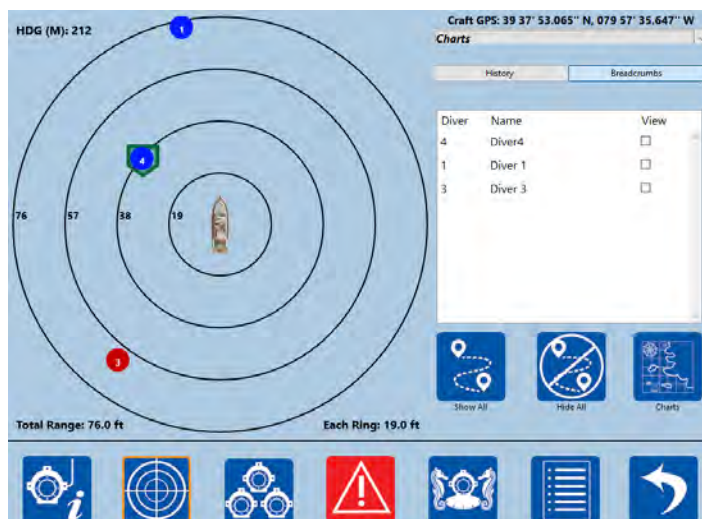

Figure 66: Breadcrumb Data Screen

Dive Team - Team Info

The **Team Info** tab will display summary information for up to six divers at once (Figure 67). The large left and right arrows will allow the Dive Master to traverse through divers six at a time. Clicking on one of the diver's informational boxes will take you directly to the Diver Detail screen for that diver.

NOTE: The icon under the diver image is the battery status of the Diver Modem. It is NOT the amount of air remaining in the tank.

Figure 67: Dive Team Screen

Dive Team – Control

The **Control** tab (Figure 68) will allow the Dive Master to control certain aspects of the current divers in the water. The Dive Master can view six divers at a time. To see more divers, click on the up and down arrows to the left of the diver images.

Figure 68: Dive Team Control Screen

Controls

1. **Diver Select** - Select the diver to control. That diver's info will appear on the right-hand side of the screen.
2. **Diver Status** - Allows the user to manually modify the diver status (Left Surface, Reached Surface).
3. **Modem Power** - Change the output power level of the diver modem. The default modem power level is 6 but the power level can be changed to any level from 5 to 8. When changing the power level, the text will be displayed with a question mark until a response is received.
4. **Silence** - Silence the diver modem. Effectively, this stops the querying of the diver modem so that no acoustic signals are transmitted or received. This feature can be used in special circumstances where it may be critical for a diver not to be noticed. Once silenced, the modem may be enabled again by clicking the button that is now labeled "**Broadcast.**"
5. **End Assist** - End any assistance this diver is providing to another (only available with Shearwater® device). If this button is available, a confirmation dialog will be presented to ensure the Dive Master does want to end assistance.
6. **End Send** - End any sending of divers to a specific latitude and longitude. A confirmation dialog will be presented to ensure the Dive Master does want to end the operation.

Audio and Visual Cues for Assist and Send

If the End Assist or End Send is selected, the modem will emit a one second beep for five times to alert the diver that the operation has been canceled. Then, the modem will stop beeping and any Shearwater® device will clear the operational message from the display.

Dive Team – 3rd Party Data

The **3rd Party Data** tab (Figure 69) displays additional information regarding any external devices (e.g. Shearwater®). If a diver has a Shearwater® device, a small image of the associated device (Petrel, NERD, pressure sensor) will appear with any data received from it. If the diver does not have any supported external device, a red "X" will appear with "NO DATA AVAILABLE" in the box.
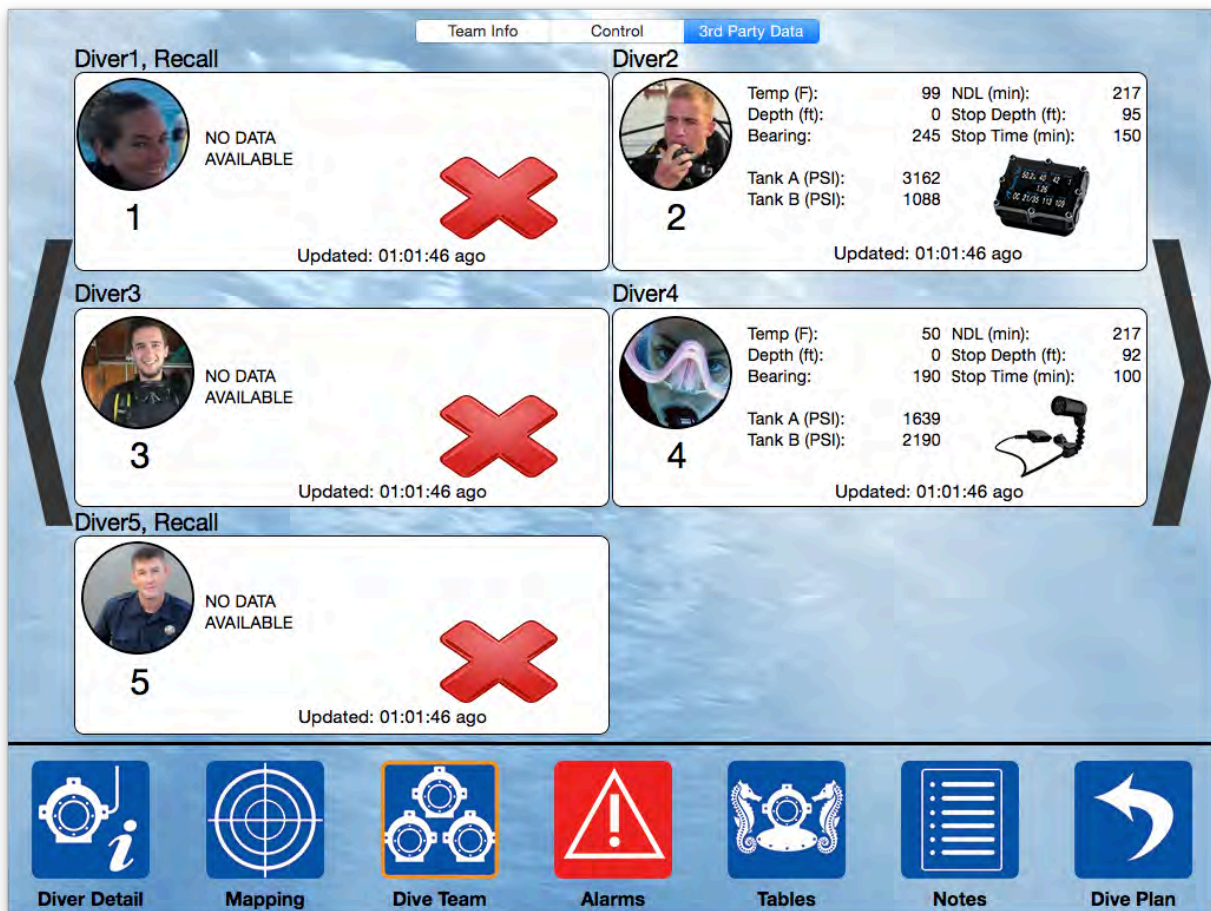

Figure 69: 3rd Party Data Screen

Alarms

When any alarm condition currently exists, the **Alarms** button will turn red to alert the Dive Master. In the case of the lost USB comms, the **Alarms** button will turn red with the "USB" indicator inside the icon. Ensure the Topside Modem is powered on and plugged into the Monitoring Computer properly.

The alarm screen displays (Figure 70) up to six divers at a time with the various alarm types. If an alarm exists for that diver, the circle beside the text is filled in red.

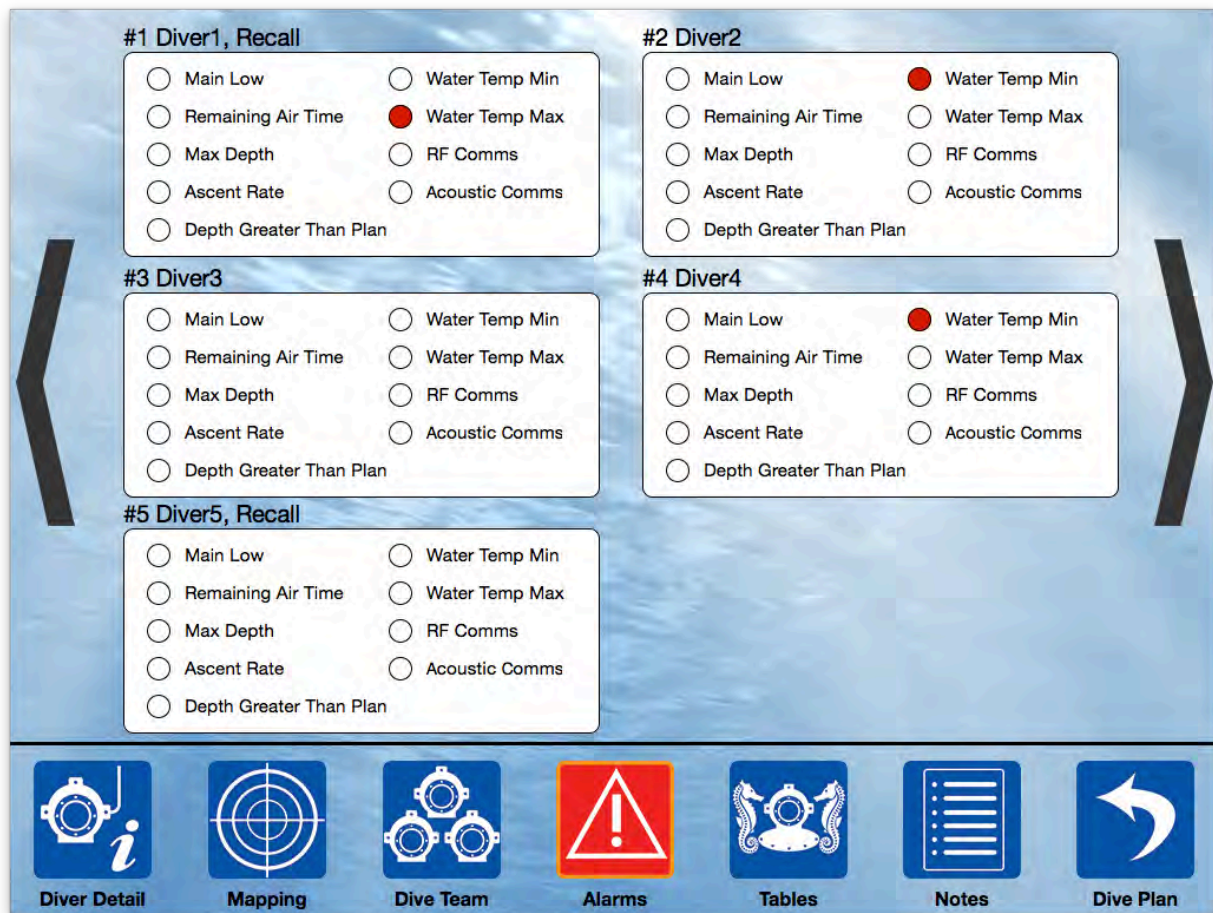Using the large left and right arrow buttons will traverse the list of divers six at a time.

Figure 70: Diver Alarm Screen

Alarm Details
See Alarm Details in the Global Alarms Section.

Tables

The **Tables** button (Figure 71) provides various dive tables for quick reference and includes: U.S. Navy, National Oceanic and Atmospheric Administration (NOAA), Professional Association of Diving Instructors (PADI), Buhlmann, and Defense and Civil Institute of Environmental Medicine (DCIEM). Clicking each main button for a dive table will display the corresponding dive table screen.

Once a table is chosen, a popup list at the top of the window allows the Dive Master to switch between the various sub tables (Figure 72). When viewing the table, the user may scroll using the scroll bar on the right and bottom as required. Once a type of table (Navy, NOAA, PADI, etc.) is selected, the sub tables are persistent meaning each time the **Tables** button is clicked, that same list of tables is available. To switch back to the Dive Tables main screen to choose a different set of tables, click the blue **"X"** button in the upper right-hand corner of the dive table screen.
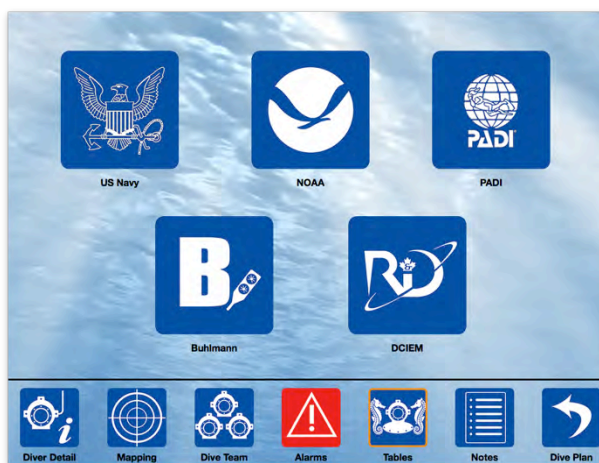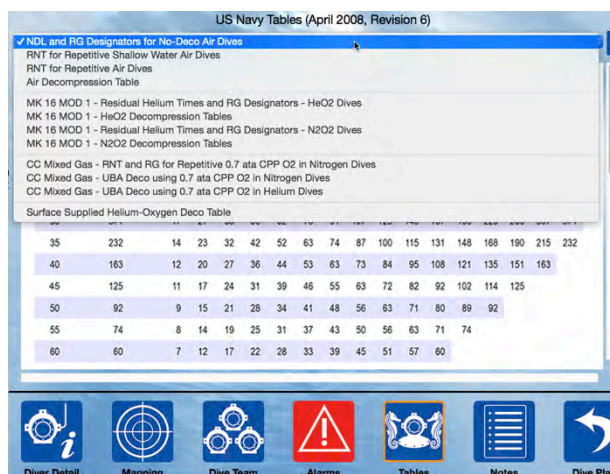

Figure 71: Dive Table Screen

Figure 72: Selected Dive Tables Screen

Notes

The **Notes** button (Figure 73) is used when a Dive Master wants to document an event during the dive. The left column provides a free form text area for the Dive Master to enter notes. Pressing the **Submit** button below the text area will add the note to the note history with a date/time stamp. Observe only one line of the note will be shown but the entire note is saved. If the Dive Master wants to delete a previously entered note, he or she may select the note in the right list area and press the **Delete Selected Note** button. When the dive is completed, the recorded notes are included in the full dive report.
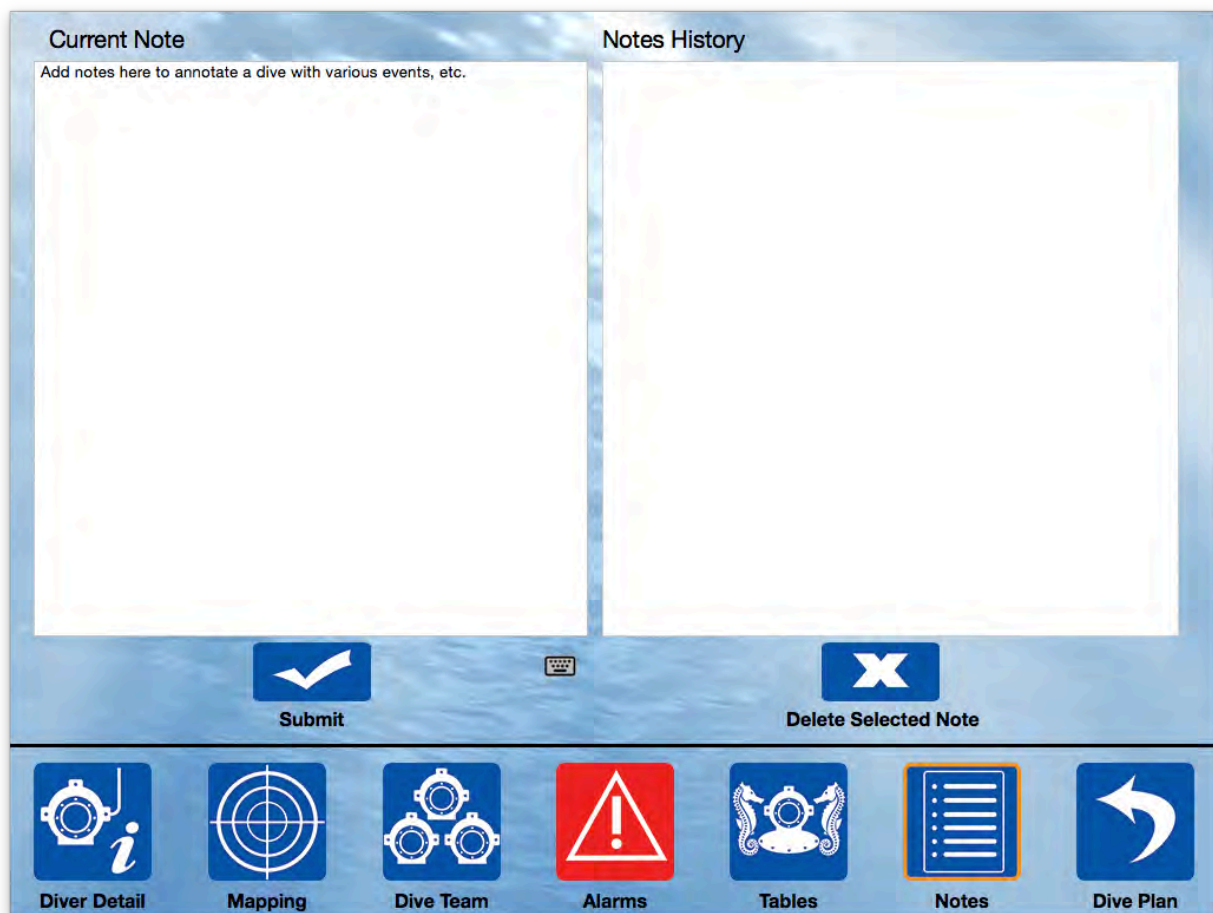

Figure 73: Notes Screen

Dive Plan

The **Dive Plan** button will allow the Dive Master to return to the Dive Plan screen to complete the dive, add additional divers to the water, or remove divers that are on the surface to complete their individual dives. The dive plan text fields may also be edited on the screen. This allows the Dive Master to dynamically manipulate the dive for any number of reasons (e.g. replacing a diver that is tired, allowing a diver to surface to swap out equipment, etc.).

Additional Functionality

Shearwater® Distress

A diver with a Shearwater® device may issue a Diver Distress message indicating that he or she is in trouble (Figure 74). This message will also appear in the question area on the screen to ensure the Dive Master sees and handles the situation effectively. When a diver issues the Diver Distress message, the modem will emit a Morse code SOS signal (3 short beeps, 3 long beeps, 3 short beeps). Each time the modem receives any communication from the Topside Modem, this SOS signal will be emitted. This can be helpful for another diver to hear the SOS call and head toward the diver in distress.

When the diver cancels the Diver Distress, the modem will stop beeping and a message will be sent to the Dive Master indicating the Diver Distress call is complete (Figure 75). The distress cancel messages will appear in the question area to ensure the Dive Master recognizes the situation change.

Shearwater® Send Return Home

A diver with a Shearwater® device may issue a diver Send Return Home message indicating that he or she would like the directional information to the topside craft. When a diver issues this command, a message is sent to the Dive Master and the issuing diver is placed in RECALL mode. In RECALL mode, the diver is provided with the range and bearing to the topside craft.

When the diver cancels the Send Return Home (Figure 76) a message is sent to the Dive Master. The diver will be taken out of RECALL mode and will no longer receive range and bearing to the topside craft. Normal operation will resume.

Shearwater® Send Assist

A diver with a Shearwater® device may issue a Send Assist (Figure 77) message indicating that he or she needs assistance. This functionality is to be used in a non-threatening, non-lethal scenario. When a diver issues this command, the Dive Master is notified and can then direct the best available diver to the diver in need.

When the diver cancels the Send Assist the Dive Master is notified and can make the appropriate adjustments. Normal operation is resumed.

Figure 74: Shearwater® Distress

Figure 75: Diver Distress

Figure 76: Return Home

Figure 77: Send Assist

Section 6: Maintenance

Introduction

The Diver6 System has been designed for minimal maintenance. All materials on the Diver6 System have been carefully selected to minimize maintenance. Where possible the Diver6 System has been sealed to prevent any sensitive components from being exposed to the harsh marine environment.

Routine Maintenance

In addition to the routine deployment tasks outlined in Section 4 of this manual, the following routine maintenance tasks should be performed:

Weekly Maintenance Tasks

Equipment	No.	Weekly Maintenance Summary

Diver Modem	6	• Diver Modem Connector O-Ring:
		   o If the O-ring appears defected please remove the O-ring on the Diver Modem using the plastic O-ring pick in the Tools & Spares Kit.
		   o Clean the O-ring groove with a solvent wipe provided in the Tools & Spares Kit.
		   o Apply a very thin layer of O-ring grease (Christo-Lube MCG111) to a new Diver Modem O-ring and install new O-ring into the O-ring groove, both are provided in the Tools & Spares Kit.

Spares Checking	1	• Check stocking levels for O-rings and grease. Re-order from Azimuth as necessary.
Monitoring Computer	1	• It is suggested to fully backup the hard drive on the Diver6 System Monitoring Computer.

Maintenance for Reusable Desiccant Canisters
Inspect the desiccant through the window in the aluminum housing. The indicating silica gel changes from blue to pink when absorption capacity is reached. To reactivate, heat the canister to 300° F in an oven for three hours.

Return to Factory Annual Maintenance

It is recommended that each Diver6 System is returned annually to the Azimuth factory for a full annual maintenance comprising (for one Portable Six Diver6 System):

Equipment	No.	Annual Maintenance Summary
Topside Modem	1	• Firmware Upgrade • Housing Check: Disassemble and check internals, replace O-rings
Diver Modem	6	• Firmware upgrade • Housing check: disassemble and check internals, replace O-rings and battery then reassemble • Inspect for physical damage, specifically to depth sensor • Visually inspect internal connections/wiring, PCB inspection • Validate battery performance • Charging system verification testing • Check depth and temperature sensor • Unit performance testing with factory reference
Monitoring Computer	1	• Inspect Tablet/Laptop Condition • Reformat and install Operating System updates as needed • Upgrade Software
Topside Battery and Cable	1	• Battery capacity verification • Battery charger testing • Clean and inspect for mechanical defects
System Level Performance Testing	1	• Full system level performance testing of the entire Diver6 System against factory reference standard.

Documentation	1	• Update user documentation
		• Maintenance reporting comprising of:
		   o Condition Assessment
		   o Recommendations for upgrade or repair of items

Annual return to factory maintenance is a separate service contract to the purchase of the Diver6 Equipment. For details on the return to factory annual service price please contact your Diver6 System representative.

Section 7: Troubleshooting

Problem	Possible Solutions
Topside Modem not communicating with software	1. Confirm that the COMM ports are configured properly in the software. Run software diagnostic tests. 2. Confirm that all cables are properly connected. 3. Confirm that the Battery Unit is on. 4. Confirm that the battery is charged.
Diver Modem not communicating	1. Confirm that the modem is properly configured in the software. Run software diagnostic tests. 2. Confirm that the modem is on. 3. Confirm that the modem is charged.
Battery Unit will not turn on	1. Confirm that the battery is properly seated in the box. 2. Confirm that the battery is charged.
USB will not connect	1. Verify that your cabling is connected properly to the Topside Modem. 2. Verify that the Battery Unit is on and cabling properly connected. 3. Verify that the battery is charged. 4. Verify that the USB driver is properly loaded.
Xplore Tech internal GPS will not connect	1. Verify that the GPS settings are properly configured. Run software diagnostic tests.
3rd party or external GPS will not connect	1. Verify that the GPS settings are properly configured. Run software diagnostic tests. 2. Verify that your GPS is properly connected to your computer. 3. Verify that the GPS is on or NOT in sleep mode. 4. Verify that your GPS is communicating on the proper COMM channel. See your GPS manufacturer manual for details. 5. Verify that all software drivers from your GPS have been properly loaded. See your GPS manufacturer manual for details.

Xplore Tech Tablet will not turn on	1. Plug unit into power source with tablet charger. Possibly battery needs charged. 2. Push the power button to get the computer out of sleep mode. 3. Hold the power button in for 5 or more seconds to shut the computer down, restart computer.
Shearwater NERD or Petrel will not connect / receive messages	1. Confirm that all your cabling is properly connected. 2. Insure that you have the Diver6 firmware loaded on your device. 3. Refer to your Shearwater manual for further troubleshooting.
Diver not getting pressure data from Shearwater® pressure sensor	1. Confirm that your hose(s) is connected to the HP port on your regulator. 2. Confirm that your hose is properly connected in the Shearwater® pressure sensor. 3. Confirm that your pressure sensor is properly connected to the Diver Modem.

CHART MANAGEMENT APPENDIX

The Diver6 Charts section features (Electronic Nautical Chart) ENC charts for viewing of divers overlaid on a nautical chart. The charts are served locally on the Diver6 tablet and DO NOT require an internet connection to be viewed. The charting system supports S-57/63 charts.

The most up to date charts (U.S. charts) can be downloaded from the NOAA website: http://www.charts.noaa.gov/ENCs/ENCs.shtml. S-63 charts (international charts) can be purchased from our preferred vendor SiiTech (www.siitech.com).

Your system has been preloaded with all U.S. coastal charts. International customer will need to purchase charts for their area of operation.

CHARTS OVERVIEW

The Charts section under the Options allows the Dive Master to view divers in the water with an ENC (S57/63) chart overlay. Charts provide the Dive Master better diver situational awareness.

The Charts view provides features for the Dive Master to easily manage the map and the divers. The Charts menu bar is composed of nine buttons.

Bright: Sets the charts with a day mode screen brightness.

Dusk: Sets the charts with a dusk mode screen brightness.

Night: Sets the charts with a night mode screen brightness.

Toggle History: Enables/Disables historical data view.

Center: Re-centers the chart based on the craft GPS (Tablet GPS).

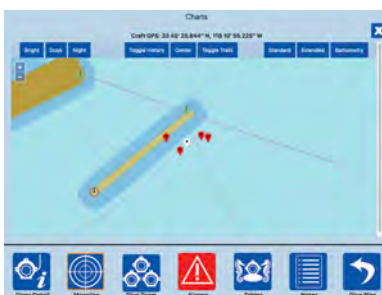**Toggle Trails:** Enables/Disables current diver breadcrumb trails.

Standard: Shows ENC view with the minimum amount of map detail.

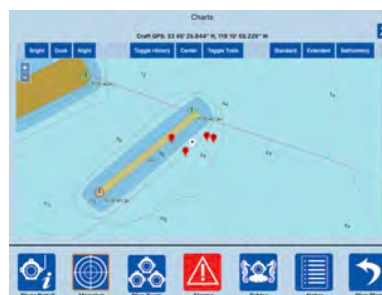**Extended:** Shows ENC view with more map details.

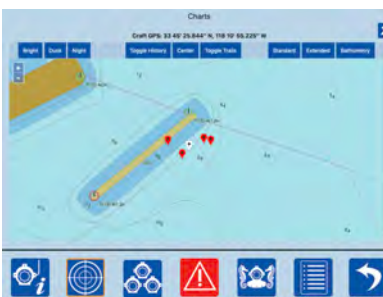**Bathymetry:** Shows ENC view with most map details.
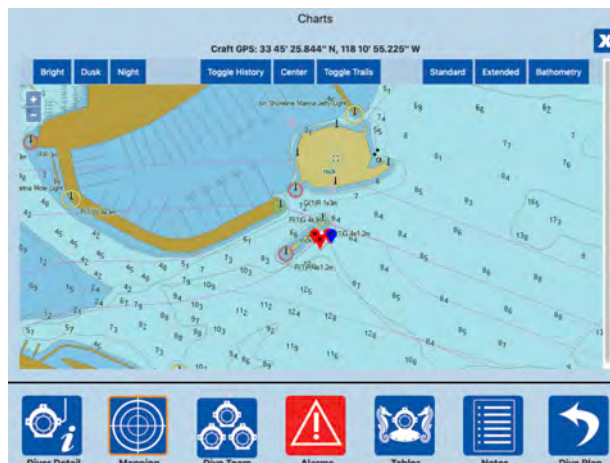
Standard View

Extended View

Bathymetry View

Bright View

Dusk View

Night View

Map Movement

The map can be moved by using the standard touch screen hand gestures. The pinch and pull commands will zoom the map in and out. You can also zoom using the plus and minus buttons in the upper left-hand corner. The map can also be dragged in any direction using the provided stylus or your index finger.

Marker Identification

The markers on the screen are color-coded and consistent with the color scheme of markers throughout the Diver6 software.

Blue Pin: Represents a normal active diver.

Red Pin: Represents a diver with an alarm condition.

White Pin: Represents the craft (Ownship).

Diver Information

Each diver on the screen has metadata for the Dive Master to view (Figure 78). By hovering the stylus over the diver marker or selecting a diver marker, a pop-up window will appear with information on that diver. This is a quick way for the Dive Master to get information on the diver in the water.

Figure 78: Chart Server Window

History and Trails

When the Dive Master loads historical data into the system or turns on the current dive breadcrumb trails for divers, that data can be viewed in real time on the charts (Figure 79). The Toggle History and Toggle Trails buttons will show the diver data as an overlay on the charts. Historical data will appear as orange diamonds. Current dive breadcrumb trails will appear as green stars.
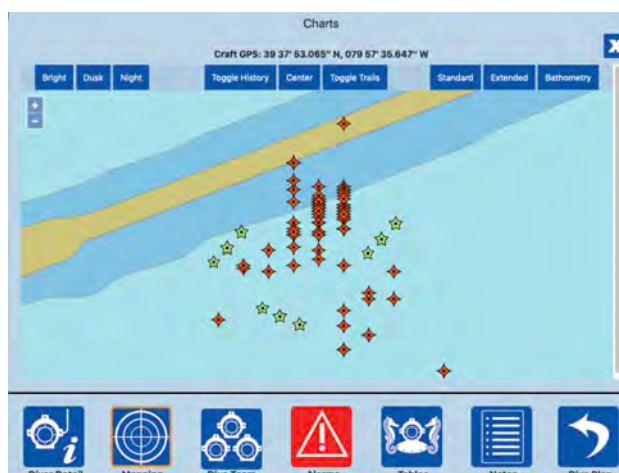

Figure 79: History and Trails

CHART SERVER

The Diver6 tablet is running an ENC chart server in the background. This server is locally hosted and does not require an internet connection for viewing and using the charts. Dive Masters will have access to their loaded charts anywhere in the world. The chart server is automatically started when the tablet boots up and no need for any user interaction.

Gathering your Charts

U.S. Charts

The chart server will host S-57/S-63 charts. NOAA provides free charts for all U.S. States and Territories on their website.

http://www.charts.noaa.gov/ENCs/ENCs.shtml

International Charts

International charts can be purchased and loaded into the system. We recommend using SiiTech. www.SiiTech.com to order your S-63 international charts.

Loading your Charts (NOAA ENC)

1. Download your charts from NOAA. - http://www.charts.noaa.gov/ENCs/ENCs.shtml
2. Unzip the downloaded file.
3. Click the Chart Import Icon on the Desktop OR locate the SiiTech folder in the Start menu and click the Chart Import Icon located there.
4. A window will appear waiting for your instruction (Figure 80).
   a. In the "Chart Folder" text box, browse to the location of your recently downloaded charts.
   b. In the GDB Folder text box – DO NOT CHANGE. This is the location of the chart database. If you make multiple database locations, you will have errors and missing charts on your machine. This folder location should remain UNCHANGED.
5. Click the Next button and your charts will be imported. Once the status bar has fully filled, your charts have been be added.
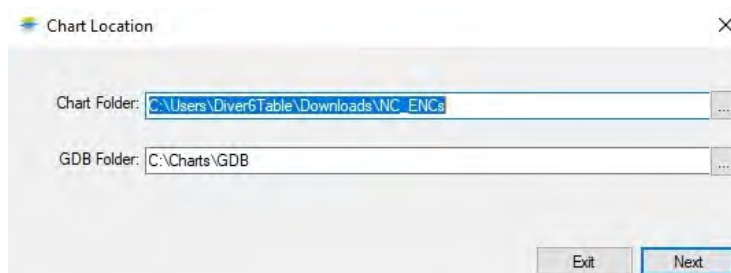6. Reboot the machine.

Figure 80: Chart Location

Loading your Charts (International S-63)

International charts purchased from SiiTech (our recommended provider) do not require the Chart Import tool. The charts are preconfigured by the manufacturer. Loading the charts requires a new Tile Server to be set up in the software.

NOTE: We cannot guarantee or determine if international charts (S-63) not purchased from SiiTech will work properly in the ChartServer.

Setting up International Charts Tile Server

1. Download your charts and place them in your chart GDB directory. See (Figure 81) the example directory structure to the right.
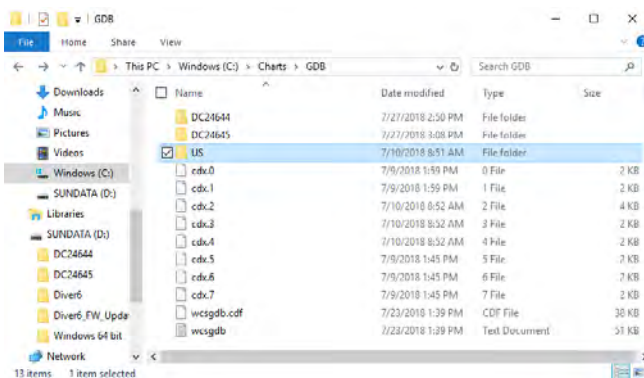

Figure 81: Chart Directory

2. Open the ChartServer Software. Click the EDIT menu and select "New Tile Server" (Figure 82).
3. When the "Tile Server Properties" window opens, give the server a unique name. It is recommended to name the server the geographic location you are loading.
4. Click the "Chart Options" button. The "ChartServer Option Properties" window will open.
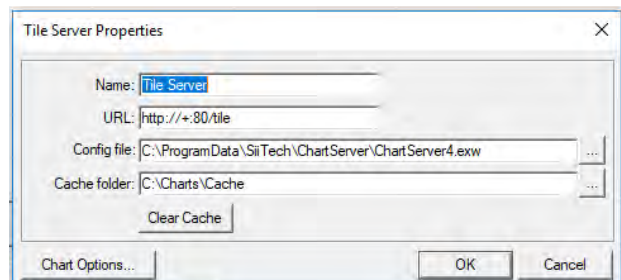

Figure 82: Tile Server Properties

5. Click the LOAD button on the ChartServer Options Screen (Figure 83). In the new window, locate the ".CDF" file within the directory tree of the S-63 charts that you are loading.
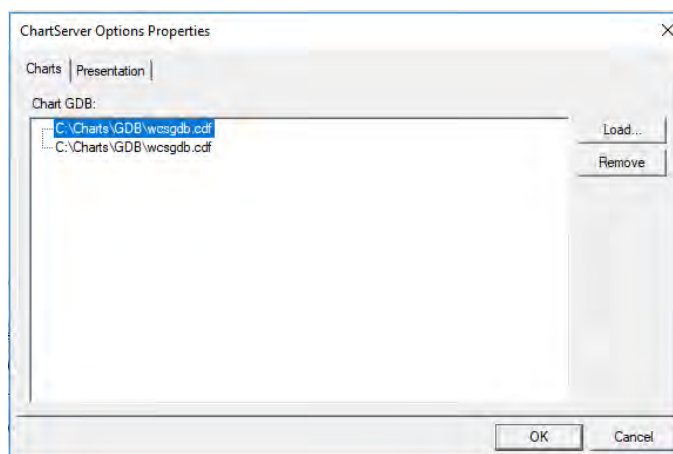

Figure 83: ChartServer Option Properties

6. Figure 84 is an example of the ".CDF" file. Tis file is the index file needed for S-63 charts to load in the Tile Server.
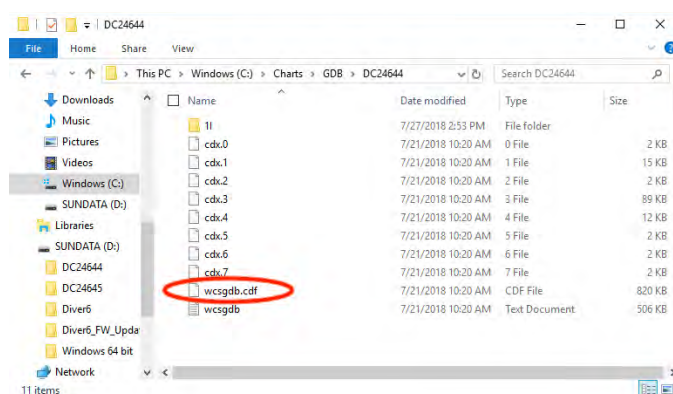7. Click OK (Figure 84) when you are finished.
8. Reboot the machine.

Figure 84: Chart Index File