

STM-1 & STM-10

Surface Stations

Technical Reference Manual



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1. Introduction

The STM-1 and STM-10 surface stations are designed for use with the PILOT™ short baseline tracking system, the AquaMap™ long baseline precision sea floor survey system and the MANTA™ data acquisition and telemetry system. These surface stations are normally used with a Microsoft Windows 95 or Windows NT machine. The DiveBase surface station software, a windows application, displays the target information.

While the STM-1 and STM-10 offer the same tracking and navigation capabilities, they are designed for use in different environments:

- The STM-10 is designed for open boat and 'vessel of opportunity' applications. It is housed in a rugged, splash proof carrying case and is used with a notebook computer that is placed on the station's instrument panel. The STM-10 can be powered by its internal batteries or external line power.
- The model STM-1 is intended for permanent installations. The STM-1 sheet metal housing can be installed in a 1/2 height drive bay of a computer, it can be mounted in equipment racks or the housing can simply be placed on a desk or any other suitable surface. The STM-1 always requires external power. It's power plug is compatible with standard PC power systems. An external universal power supply is provided as well.



Figure 1: The STM-1 Surface Tracking Module For Permanent Installations



Figure 2: The STM-10 Surface Station For 'Vessel Of Opportunity' Operations

2. Unpacking The Surface Station

Please ensure that your STM-1 shipment contains these components.

STM-1 Component List

- 1 ea. model STM-1 surface station
- 1 ea. ACDC-U universal switching power supply
- 1 ea. LINK-S data exchange cable
- 3 ea. TDCR-S50-40 sonar transducers
- This manual

An STM-10 shipment should contain these components.

STM-10 Component List

- 1 ea. model STM-10 surface station
- 1 ea. A/C power cable
- 1 ea. Computer data cable terminated with a DB9 and an AMP circular plug
- 1 ea. Configuration cable terminated with two AMP circular plugs
- 1 ea. Power cable for Amrel Rocky computers. Terminated with an AMP and an Amrel power plug
- 3 ea. TDCR-S50-40 sonar transducers
- This manual

Both stations also require a personal computer running Microsoft Windows 95 or NT and the DiveBase surface station software. These items are not a part of the station itself, and must be purchased separately.

Please contact Desert Star Systems immediately if you are missing any components.

3. Surface Station Installation And Activation

The STM-1 surface tracking module or the splash proof model STM-10 together with a Windows 95, 98 or NT machine forms the surface station.

- Model STM-10 is our most popular surface station. The STM-10 is housed in a splash proof carrying case. The station travels well, withstands considerable abuse and can run on its own battery power or external AC power. It is used with a notebook computer. We recommend the use of the ruggedized 'Rocky' notebook computers by Amrel (www.amrel.com), but other notebooks will work too.
- Model STM-1 is designed primarily for permanent installation in dry environments. The small STM-1 housing is designed to be integrated into the drive bay of a PC, but it may also be mounted externally. The STM-1 communicates with the Windows PC through a serial data cable.

Follow the instructions that apply to your installation.

3.1. Installing The STM-10

1. The STM-10 operates in conjunction with a notebook computer, which must run Microsoft Windows 95, 98 or NT. Open the STM-10 lid and place the notebook computer on the panel as shown above.
2. Connect a serial (COM) port of the notebook computer to the PC-COM connector of the STM-10, using the supplied cable. If the notebook computer has more than one COM port, we recommend the use of COM1.
3. The notebook computer may be powered by the STM-10. A power cable for Amrel 'Rocky' notebook computers is supplied with the STM-10. If you are using a Rocky, connect the cable to the PC-POWER connector of the STM-10 and the power jack of the Rocky computer.
4. If no power cable is connected to the A/C connector of the STM-10, the STM-10 will automatically use its internal batteries. Use the supplied power cable or a power cable fitting the standard of your country to operate on A/C power. CAUTION: Some ship A/C power systems are noisy. The electric noise of these systems can interfere with sonar operations. The DiveBase noise test functions let you check the noise levels seen by the sonar system. Use them if you suspect a problem.
5. Follow the instructions below to install the sonar transducers.

3.2. Installing The STM-1

The STM-1 may be installed in a drive bay of the surface station PC, or it may be mounted externally.

To install the STM-1 in a drive bay...

1. Slide the STM-1 into an empty half-height 5" drive bay on your PC.
2. Connect a spare 4-pin power plug of your PC into the power jack on the back panel of the STM-1 housing. Use the supplied Y-splitter if there are no free power plugs in your PC.
3. Locate the 10-pin COM1 jack on the motherboard of your PC. Disconnect the cable which is connected to it. Plug the supplied ribbon cable into the COM1 jack on the PC motherboard and into the 10-pin jack on the back panel of the STM-1 housing.
4. Follow the instructions below to install the sonar transducers.

To mount the STM-1 externally...

1. Place the STM-1 close to the PC.
2. Connect the DT1-ADC power supply to the 4-pin power jack on the back panel of the STM-1 and to a suitable 110 VAC or 220 VAC power outlet.
3. Connect the DB9 connector on the station's back panel to the COM1 connector on your PC. Use the DT1-PC-LINK data link cable.
4. Follow the instructions below to install the sonar transducers.

3.3. Surface Station Sonar Transducer Installation

The STM-1 and STM-10 surface stations can be connected to up to three sonar transducers. These transducers serve as the reference for navigation and the antenna for communication. Proper mounting of the transducers is essential. If the transducers are allowed to swing about, survey accuracy is degraded. If transducers are blocked by obstacles, navigation data may not be available.

- For short baseline surveying, connect two or three ship-board mounted sonar transducers to the surface station. The surface station determines the location of the divers by measuring the distance from each surface station transducer to the diver. In general, you will connect three sonar transducers. However, the use of two sonar transducers is sufficient if dive operations are restricted to one side of the baseline. Always use connector SONAR #1 for the first transducer, SONAR #2 for the second transducer and SONAR #3 for the third transducer.
- For long baseline navigation, connect just one transducer to connector SONAR #1 of the surface station. Then, use anywhere from one to four baseline stations to complete the baseline configuration. The surface station will determine the diver position by measuring the diver's distance from both the surface station transducer and the baseline stations.

Short Baseline and Long Baseline Navigation

Figure 3 gives a birds eye view of the distribution of three sonar transducers on a vessel. These transducers form a 'short baseline'.

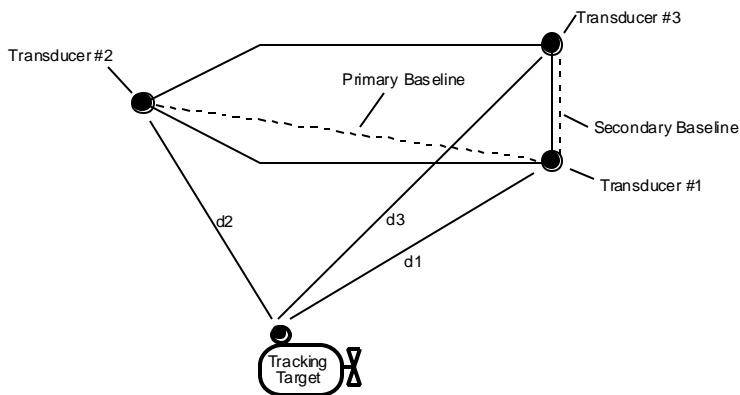


Figure 3: Distribution of Three Baseline Transducers aboard a Vessel

Transducer #1 is mounted at the stern starboard side, #2 is located forward and #3 sits at the stern, port side. Transducers #1 and #2 should have the greater separation and form the main baseline. Transducer #3 must always be to the right of the imaginary line starting at transducer #1 and extending towards transducer #2. The angle between the Transducer #1-#2 and Transducer #1-#3 baseline will ideally be close to 90 degrees. It should never approach either zero degrees or 180 degrees. If the three transducers are employed in something approximating a straight line, the system will not be able to determine if the diver is located to the left or the right of that line. The length of the baselines relates directly to the accuracy of the diver direction measurement. If the baseline is 3 meters long, the direction reading will be accurate to about +/- 5 degrees. If the transducer spacing is 30 meters, the direction accuracy will be about +/- 0.5 degrees.

On most ship operations, the #1-#2 baseline will be longer than the #1-#3 baseline. In such cases, tracking accuracy will be better broadside to the #1-#2 baseline (broadside to the surface vessel). The accuracy of the diver distance and depth reading is independent of the surface station transducer separation distance. Distance accuracy is very precise, typically about +/- 0.15 meters. The depth accuracy depends on the sensitivity of the depth sensor in the diver station. It is about +/- 1% of the maximum depth rating of the diver station.

Short baseline tracking has the advantage that all baseline transducers are vessel mounted. Hence, there is no need to anchor the vessel in order to track - indeed the vessel could be underway. It is a great tracking method if the objective is simply to establish the position of the underwater stations relative to the vessel or if you are looking for some rough survey data. For precision sea floor survey tasks however, operate your system in 'long baseline' mode. Rather than establishing a two or three transducer baseline on your vessel, you will mount only a single transducer on the vessel. Supplement the transducer with anywhere from one to four model baseline stations. The baseline length - and hence accuracy - will no longer be limited by the size of your vessel.

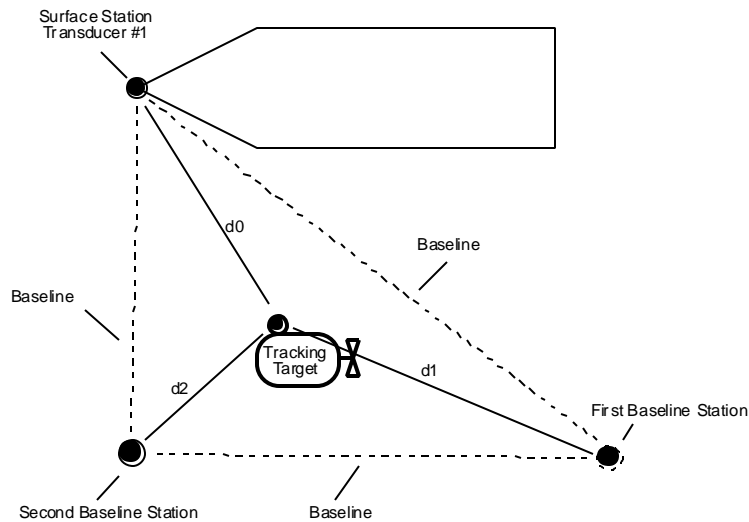


Figure 4: Bird's Eye View of a Long Baseline Configuration

Be mindful that movements of the surface station transducer relative to the baseline stations will degrade surveying accuracy. This is not a problem if the surface station transducer is mounted on a stable platform such as a dock. When using a boat, you can try mounting the transducer itself on a nearby buoy - with the cable running over to the boat. At the time of this writing, it was also planned to implement an option on the diver stations which would allow them to 'ignore' the surface station transducer position. An unstable surface station transducer would thus not reduce the accuracy of diver station position measurements.



Figure 5: A Sonar Transducer is lowered over the side of the Surface Vessel

The most common method of mounting the surface station sonar transducers is shown in figure 5. The cabled transducer is attached to a load carrying (strain relief) line and weighted down with a lead weight of about 5 kg (10 pounds). The line is attached to the top U-bolt of the transducer cage, the weight to the bottom U-bolt. The transducer is then lowered over the side of the vessel. This mounting method is fast and does not require any special engineering. The weighted transducer is kept in the proper 'cable up / transducer head down' orientation by the weight. The approach lends itself to anchored operations as well as live boat operations as long as the weight and line strength is dimensioned properly to keep the transducer down even at the highest conceivable vessel speed. Of course, caution must be taken to prevent the transducer from getting caught up in the ship's propeller.

Depending on circumstances, several other mounting techniques may be employed. A few methods are listed here.

- Lower the transducers over the side of the vessel. This technique allows you to easily adjust transducer depth to optimize performance. However, if surge or currents are present the transducers will sway and navigation accuracy will be limited.
- Mount the transducers on poles secured to the side of your vessel. Adjust the pole length to mount the transducers at the desired depth. The transducers should at least clear the keel of the vessel.
- Mount the transducers hard against the hull of your vessel. This is a very clean mounting technique that does not require disassembly when the vessel is in motion. Consider however that the hull will shield any sonar signals. Mount the transducers on the hull such as to obtain a good 'sonar view' of the environment.
- If you are operating from a small vessel such as an inflatable, your baseline may be too short to be useful. In this case, mount one transducer on the boat and the second transducer on a buoy anchored some distance away. You can run the transducer cable through the water. If necessary, attach small floatation devices to the transducer feed cable.
- Anchor your vessel properly to minimize movement of vessel based transducers.

Surface Station Transducer Mounting Techniques

To maximize performance, please also consider these guidelines:

- Many objects reflect sonar energy, especially if they contain air such as a ships hull, air tank or even kelp. A 'shadow' is thus created behind the body. A transducer located in that shadow may not pick up sonar energy. It is important to ensure that transducers are placed such that no path blockage will occur. The system can tolerate temporary shadowing, but a permanent blockage will result in loss of navigation and communication capabilities.
- There are many natural and man-made noise sources under water. All stations in a network must be able to 'hear' the other stations. This implies that the signal of the other stations must be 'louder' than the background noise. Thus, it is important to keep sonar transducers away from any interfering noise sources. Most problematic is high-frequency noise such as is generated by a boats propeller churning in the water, gas or fluids 'hissing' through a pipe, the banging of hammers and other tools etc. The system can tolerate momentary, sporadic noise. However a persistent noise source will raise a 'curtain' that the system may not be able to penetrate.
- Also consider the stability of your mounting technique. The baseline transducers are the reference for all measurements. Consequently, a shifting baseline will result in skewed position fixes.
- Practical limitations may not allow you to obtain an ideal setting for transducer mounting. However you should attempt to minimize the interfering factors.

How to Maximize Sonar Transducer Performance

3.4. Surface Station Activation And Operation

To use a surface station for tracking, activate it and run DiveBase on the associated PC. Make sure to select the proper configuration file for your mission as the active configuration file (choose **Select Active Configuration File** on the **File** sub-menu), if you haven't done so already. Then select **Start Tracking NOW!** from the **Action** sub-menu.

The STM-1 surface station is active whenever power is applied. A RESET button on the front of the STM-1 housing is available to re-start the station. The STM-10 station offers additional functionality. The following tables explain the STM-10 switch and connector functions.

Connector	Function
A/C	A/C power inlet for STM-10 operation and charging. 95V - 250V / 47 Hz - 63 Hz.
Sonar #1, Sonar #2, Sonar #3	Connectors for the three cabled sonar transducers
PC-POWER	12V DC / 2A is available here for powering a notebook computer. A power cable is supplied for connection to a Amrel Rocky notebook computer.
PC-DATA	The STM-10 serial data port. Use the supplied data cable to connect to a COM port of your PC.
CONFIGURE	Transponder configuration port. Use the supplied cable to connect the baseline and diver stations to the STM-10 for configuration or downloading of new transponder software (SmartDive). This port is wired to the PC-DATA port (and on to the PC COM port) if the Configure/Track switch is in the Configure position.

Figure 6: The STM-10 Connectors

STM-10 Mode	TRACK/OFF/CHARGE Switch	CONFIGURE/TRACK Switch
STM-10 OFF	OFF	Don't care
Tracking	TRACK	TRACK
Transponder Config.	TRACK	CONFIGURE
STM-10 Battery Charge	CHARGE	Don't care

Figure 7: STM-10 Switch Functions

Both the STM-1 and the STM-10 feature a status LED. The status LED is controlled by whatever application is currently running on the surface station or a transponder. Refer to the following tables to interpret the blink patterns for SmartDive. Note that the same blink patterns also apply to other AquaMap stations with a status LED, such as the baseline stations and the DS-3 diver station.

Status LED Pattern	Description
LED is OFF	The surface station is OFF, or it is not running any application software (no application software installed, surface station is connected to DiveTerm for maintenance functions)
LED is always ON	Not a valid blink pattern. A hardware problem may exist, the surface station supply voltage may be below 7 Volt.
Single short blink once per second	Surface station is running SmartDive and is operating fine.
Double blink once per second	A position fix has been received.
Triple blink once per second	Surface station self test failed. Run DiveTerm on the PC and start SmartDive from DiveTerm. Watch the error code. Look in next table to interpret the error code.
1/2 sec ON, 1/2 sec OFF	Surface station is running SmartDive, but SmartDive is not initialized yet - just start tracking. This signal may also indicate that a different application is running. Use DiveTerm to verify that SmartDive is running.
1 sec ON, 1 sec OFF	Charging of the surface station battery is under way (STM-10 only)
1 sec ON, 3 sec OFF	Battery charging is complete (STM-10 only)
Other blink patterns	A different application is running on the surface station. Use DiveTerm to select SmartDive as the active application.

Figure 8: SmartDive Blink Patterns

The status LED of the surface station or a transponder will triple blink if the self test failed. Connect the surface station or transponder to the PC and run DiveTerm. Reset the surface station or transponder. After a link is established, run SmartDive. After a few seconds, a TEST FAIL message will appear. Use the table below to interpret the error code(s) in [brackets] after the message.

Error Code	Description
1	Memory Error. The transponder memory is defective.
2	RTC Error. The real-time clock is not running. The clock battery may be low or the clock may be defective. Try setting the clock in DiveTerm.
3	VFO Error. The variable frequency oscillator, a part of the sonar transmitter and receiver, is not working.
4	ADC Error. The analog to digital converter is not working or is out of calibration. The transponder may still work, though depth sensing and battery charging may fail.
5	Depth sensing error. The depth sensor is not working or is out of calibration. The rest of the transponder may still work.
6	Sonar transmitter error. The sonar transmitter is not working, or the sonar transducer is not plugged in or is defective. CAUTION: In SmartDive V1.80X, this test may fail without a problem actually existing.
7	Sonar receiver error. The sonar receiver is not working, or the sonar transducer is not plugged in or is defective. CAUTION: In SmartDive V1.80X, this test may fail without a problem actually existing.

Figure 9: SmartDive Self Test Error Codes

3.5. Installing And Configuring Surface Station Software

The surface stations are controlled by software called SmartDive™. SmartDive™ works in conjunction with the PC based DiveBase™ tracking display software. The latest version of SmartDive™ is installed on the surface station by the factory prior to shipping. However, on occasion new versions of SmartDive™ will be published. Use the DiveTerm™ utility to install such new software on the STM-1 or STM-10. The use of DiveTerm™ is explained in your system operator's manual and of course in the DiveTerm™ manual itself.

The surface stations are designed to automatically start running the selected 'default application' (typically SmartDive™) shortly after they are turned on. Thus, during normal operation - once the station has been properly installed - all you've got to do before deployment is to switch the station on.

Like any other station of an AquaMap™, PILOT™ or MANTA™ system, your surface station must be configured before it is used. However, unlike other stations, the surface station is automatically configured by the DiveBase™ tracking software on your PC when tracking operations start. In other words - you don't have to worry about this step.

Please be aware that your surface station can also run different software, and thus serve different functions. For example, the A.MODEM application can turn your surface station into the deck unit of an acoustic modem or 'underwater teletype'. Please refer to the particular software instructions for details.

4. Connectors, Indicators And Controls

The practical use of the surface station connectors, indicators and controls is explained earlier in this manual. Here is a summary of all controls for the two surface stations.

4.1. STM-10 Connectors, Indicators And Controls

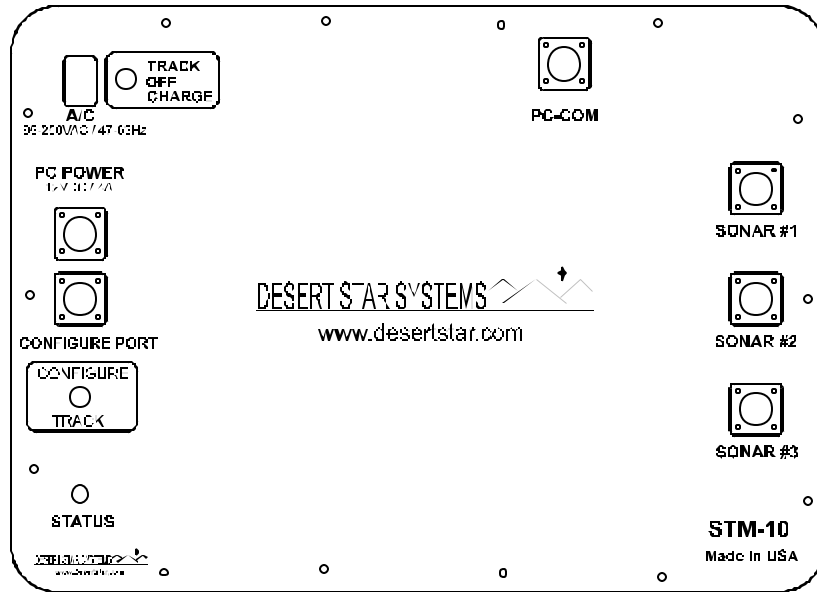
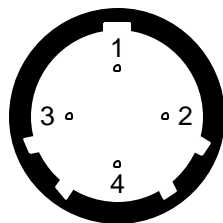


Figure 10: STM-10 Panel Layout

SONAR #1, SONAR #2, SONAR #3

Connect the three cabled sonar transducers here. If less than three transducers are used, start with Sonar #1. The connectors are four pin AMP circular connectors, reverse sex.

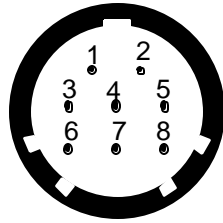


- 1: Ground
- 2: External Sonar Transducer
- 3: No Connect
- 4: No Connect

Figure 11: SONAR #1, SONAR #2, SONAR #3 Connectors

PC-COM

The data interface connector to the personal computer. Connect the short 'computer data cable' to here and a COM port of the PC. This is an eight pin AMP circular connector, standard sex.

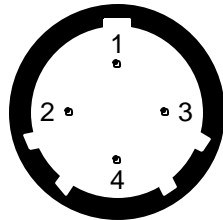


- 1: Ground
- 2: Transmit Data (To PC)
- 3: Receive Data (From PC)
- 4-8: No Connect

Figure 12: PC-COM Connector

PC-POWER

Connect the Amrel power cable here. This is a nominal 12V power output to supply power to the notebook computer that is used with the STM-10. Up to 4 Ampere is available. The power is supplied by the STM-10 internal battery packs. Each of the four parallel packs consists of ten 'D' size nickel cadmium cells switched in series. With full batteries, about 12.5 Volt is available. The voltage drops to about 10.5 volt by the end of the battery life. This is a 4 pin AMP circular connector, standard sex.

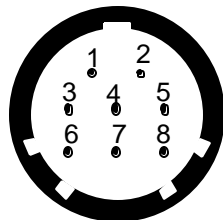


- 1: Ground
- 2: +12VDC nominal, up to 4 Amp
- 3: No Connect
- 4: No Connect

Figure 13: PC-Power Connectors

CONFIGURE PORT

Use the configuration cable to connect diver, ROV and baseline stations for configuration, data download and software installation to the STM-10. When the TRACK/CONFIGURE switch is in the CONFIGURE position, the COM port of the notebook computer which is connected to the STM-10 PC-DATA port is routed through to this CONFIGURE PORT. This is a 8 pin AMP circular connector,



- 1: Ground
- 2: Transmit Data (To PC)
- 3: Receive Data (From PC)
- 4-8: No Connect

Figure 14: CONFIGURE PORT Connector

A/C Connector

The connector for external line power to the STM-10. The STM-10 uses a universal power supply and is compatible with line voltages from 95 to 250 VAC, 47 to 63 Hz. This is a universal A/C power connector. A power cable for United States standard outlets is provided. Use the appropriate cable for international use.

CONFIGURE/TRACK Switch and TRACK/OFF/CHARGE Switch

Use these two toggle switches to select the operating mode of the STM-10. Switch the TRACK/OFF/CHARGE switch to the OFF position and then to TRACK to restart the STM-10.

STM-10 Mode	TRACK/OFF/CHARGE Switch	CONFIGURE/TRACK Switch
STM-10 OFF	OFF	Don't care
Tracking	TRACK	TRACK
Transponder Config.	TRACK	CONFIGURE
STM-10 Battery Charge	CHARGE	Don't care

Figure 15: STM-10 Switch Functions

STATUS LED

The status LED is controlled by whatever application is currently running on the surface station or a transponder. Refer to the following tables to interpret the blink patterns for SmartDive. Note that the same blink patterns also apply to other AquaMap stations with a status LED, such as the baseline stations and the DS-3 diver station.

Status LED Pattern	Description
LED is OFF	The surface station is OFF, or it is not running any application software (no application software installed, surface station is connected to DiveTerm for maintenance functions)
LED is always ON	Not a valid blink pattern. A hardware problem may exist, the surface station supply voltage may be below 7 Volt.
Single short blink once per second	Surface station is running SmartDive and is operating fine.
Double blink once per second	A position fix has been received.
Triple blink once per second	Surface station self test failed. Run DiveTerm on the PC and start SmartDive from DiveTerm. Watch the error code. Look in next table to interpret the error code.
1/2 sec ON, 1/2 sec OFF	Surface station is running SmartDive, but SmartDive is not initialized yet - just start tracking. This signal may also indicate that a different application is running. Use DiveTerm to verify that SmartDive is running.
1 sec ON, 1 sec OFF	Charging of the surface station battery is under way (STM-10 only)
1 sec ON, 3 sec OFF	Battery charging is complete (STM-10 only)
Other blink patterns	A different application is running on the surface station. Use DiveTerm to select SmartDive as the active application.

Figure 16: SmartDive Blink Patterns

The status LED of the surface station or a transponder will triple blink if the self test failed. Connect the surface station or transponder to the PC and run DiveTerm. Reset the surface station or transponder. After a link is established, run SmartDive. After a few seconds, a TEST FAIL message will appear. Use the table below to interpret the error code(s) in [brackets] after the message.

Error Code	Description
1	Memory Error. The transponder memory is defective.
2	RTC Error. The real-time clock is not running. The clock battery may be low or the clock may be defective. Try setting the clock in DiveTerm.
3	VFO Error. The variable frequency oscillator, a part of the sonar transmitter and receiver, is not working.
4	ADC Error. The analog to digital converter is not working or is out of calibration. The transponder may still work, though depth sensing and battery charging may fail.
5	Depth sensing error. The depth sensor is not working or is out of calibration. The rest of the transponder may still work.
6	Sonar transmitter error. The sonar transmitter is not working, or the sonar transducer is not plugged in or is defective. CAUTION: In SmartDive V1.80X, this test may fail without a problem actually existing.
7	Sonar receiver error. The sonar receiver is not working, or the sonar transducer is not plugged in or is defective. CAUTION: In SmartDive V1.80X, this test may fail without a problem actually existing.

Figure 17: SmartDive Self Test Error Codes

4.2. STM-1 Connectors, Indicators And Controls

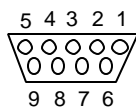
The functions of the SONAR connectors and the STATUS LED are identical to that on the STM-10. Please refer to the previous section for details. The STM-1 also features a RESET push-button switch. Press this button to restart the STM-1.

Serial Data Connectors

There are two RS232C serial data connectors located on the back panel of the surface STM-1. Plug the supplied LINK-S cable into the DB9 connector on the surface station and a COM connector on your PC if you are using the surface station as an external device.

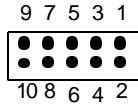
The ribbon cable jack should be used if you mount the surface station in the drive bay of a PC. Use the supplied ribbon cable to link this jack to the COM1 jack on the motherboard or serial IO card of your PC. Make sure that pin 1 on both cable connectors is aligned with pin 1 of the surface station and the motherboard jack respectively.

The wiring of the DB9 connector and the ribbon cable jack is identified in the following tables.



- 1: Not Connected
- 2: TXD (Transmit Data), Output
- 3: RXD (Receive Data), Input
- 4: DSR (Data Set Ready), Input
- 5: Signal Ground
- 6: DTR (Data Terminal Ready), Output
- 7: CTS (Clear To Send), Input
- 8: RTS (Request To Send), Output
- 9: Not Connected

Figure 18: DB9 Serial Data Exchange Connector Pin Assignment



- 1: Not Connected
- 2: TXD (Transmit Data), Output
- 3: RXD (Receive Data), Input
- 4: DSR (Data Set Ready), Input
- 5: Signal Ground
- 6: DTR (Data Terminal Ready), Output
- 7: CTS (Clear To Send), Input
- 8: RTS (Request To Send), Output
- 9: Not Connected

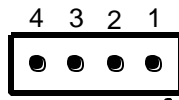
Figure 19: Ribbon Cable Connector Pin Assignment

ADVISE:
Some motherboards and serial I/O cards have the connectors wired in a non-standard way. Make sure that the connector is wired in the same way as the Ribbon Cable, If it is not you will have to purchase a new serial I/O card that is wired correctly or connect the STM-1 to the external serial port using the DB9 connector

Power Connector

A 4-pin 'disk drive power connector' (model 3M 53109-0410 jack; model 3M 70156 plug) is used to supply power to the station. The power connector is directly compatible with personal computer cabling. When the station is installed in a PC drive bay, simply connect a spare power connector to the jack on the back panel. The station may also be powered by the external ACDC-U power supply or you may connect a 9V to 16V DC power source.

The station's power requirement is 120 mA in receive mode and up to 2 Ampere in transmit mode.



- 1: Ground
- 2: +9V to +12V @ 2 Ampere
- 3: No Connect
- 4: No Connect

Figure 20: Power Connector Pin Assignment

5. Maintaining The Surface Station

Models STM-1 and STM-10 require virtually no maintenance. Make sure the connectors remain free of debris and use a dry or somewhat damp cloth to remove dust.

Please be aware the STM-1 module is not waterproof or even water resistant. Make sure it is operated in a dry area. Make sure all connectors are dry before connecting them to the station.

If the station should come in contact with significant quantities of salt water, you may have a slight chance of rescuing it by instantly removing it from the power source, rinsing it thoroughly with fresh water and shaking it dry.

The STM-10 is more resistant to water. All connectors and the panel are sealed. Still, we recommend to limit the water exposure to drops and spray.

6. Model STM-10 Specifications

Size:	470 mm x 343 mm x 195 mm (18.5" x 13.5" x 7.7") overall Housed in a rugged, splash-proof carrying case
Weight:	9.5 kg (21 lbs.)
Operating temperature:	0-50 degrees Celsius
Data I/O:	Controlled via IBM compatible PC through serial data link
Status Indicator:	Status LED on front panel
Microprocessor:	MC68HC11, 1 MHz
Memory:	128 Kbyte of battery backed-up SRAM (for user data) 2.5 Kbyte of volatile SRAM (stack space) 512 Kbyte of permanent FLASH memory (for DiveCode) 24 Kbyte of EPROM (firmware storage)
Sonar transceiver:	0-160 Watt RMS output in transmit mode RX sensitivity 7 microvolt RMS @ 6 dB S/N 4th order continuous time bandpass filter Digital frequency synthesis, tunable in 0-100 kHz range, resolution 1.5 Hz
Sonar transducers:	Up to three external transducers. 34-41 kHz standard. Other frequencies available on request
Sonar range:	100-1000 meters communication range, depending on sea conditions Extended range available on special request.
Sonar modulation:	Multi frequency-shift keying (MFSK)
Sonar bitrate:	15 - 150 bits/sec
Sonar Navigation:	Long baseline and short baseline principle supplemented by sensor derived depth information yields 3D position information for mobile stations Navigation range is 100-1000 meters, depending on sea conditions. Extended range available on special request. Distance measurements repeatability +/- 0.15 meters (system limit)
Internal batteries:	Nickel Cadmium re-chargeable cells, 12V 18Ah capacity Battery life about 120 hours per charge when NOT powering an external notebook computer About 10 - 20 hours per charge when powering an external notebook computer through PC-POWER con. Battery charge time is about 24 hours
External power:	May be powered by external line power, 95 - 250 VAC / 47 - 63 Hz

Note: all specifications are subject to change without notice

7. Model STM-1 Specifications

Size:	216 mm x 146 mm x 38 mm (8.5" x 5.75" x 1.5") overall Compatible with standard half-height 5" drive bays on personal computers May be installed in a drive bay or may be desk-top mounted
Weight:	1100 gram (40 oz)
Operating temperature:	0-50 degrees Celsius
Data I/O:	Controlled via IBM compatible PC through serial data link
Status Indicator:	Status LED on front panel
Microprocessor:	MC68HC11, 1 MHz
Memory:	128 Kbyte of battery backed-up SRAM (for user data) 2.5 Kbyte of volatile SRAM (stack space) 512 Kbyte of permanent FLASH memory (for DiveCode) 24 Kbyte of EPROM (firmware storage)
Sonar transceiver:	0-160 Watt RMS output in transmit mode RX sensitivity 7 microvolt RMS @ 6 dB S/N 4th order continuous time bandpass filter Digital frequency synthesis, tunable in 0-100 kHz range, resolution 1.5 Hz
Sonar transducers:	Up to three external transducers. 34-41 kHz standard. Other frequencies available on request
Sonar range:	100-1000 meters communication range, depending on sea conditions Extended range available on special request.
Sonar modulation:	Multi frequency-shift keying (MFSK)
Sonar bitrate:	15 - 150 bits/sec
Sonar Navigation:	Long baseline and short baseline principle supplemented by sensor derived depth information yields 3D position information for mobile stations Navigation range is 100-1000 meters, depending on sea conditions. Extended range available on special request. Distance measurements repeatability +/- 0.15 meters (system limit)
Power consumption:	9V to 16V supply voltage May be powered by PC or external (ACDC-U) power supply 0.01 mA in sleep mode 120 mA in sonar receive mode Up to 2 Ampere in high-power sonar transmit mode

Note: all specifications are subject to change without notice