

# Configuration File

## Technical Reference Manual



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## 1.0. Introduction

Configuration Files are used to define the behavior of the SmartDive™ application. The configuration file contains parameters that define navigation, communication, sleep schedules, etc. This manual describes in detail the configuration file, and how to create configuration files using DiveTerm™ and DiveBase™. DiveTerm™ and DiveBase™ requires MS Windows 95 or NT to run. New versions of DiveTerm™ are freely available on the Desert Star web site: <http://www.desertstar.com>.

## 2.0. Creating a Configuration File

You can use either DiveBase™ or DiveTerm™ to create configuration files.

The first time you run DiveBase™ you will be asked to create a default configuration file. Answer YES and you will be led through a series of screens asking you questions about your mission setup. Only DiveBase™ will ask you this, DiveTerm™ will not.

Otherwise, if you want to use an already defined configuration file for tracking operations, select **Select Active Configuration File** from the **File** sub-menu. Only DiveBase™ uses the Active Configuration file.

To create a new configuration file or edit an existing configuration file, choose **Select A New Configuration File** or **Edit A Configuration File** from the menubar in either DiveBase™ or DiveTerm™.

## 2.1 Configuration Methods

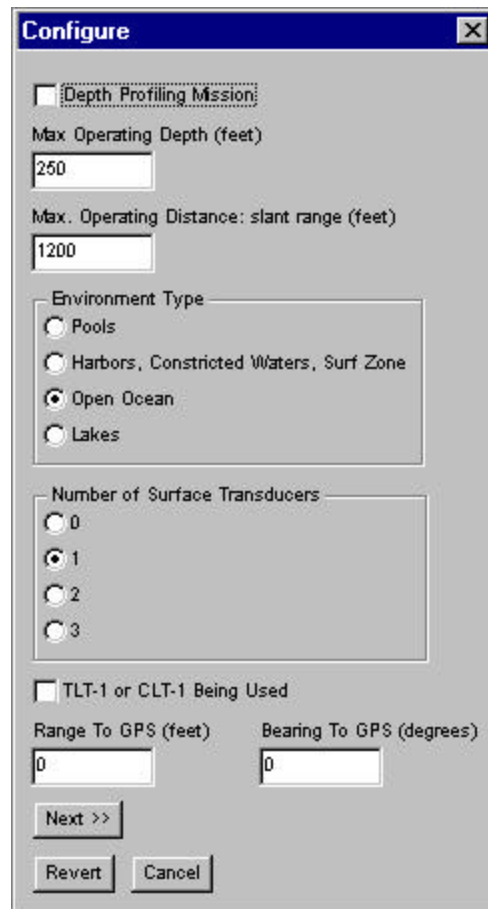
After the **Select A New Configuration File** or **Edit A Configuration File** menu items has been selected, You will be given the choice of **Simple Create** or **Advanced Create**. Choose **Simple**

**Create** and you will then be presented with a number of configuration screens. Simple creation asks for a minimum amount of information.

**Advanced Create** lets you tweak any and all parameters. Simple creation is adequate for about 90% of all operations.

## 2.1.1 Simple Configuration

The first screen is shown below.



The screenshot shows a 'Configure' dialog box with the following fields and options:

- Depth Profiling Mission
- Max Operating Depth (feet): 250
- Max. Operating Distance: slant range (feet): 1200
- Environment Type:
  - Pools
  - Harbors, Constricted Waters, Surf Zone
  - Open Ocean
  - Lakes
- Number of Surface Transducers:
  - 0
  - 1
  - 2
  - 3
- TLT-1 or CLT-1 Being Used
- Range To GPS (feet): 0
- Bearing To GPS (degrees): 0
- Next >> button
- Revert button
- Cancel button

Figure 2.0: Simple Configuration Screen 1

The configuration screens prompts you for a series of parameters that define your operation setup. After you finish enter the data on each screen press the **Next >>** button to move on. You can go back to any previous screen by pressing the **Prev <<** button when shown. The **Revert** Button will undo any changes you have made on the current screen. Once you press **Next >>** you cannot undo changes by simply pressing **Revert**, you may press **Cancel** and try again though. On the last Configuration screen there are Buttons to edit optional parameters, such as station names and Id

symbols. Appropriate default values will be used if you do not wish to edit these fields. When you are finished press **Ok** and the file will be saved under the file name you designate.

If you are creating the configuration file in DiveBase™ It will then ask if you would like to make this the Active configuration file.

**Remember: The Active configuration file is used when you are in real time tracking mode in DiveBase™.**

**Simple Configuration Questions**

<b>Question</b>	<b>What Does It Mean</b>
Surface Station Transducer Depth	Specify the depth of the surface station transducers. This number is needed to accurately compute position.
Max. Operating Distance	Tell the system how far you want to track. Greater max. tracking ranges will result in slower position update rates.
Environment Type	Specify the 'sonar environment'. See Table Below.
Number of Surface Transducers	How many transducers are connected to your surface station? In short baseline systems you will always use two or three transducers, in long baseline systems it will be one transducer. Refer to Chapter One to see which tracking method will work best for you.
TLT-1 or CLT-1 Being Used	Check this box if one of the stations you are using is a model CLT-1 or TLT-1. If you are not using one of these models make sure that this box is not checked.
Range To GPS	This is the range from surface transducer 1 to the GPS receiver, or initial Lat/Lon entered in the configuration file. It is used to determine the position of the stations with respect to the GPS receiver.
Bearing To GPS	This is the bearing of the GPS receiver, or the initial Lat/Lon entered in the configuration file from the first baseline. It is used to determine the position of the stations with respect to the GPS receiver.
Baseline Rotation	This is the angle between the first baseline and the heading sensor. It is only used on the Geocentric screens. It is used to determine the position of the stations with respect to the GPS receiver. On the relative display screens the baseline orientation field is used to denote a rotation of the baseline with North.
Number of Baseline Stations	How many baseline stations do you want to use? This question only appears if you selected long baseline tracking by specifying a single surface station transducer.
Number of Mobile Stations	You can track up to ten mobile stations (ROV, divers, etc.). Specify here how many you wish to track. If several stations are tracked, the system will interrogate them in sequence. (Note: specifying more stations than you are using may slow down your update rate).
Origin Northing	The Northing of the first surface transducer or baseline station if no surface station is used. This is on the relative displays. This is also used to position the stations on vector chart data,
Easting	See Origin Northing.
Orientation	This is the angle between north and the first baseline in the clockwise

	direction. When this is zero it is assumed that the first baseline faces north.
Origin Lat	This sets an origin latitude. It is used to display geocentric positions when real time GPS data is not available or required. The format is ( <b>dd mm s.sss C</b> ) where <b>dd</b> is degrees <b>mm</b> is minutes <b>s.sss</b> is seconds and <b>C</b> is N or S.
Origin Lon	See Origin Lat. Above. <b>C</b> is W or E.
Default Water Temp	This field allows you to set the default water temperature. The water temperature effects the speed of sound in water, and thus affects the systems distance measurements.
Pos. Avg. Sample Size	Sample size for position averaging (sliding avg.). This is the size of the sliding average used when averaging positions during a precision survey operation. This is sample size is used on the mobile stations. This is <b>NOT</b> the position average used in DiveBase™
Maximum RMS Error	The maximum acceptable Root Mean Square position error when you are doing a precision survey. This allows the diver station to generate a beep pattern for unacceptable data, useful for zero visibility surveying.
Edit Mobile Station Names and ID's Button	Allows you to give your mobile stations custom names and symbols.
Edit Baseline Station Names and ID's Button	Allows you can give custom names to your baseline stations.
Edit Pre Defined Messages Button	For diver and AUV tracking systems only. You can specify a number of messages to exchange with your divers or AUV.
Edit Sensor Configuration	See Section Below
Edit Waypoints	See Section Below
Edit Diver Observation Records	See Section Below

Most of the questions on the simple configure screens are straight-forward, however **Environment Type** requires some discussion. The environment types Pools, Harbors & Constricted Waters, Open Ocean, and Lakes, really refer to sonar environments. These are only generalizations of the different sonar environments. For example a Harbor is a often a noisy environment with a lot of mutipath (echo) sonar channels. If your operating environment is like that, select Harbors even if you are not really operating in a harbor. This table shows the assumed sonar characteristics of each environment.

**Sonar Environments**

<b>Environment</b>	<b>Noise Level</b>	<b>Multipath Level</b>
Pools	Quiet	High
Harbors and Constricted Waters	High Noise	High
Open Ocean	Moderate Noise	Low
Lakes	Quiet	Low

Environments with high noise level will require a reduced receiver sensitivity and thus will result in a reduced tracking range. Environments with high multipath will require the system to operate slower, which results in longer position update intervals.

## 2.1.2. Advanced Configuration

The advanced configuration screens let you modify any and all parameters that the system uses. It is for users that have specialized requirements or just want the absolute peak of performance.

### Advanced Configuration Questions

Question	What Does It Mean
Distance Compensation	The sonar signal filters in the DiveTracker hardware cause a delay of the timing and in particular the rising edge of received sonar signals. Thus, a signal may be detected several hundred microseconds AFTER its actual time of arrival. This delay reflects itself as an overestimation of sonar measured distances. This parameter lets you apply a correction for this error. In most cases, an offset compensation of about 30 inches will yield accurate results. When testing in an extremely small volume, such as a bucket, a value of 0 is needed.
Surface Station Transducer Depth	Specify the depth of the surface station transducers. This number is needed to accurately compute position.
Max. Operating Depth	The maximum estimated depth that any station will go to. This sets the resolution of the depth telemetry.
Max. Baseline Range	This command defines the maximum permissible range of any baseline station from the surface station transducer. The specified range must be at least as much as the maximum expected baseline station range but should not be significantly more. For example, if the baseline stations are expected to be located as far as 300 feet from the surface station transducer, a value of 500 feet may be appropriate. If any baseline station range exceeds this parameter, contact with the station will be lost. If the specified range is unnecessarily large, position update rates will fall because longer 'time slots' are allocated by the software to allow for a sufficient baseline station reply time.
Max. Mobile Slant Range	This command defines the maximum permissible range of any mobile station from the surface station transducer. The specified range must be at least as much as the maximum expected mobile station range but should not be significantly more. For example, if the mobile stations are expected to range as far as 1000 feet, a value of 1200 feet may be appropriate. If the mobile station range exceeds this parameter, contact with the station will be lost. If the specified range is unnecessarily large, position update rates will fall because the maximum wait period for a mobile station reply increases.
Range To GPS	This is the range from surface transducer 1 to the GPS receiver, or initial Lat/Lon entered in the configuration file. It is used to determine the position of the stations with respect to the GPS receiver.
Bearing To GPS	This is the bearing of the GPS receiver, or the initial Lat/Lon entered in the configuration file from the first baseline. It is used to determine the position of the stations with respect to the GPS receiver.
Baseline Rotation	This is the angle between the first baseline and the heading sensor. It is only used on the Geocentric screens. It is used to determine the position of the stations with respect to the GPS receiver. On the relative display screens the baseline orientation field is used to denote a rotation of the baseline with North.
Operations are to the Right/Left of Baseline	This question only appears if you have specified either a short baseline system with two transducers or a long baseline system with one

	baseline station. In these cases, the system will not be able to tell automatically if a mobile station is to the left or the right of the baseline (due to baseline ambiguity, see chapter 1). So you have to restrict your operations to one side of the baseline.
Origin Northing	The Northing of the first surface transducer or baseline station if no surface station is used. This is on the relative displays. This is also used to position the stations on vector chart data,
Easting	See Origin Northing.
Origin Lat	This sets an origin latitude. It is used to display geocentric positions when real time GPS data is not available or required. The format is ( <b>dd mm s.sss C</b> ) where <b>dd</b> is degrees <b>mm</b> is minutes <b>s.sss</b> is seconds and <b>C</b> is N or S.
Origin Lon	See Origin Lat. Above. <b>C</b> is W or E.
Default Water Temp	This field allows you to set the default water temperature. The water temperature effects the speed of sound in water, and thus affects the systems distance measurements.
Pos. Avg. Sample Size	Sample size for position averaging (sliding avg.). This is the size of the sliding average used when averaging positions during a precision survey operation. This is sample size is used on the mobile stations. This is <b>NOT</b> the position average used in DiveBase™
Maximum RMS Error	The maximum acceptable Root Mean Square position error when you are doing a precision survey. This allows the diver station to generate a beep pattern for unacceptable data, useful for zero visibility.
Receiver Gain	Higher numbers reflect greater receiver gain. Use '2' in normal open water operations. '1' and '0' may be used when operating in confined environments. Gain '3' is too sensitive for most practical applications. Each gain step reflects about 10dB of additional gain.
Detection Threshold	Defines the minimum receive signal strength required to trigger a signal detection. When operating at gain 2, use 10 to 16 units for most ocean work. Use higher number up to about 25 for work in noisy environments and lower numbers down to about 6 in very quiet environment. The peak-to-peak signal requirement for detection equals about 40 mV times this number as measured at the threshold detector. The actual input stage signal depends on the gain setting and the selected bandpass filter.
Transmit Power	The sonar transmit power. The maximum setting is 127. This equals approximately 60 Watt RMS into the sonar transducer. The power output is roughly linear proportional to this number, cutting the number in half thus reflects about a 3 dB reduction in power output. Use a setting of 127 for open water work. Lower values should be used in confined environments.
Pulse Length (uSec)	The length of the transmitted sonar pulse expressed in microseconds. 4000 microseconds is appropriate for open water work. Shorter pulses down to about 500 microseconds may be used in confined environments or when range requirements are limited.
AGC On	Check this parameter if you wish to use Automatic Gain Control (AGC). When this parameter is checked, stations will perform attempt to adjust their gain and threshold setting to compensate for dynamic sonar conditions. This is accomplished by listening out of the communication band of the system for short duration and counting the number of 'detected' signals, then reducing sensitivity and listening again if there

	<p>were a number of 'detected' signals. A station will also perform AGC each time it is reset, wakes up from a sleep cycle, and each time the <b>AGC Min 'No Positions' interval</b> has elapsed. The station will never get more sensitive than the settings in the Receiver Gain and Detection Threshold fields above.</p>
AGC Activation Interval (Sec)	<p>This is the interval between two consecutive attempts at automatic gain control. Each station will continue to invoke AGC at this interval until the criteria for proper operation has been met. The criteria for surface and mobile stations is determination of a valid position fix. The criteria for baseline stations is the reception of an interrogate.</p>
AGC Min 'No Positions' Interval (Sec)	<p>If no valid position fixes (or interrogates for a baseline station) have been received for this interval and the AGC Activation Interval has passed, then AGC will be invoked.</p>
AGC/Noise Test Duration (Sec)	<p>This field allows you to set the duration of the noise test used by AGC. A duration of 5 seconds is usually sufficient.</p>
AGC Max Number of Noise Events	<p>This is the maximum number of 'detected' signals that can be received during the AGC noise test and still have the test pass.</p>
Baseline Station no-activity shutdown period (seconds)	<p>This field defines how long a baseline station will wait until it enters low power sleep mode. If the baseline station does not receive an interrogate within this amount of time it will fall asleep.</p>
Baseline Station sleep period (seconds)	<p>This field defines how long a baseline station will be in low power mode before it wakes up to listen for interrogations.</p>
Baseline Station post-sleep listening period (seconds)	<p>This field defines how long a baseline station will listen for an interrogate after waking up from a sleep cycle.</p>
Mobile Station no-activity shutdown period (seconds)	<p>This field defines how long a mobile station will wait until it enters low power sleep mode. If the baseline station does not receive an interrogate within this amount of time it will fall asleep.</p>
Mobile Station sleep period (seconds)	<p>This field defines how long a mobile station will be in low power mode before it wakes up to listen for interrogations.</p>
Mobile Station post-sleep listening period (seconds)	<p>This field defines how long a mobile station will listen for an interrogate after waking up from a sleep cycle.</p>
Telemetry Type	<p>Allows you to set the amount of telemetry data sent. If set the to <b>No-Telemetry</b> position updates will be a bit more rapid. Setting this field to <b>2-channel Telemetry</b> causes the system to send 2 data channels to the surface station. The standard data channels are depth and air pressure.</p>
Data Availability	<p>The field determines whether navigation data is available to the mobile stations or just to the surface station. If set to <b>Surface Station Only</b> position updates will be a bit more rapid. This setting is useful for tracking type applications. The <b>Surface and Mobile Stations</b> setting is the correct setting for diver and AUV type navigation applications.</p>
Serial Transfer Raw Position Data	<p>Check this field if you are connecting a mobile station to another computer and wish to transfer Raw Position Data. This switch is commonly used in AUV applications.</p>
Serial Transfer X-Y-Depth Position Data	<p>Check this field if you are connecting a mobile station to another computer and wish to transfer X-Y-Depth Position Data. This switch is commonly used in AUV applications</p>
Serial Transfer Message Data	<p>Check this field if you are connecting a mobile station to another computer and wish to transfer messages sent to the station. This switch is commonly used in AUV and instrument control applications</p>

Number of Mobile Stations	You can track up to ten mobile stations (ROV, divers, etc.). Specify here how many you wish to track. If several stations are tracked, the system will interrogate them in sequence. (Note: specifying more stations than you are using may slow down your update rate).
Edit Mobile Station Names and ID's Button	Allows you to give your mobile stations custom names and symbols.
Edit Baseline Station Names and ID's Button	Allows you can give custom names to your baseline stations.
Edit Pre Defined Messages Button	For diver and AUV tracking systems only. You can specify a number of messages to exchange with your divers or AUV.
Edit Sensor Configuration	See Section Below
Edit Waypoints	See Section Below
Edit Diver Observation Records	See Section Below

## 2.2. Sensor Configuration

The sensor configuration screen is used to set parameters for autonomous data acquisition. If you are not using your system for data acquisition you do not need to edit any parameters on the this screen.

Figure 2.1 Sensor Acquisition Parameter Screen

The first row of check boxes are for setting which data channels you are interested in.

The second row determines what the system does with those channels.

The **Interval** specifies how often the data channel will be sampled. Check **Sleep Between Acquisitions** if you wish the station to enter low power mode between data acquisitions. Check **Sonar Transmit each Acquisition** to send each data sample to a surface station over the acoustic link. Check **Store Acquisitions** to save each data sample in FLASH memory. Data saved in FLASH memory can be retrieved using DiveTerm™ and turned into a human readable format with the Convert Utility.



Waypoint	X (Feet)	Y (Feet)	Waypoint	X (Feet)	Y (Feet)	Waypoint	X (Feet)	Y (Feet)	Waypoint	X (Feet)	Y (Feet)	Waypoint	X (Feet)	Y (Feet)
01)	0.00	0.00	11)	10.00	-50.00	21)	-0.00	-100.00	31)	10.00	-150.00	41)	-0.00	-200.00
02)	10.00	0.00	12)	0.00	-50.00	22)	10.00	-100.00	32)	0.00	-150.00	42)	10.00	-200.00
03)	10.00	-10.00	13)	-0.00	-60.00	23)	10.00	-110.00	33)	-0.00	-160.00	43)	10.00	-210.00
04)	0.00	-10.00	14)	10.00	-60.00	24)	0.00	-110.00	34)	10.00	-160.00	44)	0.00	-210.00
05)	-0.00	-20.00	15)	10.00	-70.00	25)	-0.00	-120.00	35)	10.00	-170.00	45)	-0.00	-220.00
06)	10.00	-20.00	16)	0.00	-70.00	26)	10.00	-120.00	36)	0.00	-170.00	46)	10.00	-220.00
07)	10.00	-30.00	17)	-0.00	-80.00	27)	10.00	-130.00	37)	-0.00	-180.00	47)	10.00	-230.00
08)	0.00	-30.00	18)	10.00	-80.00	28)	0.00	-130.00	38)	10.00	-180.00	48)	0.00	-230.00
09)	-0.00	-40.00	19)	10.00	-90.00	29)	-0.00	-140.00	39)	10.00	-190.00	49)	-0.00	-240.00
10)	10.00	-40.00	20)	0.00	-90.00	30)	10.00	-140.00	40)	0.00	-190.00	50)	10.00	-240.00

All coordinates are in Feet  Do Not Use Baseline Relative Coordinates

OK Cancel Clear Create Search Pattern

Figure 2.3 Waypoint Screen

Select **Do Not Use Baseline Relative Coordinates** to enter Waypoints with reference to some Northing/Easting origin. Baseline Relative Coordinates are useful when you want to use the same waypoint pattern but want to move the baseline to various locations.

Press the **Create Search Pattern** button to define a search pattern.

Create Search Pattern

Start Position X: Y:

0 0

Bearing:

0

First Turn Right

Leg Length: Separation: Search Area Width (Distance Between First and Last Legs):

0 0 0

All units are in Meters

OK Cancel

Figure 2.4 Create Search Pattern Screen

Figure 2.4 shows the **Create Search Pattern** Screen.

The first two fields define the **X** and **Y** coordinates for the starting position of the search pattern. The **Bearing** defines the bearing of the first leg of the search pattern with respect to the first baseline. Check the **First Turn Right** box if the first turn in the search pattern is to the right,

**Leg Length** defines the length of each leg of the search pattern. **Separation** defines the distance between successive legs of the search pattern. **Search Area Width** defines the distance that the search pattern should extend in a direction perpendicular to the legs of the search pattern.

The Waypoints will be displayed in DiveBase™ as soon as the configuration file is saved and made active.

## 2.4. Edit Diver Observation Records

The **Observation Record Editing** screen allow you to define how the observation recording screens on mobile diver stations will appear, and what data will be stored.

The first screen of the Observation Record Editing Screens allows you to define lists of data that can used in the observation recording. You can define up to 10 different lists. Enter the number of elements in the list and press the **Edit** button to edit the elements of the list.

The check boxes near the bottom of the screen allow you to set what data will be automatically stored with each observation recording. Check the data items that you want to store. Note: These items will not appear on the diver station observation screen.

List	Number of elements	Edit
List 01	11	Edit
List 02	4	Edit
List 03	11	Edit
List 04	27	Edit
List 05	0	Edit
List 06	0	Edit
List 07	0	Edit
List 08	0	Edit
List 09	0	Edit
List 10	0	Edit

Automatic Depth    X    Y    RMS Error    Temp

Edit Observation Screen

OK   Cancel

Figure 2.5 Observation Record Editing Screen

Press Edit Observation Screen to edit the actual observation screen that will be displayed on the diver station. Figure 2.6 shows the **Observation Screen**.

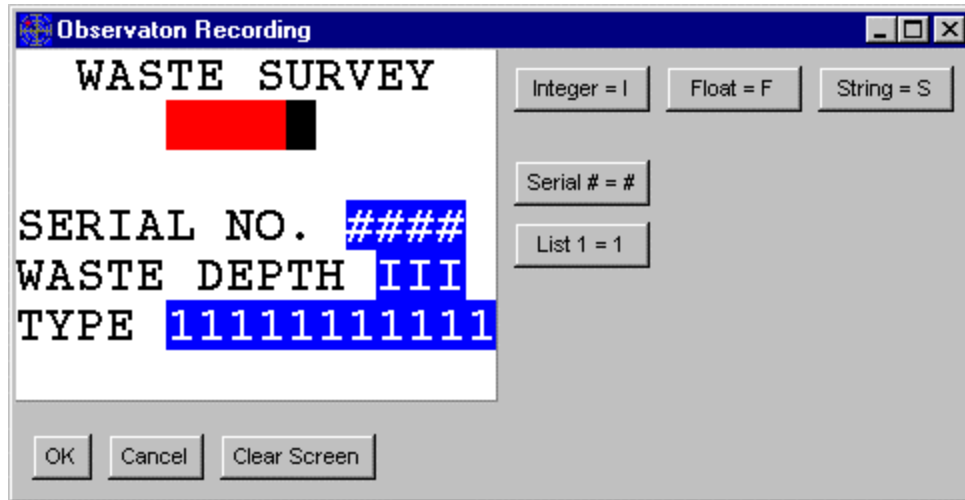


Figure 2.6 The Observation Screen

The white area on the left shows how the observation screen will look on the diver station. You can type in any characters that you wish to be displayed. The editing only works in an overstrike mode, so you can not insert characters, only overwrite them.

Clicking and dragging will select an area on a single line of the observation screen. The selected area will be hi-lighted in Red. You can delete the hi-lighted are by pressing the delete key. You can set the hi-lighted area to be a **Data Field** by pressing one of the buttons on the right side of the screen.

The **Data Fields** will be where the diver enters data during a survey. The minimum size for most data fields is 3 characters. The minimum size for list data fields is 4 characters. When the hi-lighted area is large enough the available **Data Field** buttons will become active.

After you press a **Data Field** button the hi-lighted area will contain the single character identifier for that **Data Field**. When they are not hi-lighted **Data Fields** will be shown as white characters on a blue background.

Press **OK** when you are satisfied with the **Observation** screen.

### 3.0. Downloading the Configuration File

Either DiveBase™ or DiveTerm™ can be used to download configuration files to DiveTracker™ stations. Please see the DiveBase™ or DiveTerm™ literature for more information on downloading configuration files.