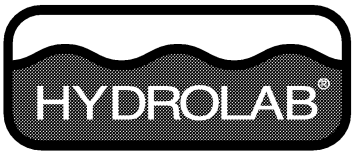
Surveyor ® 4

Water Quality Data Display

User's Manual



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Contents

Introduction

Thank you for choosing Hydrolab's newest and most advanced instrument, the Surveyor® 4 data display. As a global company and market leader, Hydrolab prides itself in the advanced technology, reliability, and serviceability of its instruments. Our customer support services are built on years of experience in the field and are ready to answer your questions and help you "get the job done."

If you have any questions or comments regarding this manual or the proper use of your equipment, contact Hydrolab Corporation at 800-949-3766 (in the United States of America and Canada only) or (512) 255-8841.

Your Surveyor 4 is shipped with a user's manual, a Surveyor 4 charger cable, and a 12 VDC power adapter, and a material safety data sheet.

Please note that...

The product specifications and other information contained in this manual are subject to change without notice.

Hydrolab Corporation has made a concerted effort to provide in this manual complete, accurate, and current information for the proper use of the equipment that you have purchased. Hydrolab may not be held responsible for any errors or omissions contained in this user's manual.

If you have any questions or comments regarding this manual or the proper use of your equipment, contact Hydrolab Corporation at 800-949-3766 (in the United States of America and Canada only) or (512) 255-8841.

Conventions

This manual follows a number of conventions. Please, take a few minutes to read the following information.

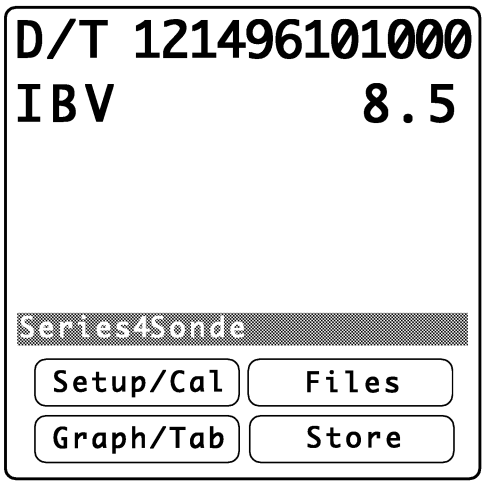
We used the metric system and included American-English equivalents in parentheses: e.g. 250 m (820 ft). The same applies to other units including degrees Fahrenheit (˚F) and Celsius (˚C). All figures were rounded off to the next or previous digit, e.g. 250 m = 820 ft (not 820.20 ft).

The American-English date format - month, day, year - is the Surveyor 4's default date format.

The instrument's menu and submenu options appear in the format that they will be displayed on your screen: e.g. `Sonde`, `Setup`, `Calibrate`, `Files`, etc.

Computer keystrokes are shown in boldface and match the keys on your computer, e.g. **Ctrl**, **Esc** or **ESCAPE**, **ENTER**, **RETURN**, etc. Keystrokes connected by a **+** sign mean that you must hold down the first key and press the second one. For instance, **Ctrl+X** means that you must hold down the **Control** key and press **X**.

The Surveyor 4 screens and messages appear in the following format:



The multiprobe screens and messages appear between two horizontal bars:

```
Id: DS4-1                DataSonde 4 /MiniSonde          04/12/96
```

"Multiprobe" refers to your water quality multiprobes like DataSonde 4, MiniSonde or earlier multiprobe models, such as DataSonde 3, H20G, etc, which are also compatible with your Surveyor 4 data display.

The use of "he," "him," or "his" was chosen as a typographical convention and also stands for "she," "her," or "hers" throughout the publication.

For additional information or technical support, call 800-949-3766 (in the United States of America and Canada only) or (512) 255-8841.

SAFETY FIRST CHECKLIST

This document contains general precautions and warnings to follow when operating Hydrolab instruments and their peripherals. Please, keep this document handy for all operators.

☑ POWER SUPPLIES:

To avoid potentially fatal electrical shock and/or instrumentation damage, we suggest that you avoid using AC to power your Surveyor 4. When deploying your Surveyor 4 outdoors, you should only use battery power (with a combined voltage not to exceed 15 volts). If you elect to deploy your Surveyor 4 outdoors using any power supply that is in any way connected to the AC mains (110 or 220 VAC), your AC power supply cable MUST be protected by a Ground Fault Interrupt (GFI) device. The installation of the GFI device MUST be done by a licensed electrician. This device may save your life!

The same applies when you are connecting your Surveyor 4 to AC mains via the charger cable and a power adapter to recharge the instrument's internal battery.

☑ OPENING A SURVEYOR 4:

To avoid internal damage to the internal components when opening the Surveyor 4, make sure that the instrument is clean and dry and that you have disconnected any cable attached to the Surveyor 4. To avoid electrical hazards, make sure your instrument is not connected to any external power supply.

☑ COMPONENT PROTECTION:

Your Surveyor 4 should be protected from temperatures under - 20 ˚C (-4 ˚F) and above 50 ˚C (122 ˚F). Follow the directions about cable and connector handling in the "Maintenance, calibration, and storage" chapter of this manual, under "DOs and DON'Ts for electrical cable".

☑ WATER AND THE INSTRUMENTS:

To avoid water contacts with the Surveyor 4's internal components during battery replacement, we recommend that you avoid replacing the batteries close to a water source.

If the Surveyor with no cable connected comes in contact with water at the connector's level, use a blow dryer on low setting to dry your instrument.

If the Surveyor 4 with no cable attached falls in the water, your instrument will display a "Charger" mode message. Dry your instrument with a towel and thoroughly dry the connectors with a blow dryer on low setting. The "Charger" message should disappear. Otherwise, call Hydrolab at 800-949-3766 (in the U.S.A. and Canada only) or (512) 255-8841.

If water leaks into the Surveyor 4, depending on the water amount, you can either use a hair dryer, or you will need to call hydrolab Technical Support lines at the above-mentioned numbers.

☑ SOFTWARE ISSUES:

To avoid erasing your Surveyor 4's main software or any other related data, do not attempt the `Download:Software` transfer mode unless you have assistance or have received instructions from Hydrolab. For more information, call 800-949-3766 (in the United States of America and Canada only) or (512) 255-8841.

1. Assembly, Communications, and Configuration

CHAPTER 1: ASSEMBLY, COMMUNICATIONS, AND CONFIGURATION

This chapter contains a first look at your new Surveyor 4 Data Display and other components of your water quality monitoring system. After assembly, you will get to know the Surveyor 4 system, its screens, and configuration.

If you are using a multiprobe, please refer to the multiprobe (DataSonde 4, MiniSonde, DataSonde 3, Reporter, H20, or H20G) user's or operating manual for specific maintenance, calibration, and deployment procedures.

1. Assembling your Water Quality Monitoring System

This section will explain the assembly process and show you the first communication screen that comes up on your Surveyor 4.

STEP 1: Please open the shipping boxes and check that all the components you ordered are included and have not been damaged during transportation.

STEP 2: Locate the cables you need for the Surveyor 4 - multiprobe connection. Notice that the Surveyor 4 can support several assembly configurations. We are going to walk through some of the most common ones (see the following steps with figure 1 on the next page).

STEP 3: If your multiprobe has a fixed cable, just connect the other end of the cable to your Surveyor 4. You can skip the rest of this step.

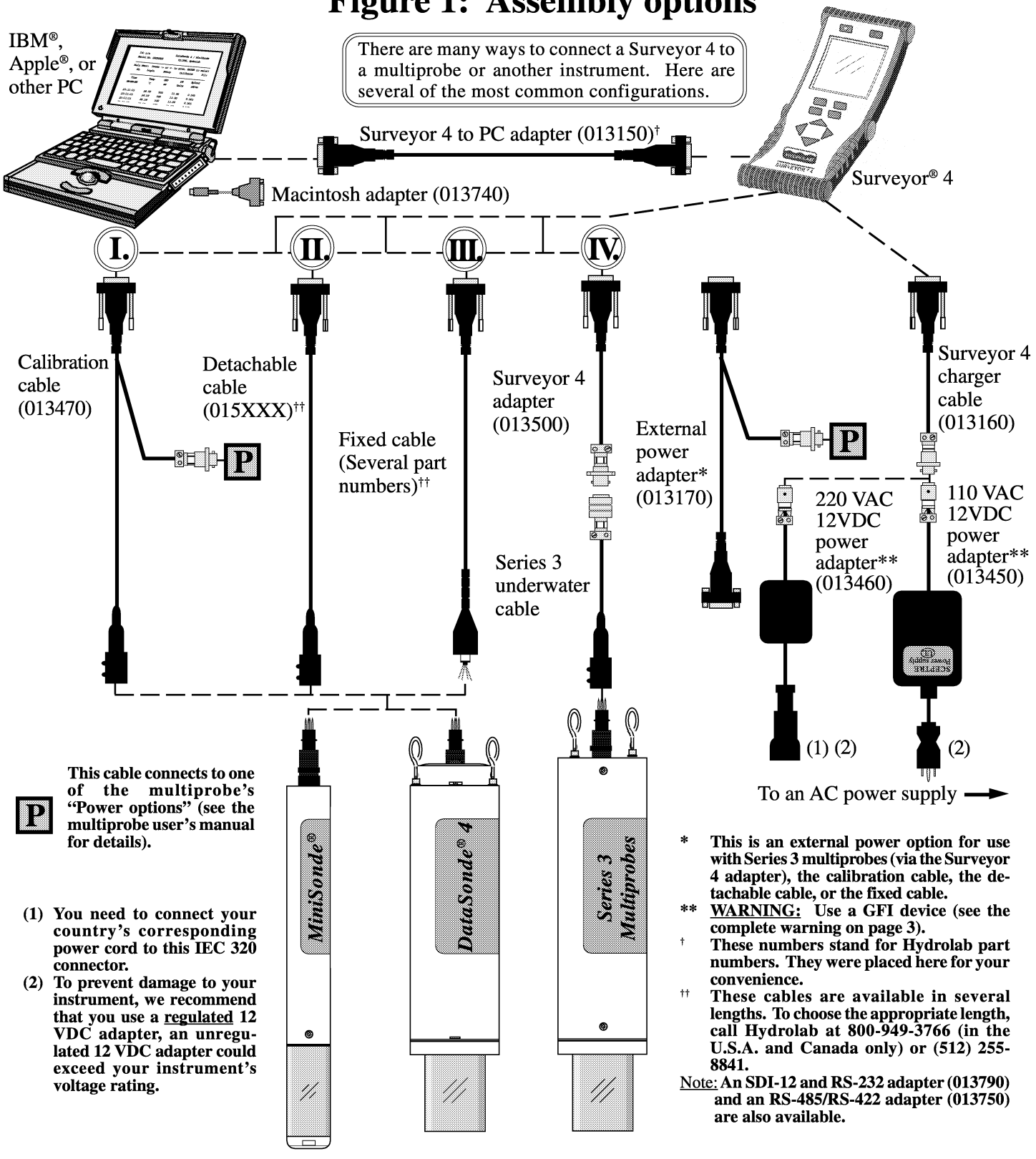
First configuration (Surveyor 4 and DataSonde 4 or MiniSonde): connect the calibration or detachable cable to your multiprobe (see figure 1, on the next page). Note the marine connector's keying. You must align the bigger pin on the multiprobe male connector to the indicator dots on your cable's marine connector. To avoid bending or damaging the connector's pins, do not force the pins into the connectors. Then, connect the other end of the cable to your Surveyor 4.

Second configuration (Surveyor 4 and Series 3 multiprobes): connect the Surveyor 4 adapter to your multiprobe underwater cable. Follow the same instructions as for the first configuration.

Third configuration (Surveyor 4 and PC): connect one end of the Surveyor 4 to PC adapter to your PC and the other end to the Surveyor 4.

STEP 4: Select a power source. The Surveyor 4 internal battery provides power for your Surveyor 4 and multiprobe (DataSonde 4 or MiniSonde). The Surveyor 4 charger cable (see figure 1) is for indoor use and should not be used close to a water source. Please, read the

Figure 1: Assembly options



P This cable connects to one of the multiprobe's "Power options" (see the multiprobe user's manual for details).

(1) You need to connect your country's corresponding power cord to this IEC 320 connector.

(2) To prevent damage to your instrument, we recommend that you use a regulated 12 VDC adapter, an unregulated 12 VDC adapter could exceed your instrument's voltage rating.

* This is an external power option for use with Series 3 multiprobes (via the Surveyor 4 adapter), the calibration cable, the detachable cable, or the fixed cable.

** WARNING: Use a GFI device (see the complete warning on page 3).

† These numbers stand for Hydrolab part numbers. They were placed here for your convenience.

†† These cables are available in several lengths. To choose the appropriate length, call Hydrolab at 800-949-3766 (in the U.S.A. and Canada only) or (512) 255-8841.

Note: An SDI-12 and RS-232 adapter (013790) and an RS-485/RS-422 adapter (013750) are also available.

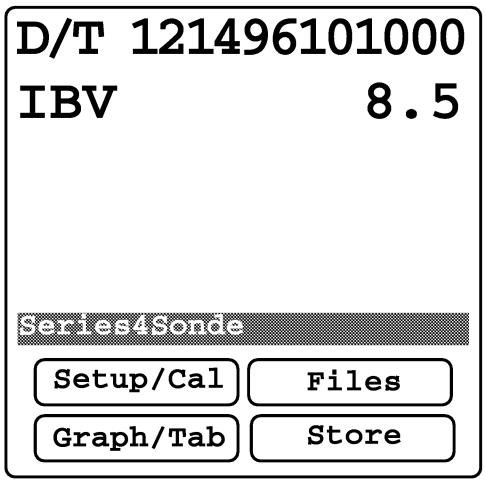
warnings below.

⚠ **WARNING:** **To avoid potentially fatal electrical shock, connect your multiprobe to a power source which does not exceed 15 volts.**

⚠ **WARNING:** **To avoid potentially fatal electrical shock, we suggest that you avoid using AC (110 and 220 VAC 12VDC power adapters) to power your multiprobe. When deploying your multiprobe outdoors, you should only use battery power. If you elect to deploy your multiprobe outdoors using any power supply that is in any way connected to the AC mains (110 or 220 VAC), your AC power supply cable MUST be protected by a Ground Fault Interrupt (GFI) device. The installation of the GFI device MUST be done by a licensed electrician. This device may save your life!**

STEP 5: Press the Off/On key (top right-hand corner of the Surveyor 4). After a short delay and the temporary welcome screen,

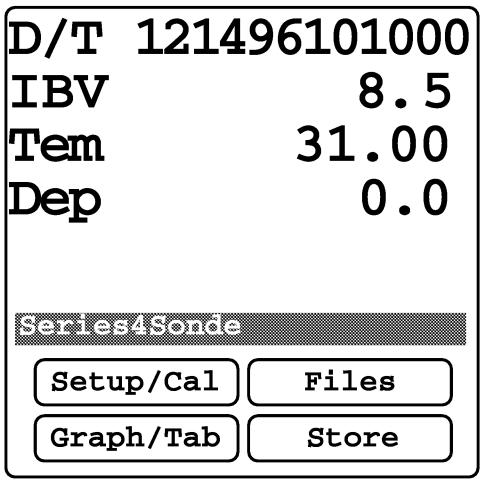
you will see the first Surveyor 4 screen, which will look as follows, if you received the Surveyor 4 directly from the factory. D/T is your Surveyor 4's time and IBV is its internal battery voltage.



NOTES:

- The displays used in this manual are representative of a specific multiprobe configuration and your screen may differ depending on your multiprobe and Surveyor 4 configurations. If you do not get the first screen, refer to chapter 5 under "Communications."
- If you connected your Surveyor 4 to a PC, none of the real-time readings will appear.

The screen below is another example of a possible Surveyor 4 screen:



If you notice any pound or number signs (#) or other typographical signs, refer to chapter 3 under "Calibration" where you will find the "Surveyor 4 software symbols" table. Dashes (----) mean that the Surveyor 4 is looking for information from a multiprobe or that the information from a multiprobe is not available.

NOTE:

- If you are using a Surveyor 4 with a Series 3 multiprobe, the associated menus will be addressed in the next chapter under "The interface modes."

⚠ **NOTICE:** **When you receive your Surveyor 4 from the factory, we recommend that you use it for a while to get familiar with the operating procedures before going out to the field. For battery recharging and replacing instructions, refer to the "Maintenance and Calibration" chapter.**

2. Basic Surveyor 4 Terminology

Please see figure 2 on the next page to help you locate your Surveyor 4 components.

The Case

The case is the body of your instrument which contains the Surveyor 4 electronics and internal battery. Our focus will be on the front panel (light grey). This panel is made of 11 soft keys and a high-resolution screen. The back of the case holds the batteries. It also has a 9-pin male connector for multiprobe or PC connection.

The Keys

The Surveyor 4 front panel has 11 keys. These 11 keys can be divided into the following sets: the top keys, the rectangular function keys, the triangular cursor keys, and the "Hydrolab" key.

The top right-hand key turns the Surveyor 4 on and off (see figure 2 on the next page). The top left-hand key turns the screen backlight on and off. The four rectangular keys, or function keys, correspond to the four rectangles (▭) at the bottom of the screen and allow setup, calibration, and other selections.

The four triangular keys (◄ ► ▲ ▼), or cursor keys, allow you to move the cursor up, down, right, and left in the Surveyor 4 menus, submenus, and virtual keyboards. These Surveyor 4 cursor keys have a repeat feature. If you press a key and hold it down, it will scroll the cursor up, down, left, or right on your screen in fast repeat mode.

There is also a special key, called the Hydrolab key. This key is located under the Hydrolab logo on the front panel. When you first connect your Surveyor 4 to a multiprobe and turn your

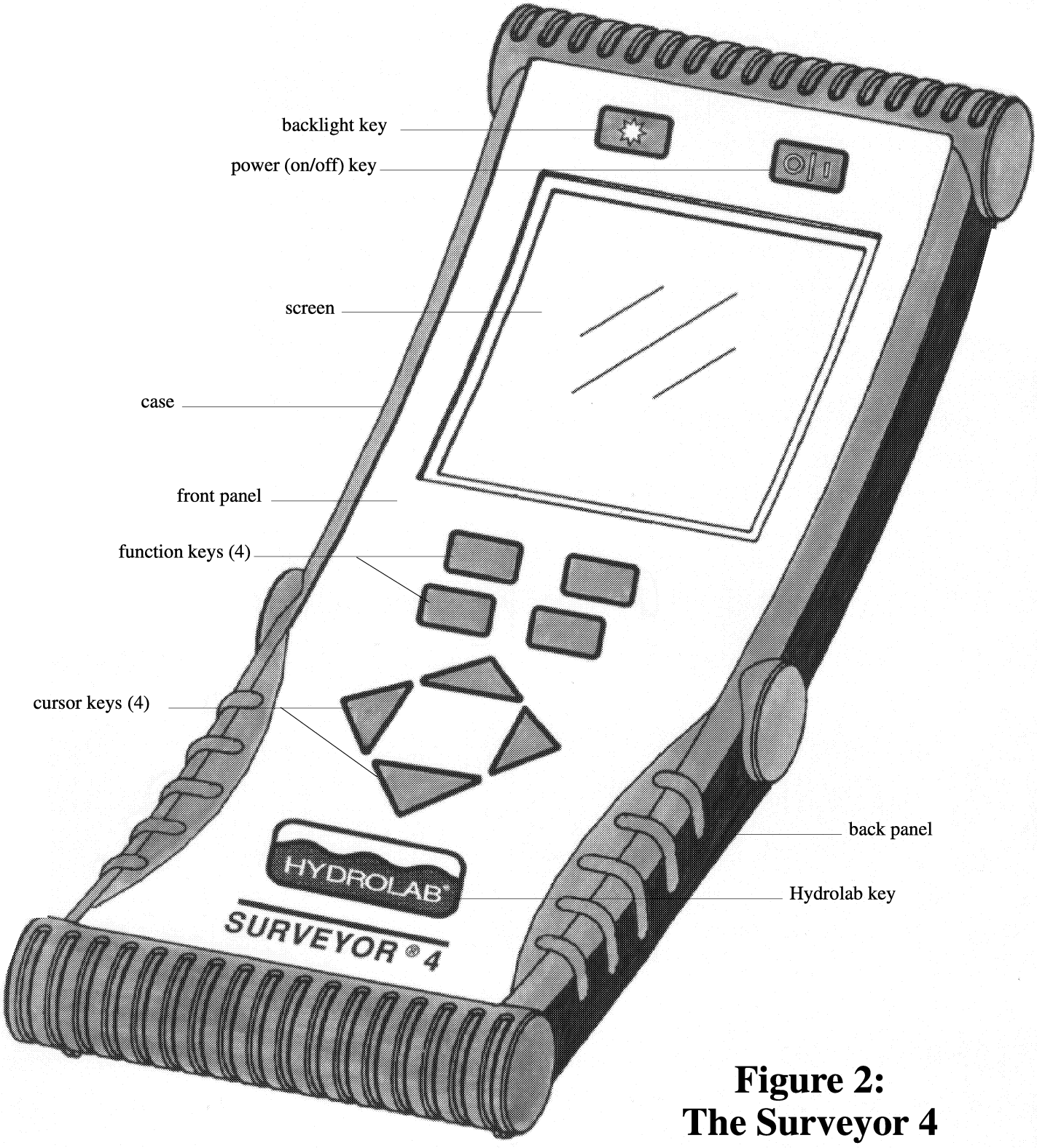
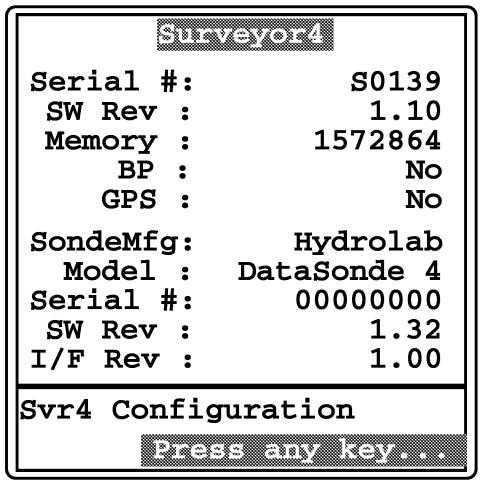


Figure 2: The Surveyor 4

instrument on (without pressing any other key), you can press the Hydrolab key to obtain system information on your Surveyor 4 and on the multiprobe.



The first five lines correspond to your Surveyor 4's system information. The serial number, which is factory-set, will differ on your unit, since it is a unique number. The SW Rev is the Surveyor 4's software revision number and represents the installed revision of the main code for your instrument. The memory is the total memory in your unit and may also differ - like most of the information in the above screen - from your specific unit. The last two lines for the Surveyor 4 allow you to see if your instrument is equipped with two optional features, internal barometric pressure and GPS (global positioning system). If Yes is displayed instead of No, you will find all the information you need about these options in the appropriate appendices at the end of this manual.

The next set of data corresponds to your multiprobe's configuration information. The first line tells you who the sonde manufacturer is, the second line provides you with an identification of what kind of multiprobe you have connected to your Surveyor 4. In this case we are using a DataSonde 4, but it could be a MiniSonde or a Series 3 multiprobe (dashes mean that the information is not available). The serial number is factory-set and will also be unique to your multiprobe. Next comes the software revision number for your multiprobe and finally the interface revision number (for Series 3, an "E" after the number means that it is an emulated interface).

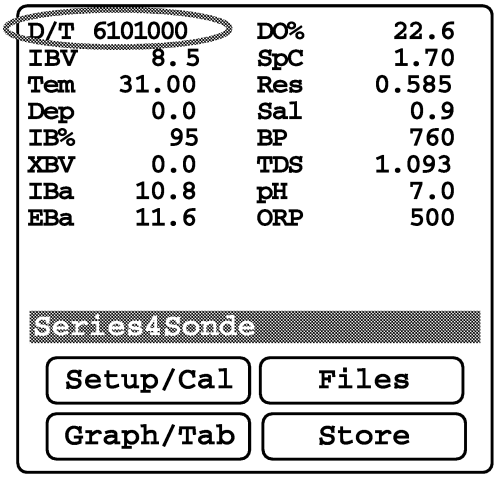
For more information on how to obtain the latest software and upgrading instructions, please call Hydrolab at 800-949-3766 (in the U.S.A. and Canada only) or (512) 255-8841.

The Screen

The large, high-contrast, liquid crystal screen displays real-time readings, graphs, or submenus (such as setup or calibration). The size of the characters depends on how many items you choose to display on the screen. We allowed the characters to be as large as possible for better readability.

A special feature, the backlight, lets you use your instrument in low-light or dark conditions. The backlight feature can be turned on or off with the top left-hand key. You can set an automatic shutoff interval (detailed in the next chapter).

The Real-Time Parameter Lines



These lines show several parameters and their corresponding real-time readings, as they are received from the multiprobe. The number of lines depends on the parameters you selected to display on your screen and on the parameters available on your multiprobe. The display automatically switches to a two-column format (as shown above) when the number of parameters exceeds 12.

The parameter names are abbreviated (i.e. Temperature will be displayed as `Tem`) followed by their real-time reading on the same line.

NOTE:

- `D/T` (date and time) is the only parameter not displayed in full on your screen when using smaller fonts. If the date and time were 121496101000, the display would show `D/T6101000`, which stands for the last digit of the date (6) and the time (101000).

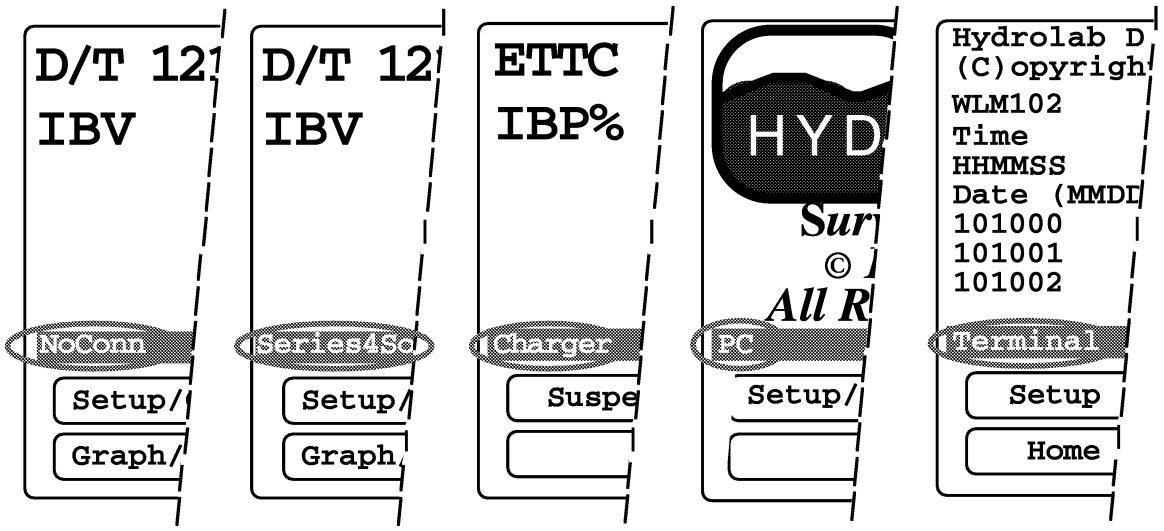
All these real-time parameter lines constitute what is called the "tabular display" in your Surveyor 4's menu and submenu in the rest of the manual.

The History Line

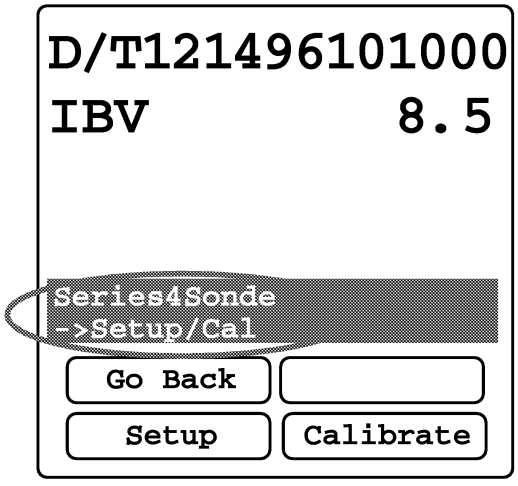
The dark grey line below the real-time parameter lines is the "history line". It shows how your Surveyor 4 is connected. This line can display six basic messages:

- `NoConn` (if your Surveyor 4 is not connected to any multiprobe, charger, or PC);
- `Series4Sonde` (if your Surveyor 4 is connected to a multiprobe and configured for Series 4 multiprobes);
- `Series3Sonde` (if your Surveyor 4 is connected to a multiprobe and configured for Series 3 multiprobes);
- `Charger` (if your Surveyor 4 is connected to an AC via the Surveyor 4 charger cable to recharge the internal battery);
- `PC` (if your Surveyor 4 is connected to a personal computer); and
- `Terminal` (if your Surveyor 4 is connected to a multiprobe and configured for terminal emulation).

Please review the sample screens below.



The history line also allows you to follow the path you select as you move through the menu and submenu structure.

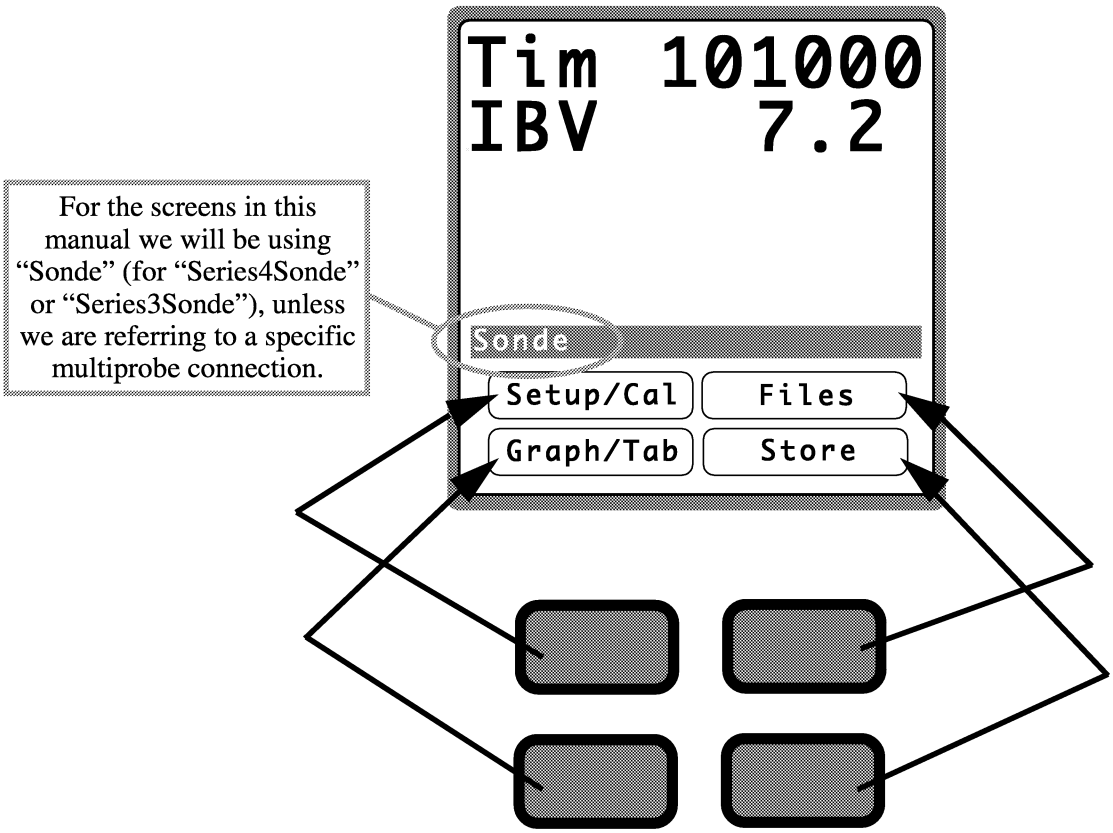


The previous screen shows that your Surveyor 4 is connected to a Series 4 multiprobe (DataSonde 4 or MiniSonde) and that you have the choice between `Setup`, `Calibrate`, and `Go Back`. Setup is addressed later in this chapter and in the next one. Calibration and other operations will be detailed in other chapters of this manual. `Go Back` brings you back to the previous screen.

The Function Keys

The four function keys are the blue rectangular soft keys on the Surveyor 4 front panel. They activate four corresponding rectangular screen keys shown on the bottom of the Surveyor 4 screen.

On the illustration below, we have matched the front panel function keys to their screen counterparts:

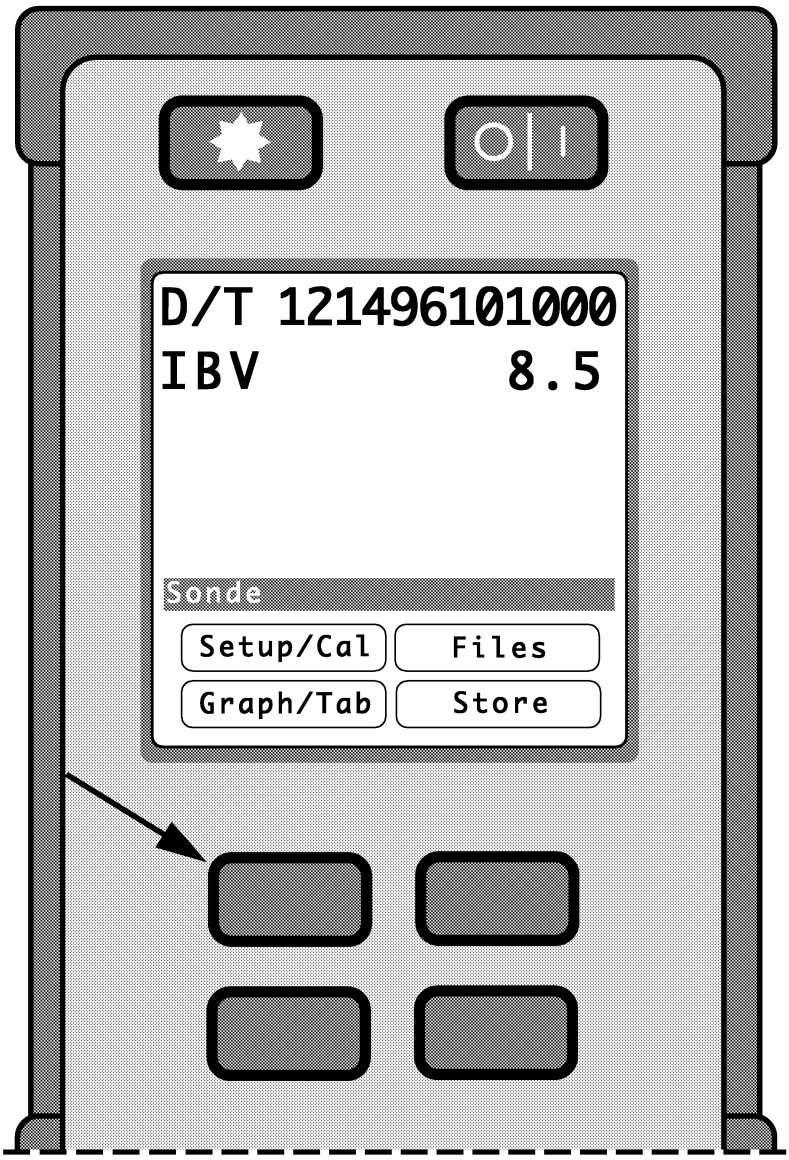


NOTE:

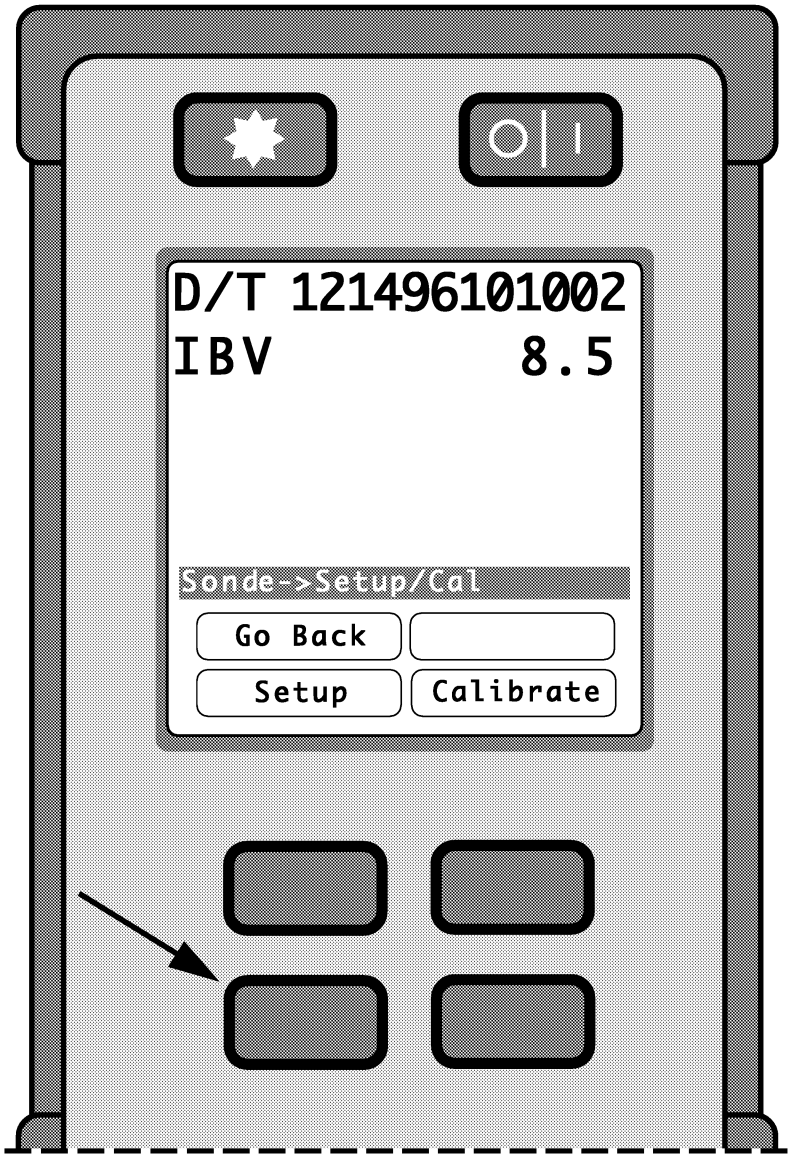
- The screen keys correspond to a front panel key, but they also represent Surveyor 4 software menus or submenus. Note that you cannot press the screen keys or menus to move up or down the menu and submenu structure. You must use the front panel cursor keys.

Let's now try an example to see how these keys work.

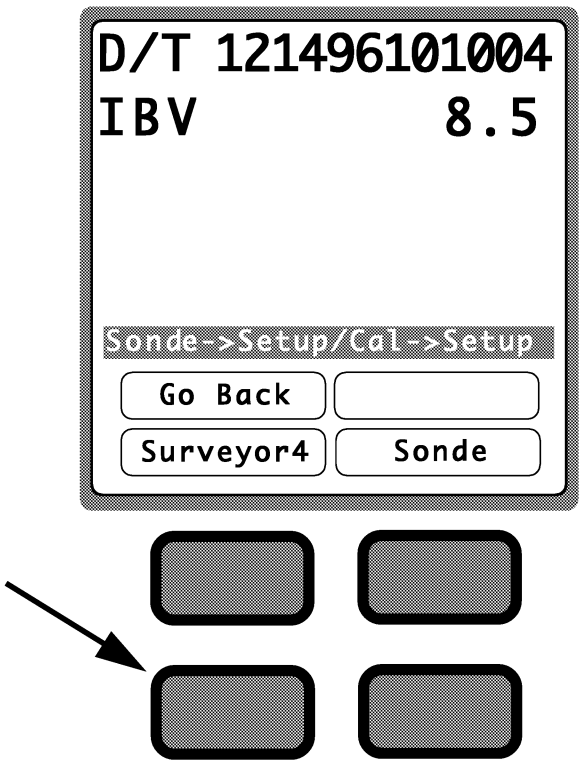
STEP 1: Press the key (marked by an arrow on the illustration below) corresponding to your screen's `Setup/Cal` key.



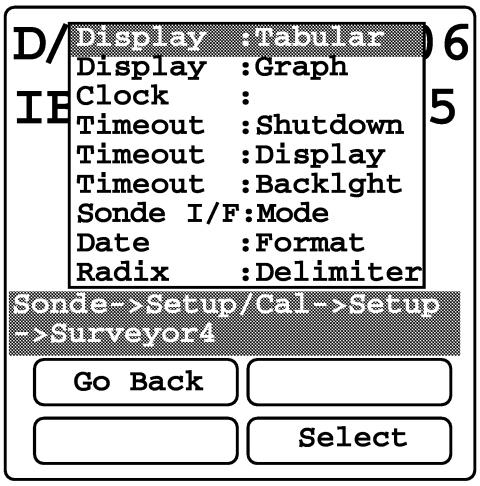
STEP 2: Then, press the `Setup` key (marked by an arrow on the illustration below).



STEP 3: Next, press the `Surveyor 4` key (marked by an arrow on the next illustration).



You have now reached the Surveyor 4 setup window:



From the screen above, you can use the triangular cursor key to highlight the setup item to change. Press the function `Select` key to setup the highlighted item. When finished with `Setup`, you can press the `Go Back` key three times and return to the tabular display.

3. Introduction to Surveyor 4 Operation

This section shows you how to set and change some of your data display's parameters. Note that your screen may vary depending on the parameter(s) you selected and have available on your instruments.

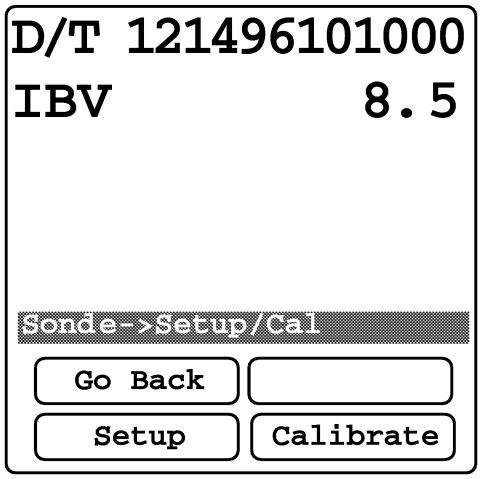
Menus and Submenus

To understand the Hydrolab user interface and to learn how easy it is to access other menu levels, called submenus, try these two exercises 'live' on your Surveyor 4:

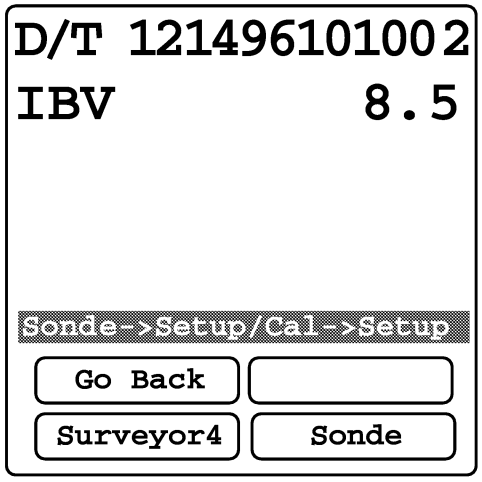
Exercise 1:

This exercise shows you how to enter the new date and time at your location. Make sure that your Surveyor 4 is turned on and properly connected to a multiprobe and that the history line (highlighted line) displays the word Sonde.

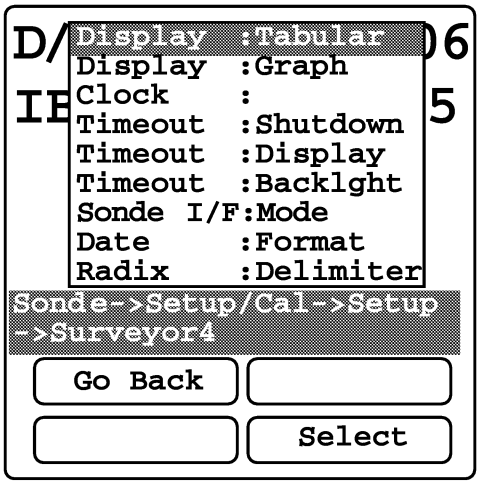
STEP 1: Press the Setup/Cal function key to get:



STEP 2: Press the `Setup` key to get:

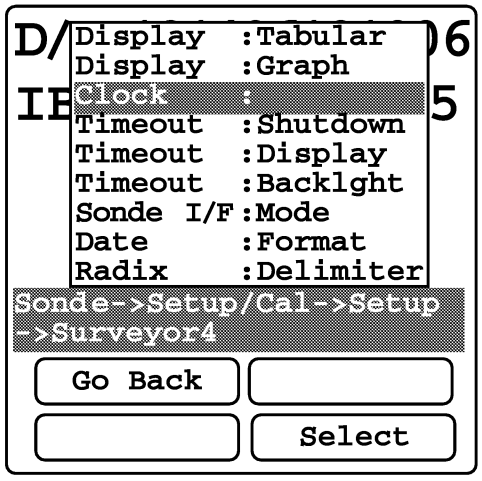


STEP 3: Press the `Surveyor 4` key to get:

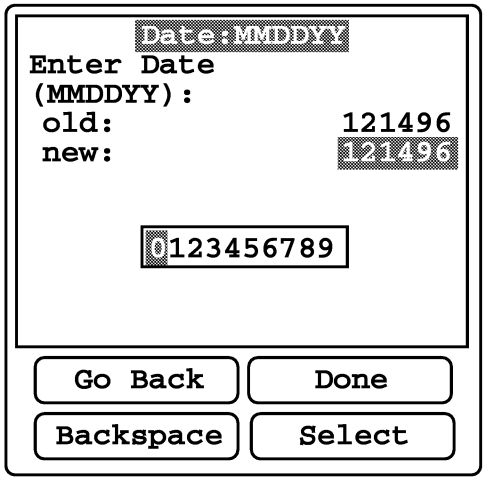


Notice that the real-time parameter lines are still being updated in the background (the numbers on the right-hand side of your screen will change at regular intervals).

STEP 4: You have the choice between several parameters. For this example, let's use the triangular cursor down key (▼) to move the cursor down to `Clock`.

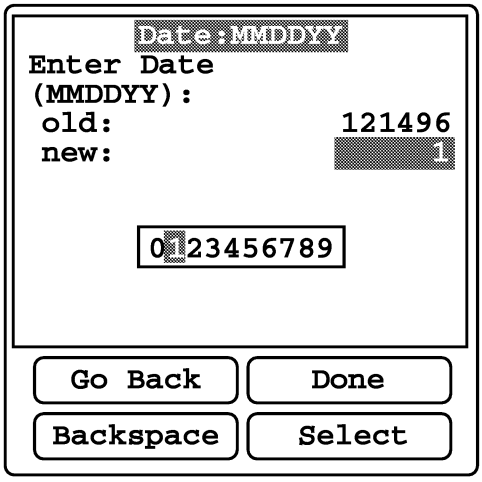


Then, press `Select` to get:

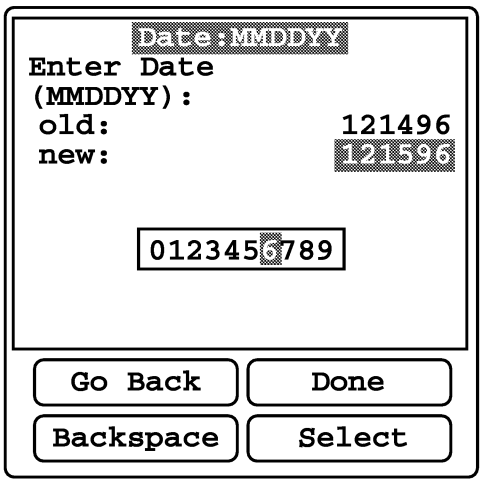


The first line is the title line (`Date: MMDDYY`). A message appears on the second, third, fourth, and fifth lines: `Enter Date (MMDDYY): old: 121496 new: 121496`. The "`new`" line is the one we are going to change, using the numbers at the center of your screen: `0123456789`. Use the left or right cursor keys (◄ ►) to move the cursor (highlighted area shown on the number 0) to the appropriate first number for the current month - 1 in the example below - and press `Select`.

The number you selected (1) appears on the "new" line:

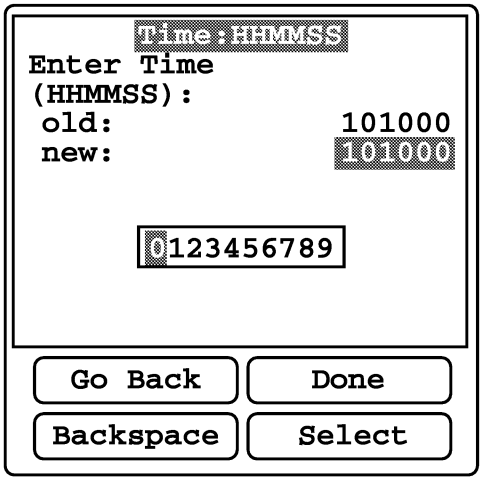


STEP 5: Repeat the step above for the second number for the month, then enter the day and finally the year. We have chosen to enter 121596 (December 15, 1996) for the example below.



If you make a mistake, you can clear your entries one by one using the Backspace key. If you enter a wrong number, the following message will appear very briefly: Invalid or incomplete text! You will be returned to the screen above to enter the correct number.

STEP 6: When you are finished, press the `Done` key. The next screen will prompt you for the new time:



Enter the new time in the same manner as you entered the new date.

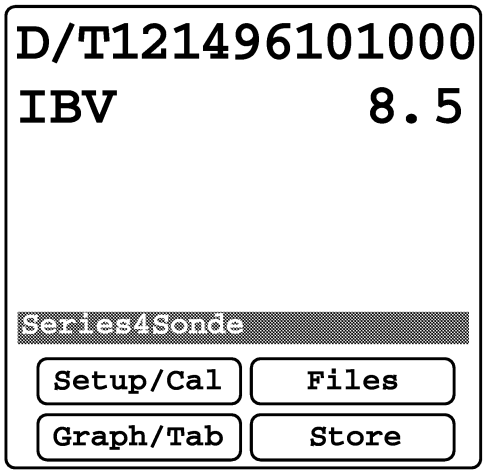
STEP 7: When you are finished, press the `Done` function key, you will hear a sharp beep and you will see very briefly the following message at the bottom of your screen: `Setup Successful! Press any key...` Press any key to return to the Surveyor 4 setup screen.

Well done! Now, let's move to our second exercise.

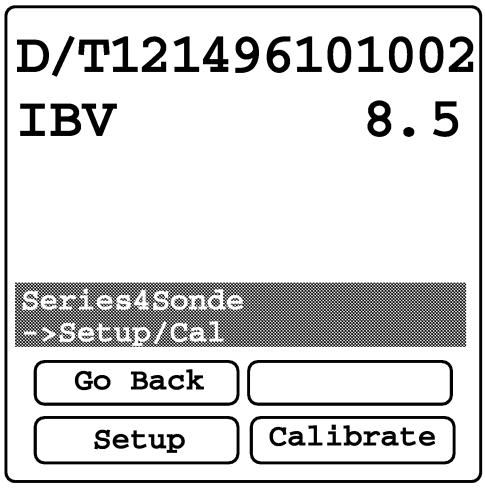
Exercise 2:

Now, let's customize your screen by adding or deleting some of the real-time parameters via the `Setup` submenu.

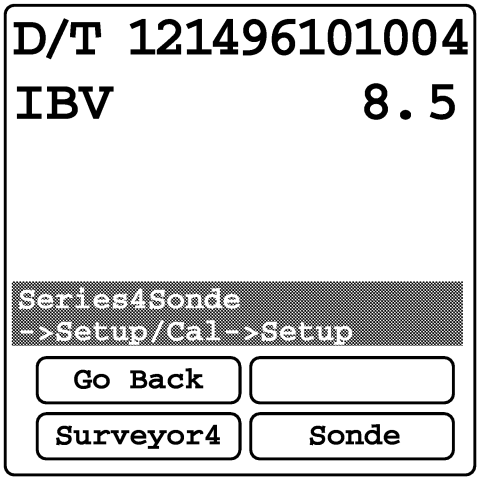
STEP 1: Starting from the screen below ...



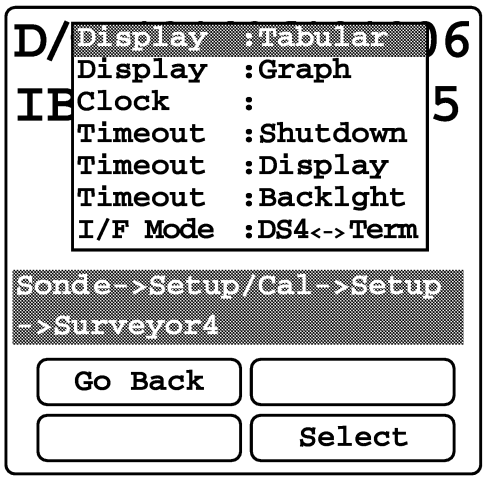
... press the `Setup/Cal` function key to get:



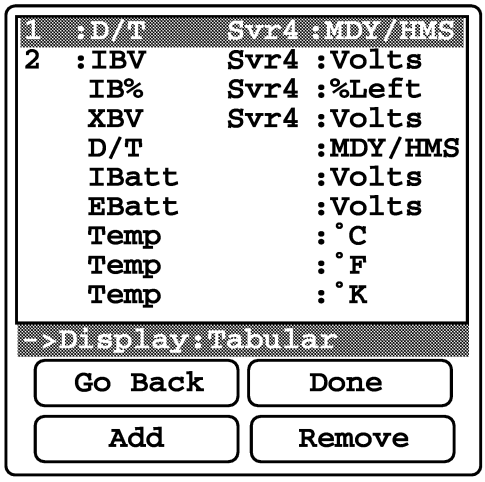
STEP 2: Press the Setup key to get:



STEP 3: Press the Surveyor4 key to select the Surveyor 4 setup mode:

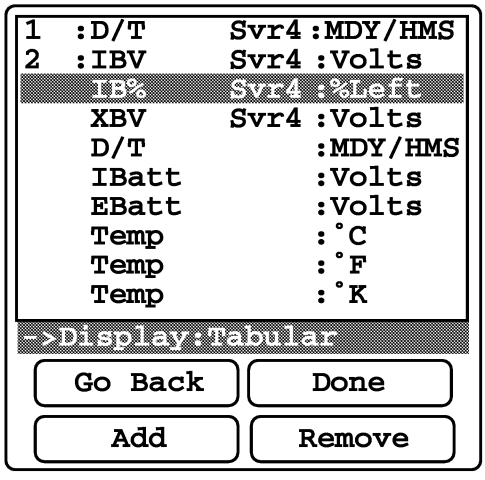


STEP 4: Depending on your setup, either leave the cursor on, or move the cursor to, `Display:Tabular`, and press the `Select` key to get:

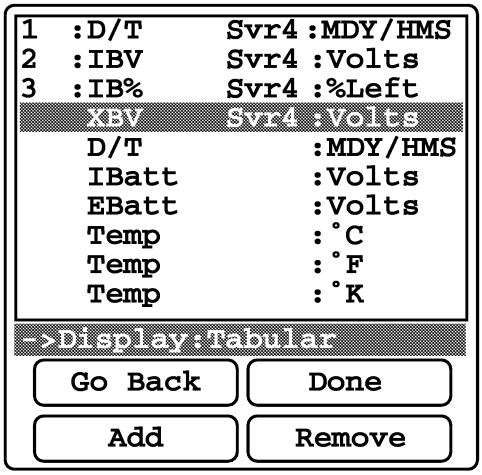


You can now see a screen with the list of the parameters. The parameters currently on your Surveyor 4 screen are preceded by numbers. These numbers give you their order of appearance (from 1 to 24) on the real-time display lines. The parameters without numbers are not currently displayed on your Surveyor 4 screen.

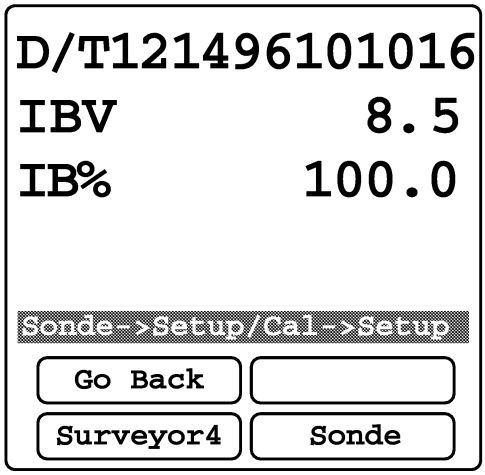
STEP 5: Let's move the cursor, using the up or down cursor keys, to `IB%  Svr4:%Left` (IB stands for internal battery), and press `Add`.



A number now appears in front of IB% Svr4:%Left (3 in the example below), meaning that when we go back to the tabular display, IB% Svr4:%Left will appear in the third position.



STEP 6: Press the Done key, any key and then the Go Back key once to return to the real-time screen (tabular display). You notice that your new parameter (IB%) was added to the screen.



You can repeat the previous steps to add up to 24 parameters. To remove parameters, simply press the Remove key instead of the Add key.

NOTE:

- Some of the parameters, such as temperature, can only be displayed in one unit. For instance, if you add `Temp:˚C`, you cannot add `Temp:˚F` and keep `Temp:˚C`. If you add `Temp:˚F`, `Temp:˚C` will be automatically be removed and its corresponding number will appear in front of `Temp:˚F`.

STEP 7: To return to your first screen, from step 6, press the `Go Back` key twice.

Congratulations! Now, you know how to customize your Surveyor 4 to display the parameters and readings that meet *your* specific needs. You are ready to move to the next chapter, "Menus", which takes a closer look at the Surveyor 4 submenus and configuration possibilities.

2. Menus

CHAPTER 2: MENUS

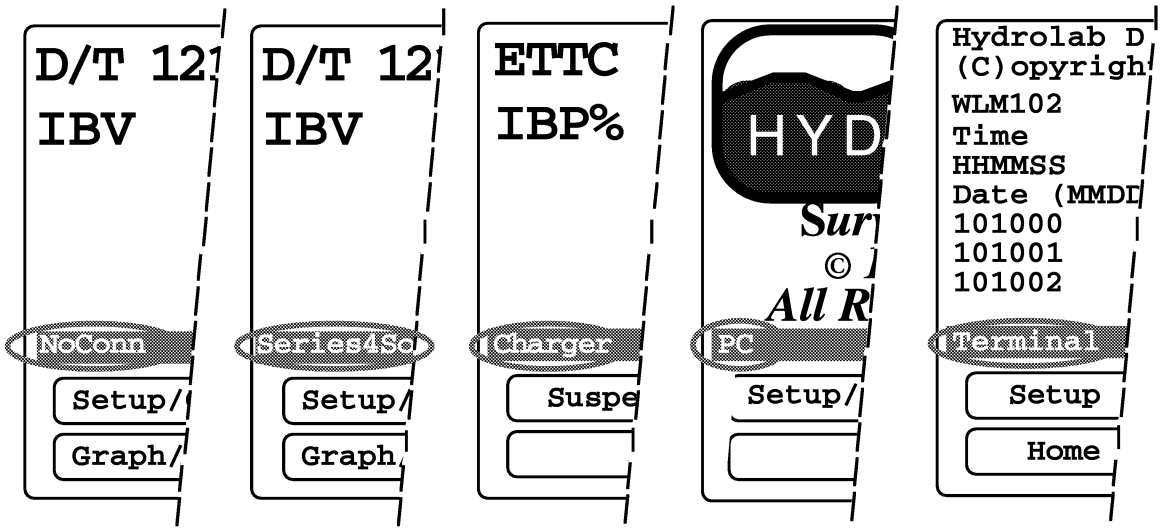
In this chapter, you will learn more about how you can configure your Surveyor 4 to meet *your* specific needs.

While the information shown on the Surveyor 4 in this chapter may be different from the information displayed on your screen, it should be close enough to help you with your own Surveyor 4 setup.

As a reminder, the dark grey line below the real-time parameter lines is the "history line." It shows how your Surveyor 4 is connected. This line can display six basic messages:

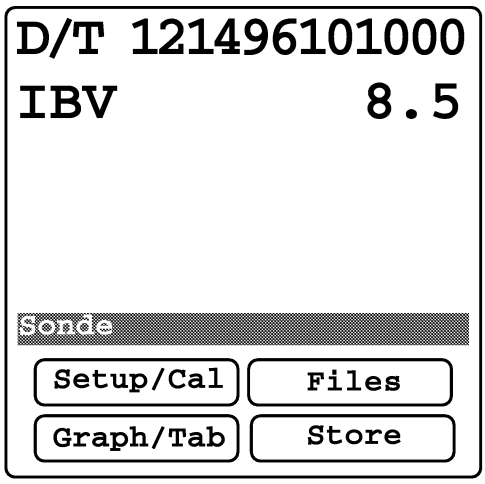
- `NoConn` (if your Surveyor 4 is not connected to any multiprobe, charger, or PC);
- `Series4Sonde` (if your Surveyor 4 is connected to a multiprobe and configured for Series 4 multiprobes);
- `Series3Sonde` (if your Surveyor 4 is connected to a multiprobe and configured for Series 3 multiprobes);
- `Charger` (if your Surveyor 4 is connected to an AC via the Surveyor 4 charger cable to recharge the internal battery);
- `PC` (if your Surveyor 4 is connected to a personal computer); and
- `Terminal` (if your Surveyor 4 is connected to a multiprobe and configured for terminal emulation).

Please review the sample screens below.



1. Preparation

After receiving your Surveyor 4 from the factory, connecting it to a multiprobe, and turning it on for the first time, the first screen that comes up on your instrument will look somewhat like this:



If this is not the case, check your assembly and communications with chapter 1 or if your screen displays "Terminal" instead of "Sonde," move to "The interface modes" later on in this chapter.

The `Files` key and its functions are addressed in chapter 4, entitled "Logging and data transfer".

The `Store` key allows you to save data to the Clipboard or files in your Surveyor 4 extended memory. The Clipboard or files will contain the information displayed on your screen at the moment you pressed the `Store` key. If you are in the graph mode, you can also press the `Store` key to store the graph information in a text format. To view the stored files, you need to select the `Review` function described in chapter 4. To transfer data to a PC, you need to connect your instrument to your computer with the Surveyor 4 to PC adapter, and follow the transfer protocol detailed in chapter 4 under "Surveyor 4 to computer transmission."

The `Setup/Cal` key gives you access to the Surveyor 4 and multiprobe setup and calibration submenus. You have already covered some of the `Setup` features in chapter 1, now it is time to see the rest of the features.

2. Security Levels

Upon initial receipt of from the factory, your Surveyor 4 comes up in a default security level. This security level will determine your access privileges to the software's submenus. Level 2 is the factory -set default level. Note that if you decide to change the security level, your Surveyor 4 will remember the new security level (or SL) the next time you power up your instrument.

For description of the 4 security levels (0-3), please refer to the table below.

TABLE 1: SECURITY LEVELS QUICK REFERENCE

Security Level	Password	To Access
Level-0	NOT REQUIRED (Surveyor 4 security level at power-up)	Power On/Off; Backlight On/Off; Surveyor4 Installed Options Display; Real-time Tabular Data Screen; Real-time Graph Data Screen; Terminal Screen; Terminal Cursor Movement; Terminal Cursor Home; Terminal Virtual Keyboard.
Level-1	USER DEFINABLE (Disabled on new Surveyor 4s)	Surveyor4 Files Status; Surveyor4 Files Review; Store; Sonde Files Statu;s Sonde File Download; Terminal File Download; Terminal Data Capture.
Level-2	USER DEFINABLE (Disabled on new Surveyor 4s)	Most Surveyor4 Setups; Surveyor4 BP User Calibration; Most Surveyor4 File Functions; Sonde Setups; Sonde Calibrations; Sonde File Create; Sonde File Delete.
Level-3	USER DEFINABLE (Factory default: "HYDROLAB")	Password Change; Factory Installed Options Change; Setup Reset; Parameter History Reset; File System Reset; Surveyor4 BP Factory Calibration; Downloading New Surveyor4 Software.

⚠ **WARNING: To avoid erasing your multiprobe's main software or any other related data, do not attempt to log on to level 3 unless you have assistance from Hydrolab. For more information, call 800-949-3766 (in the United States of America and Canada only) or (512) 255-8841.**

3. Connections and Interface Modes

As seen in the previous section, your Surveyor 4 allows 6 different interface modes or connections which will determine the basic message displayed on your instrument's history line. The history line messages are dependent on the types of cable that you connect to your Surveyor 4 and to the interface mode (or SondeI/F:Mode) you select within your Surveyor 4 internal setup menu.. If your instrument has no power left, your Surveyor 4 will not turn on and the message will not appear.

NoConn

The NoConn connection mode is displayed on your Surveyor 4's history line when no cable is connected to your instrument and your Surveyor 4 is turned on.

Charger

The Charger connection mode is displayed on your Surveyor 4's history line when the Surveyor 4 charger cable is connected to your instrument and your Surveyor 4 is turned on. You will need to connect a 100 or 200 power adapter cable to the Surveyor 4 charger cable and insert the other end of the appropriate power adapter into the wall plug. For detailed instructions on how to recharge your Surveyor 4, please refer to Chapter 3 under "Surveyor 4 Internal Battery Recharging."

PC

The PC connection mode is displayed on your Surveyor 4's history line when the Surveyor 4 to PC adapter is connected to your instrument and your Surveyor 4 is turned on. The message will appear even before you physically connect the other end of the Surveyor 4 to PC adapter to your computer. If you have a Macintosh computer, you will also need to connect the Macintosh adapter to the other end of the Surveyor 4 to PC adapter.

NOTE:

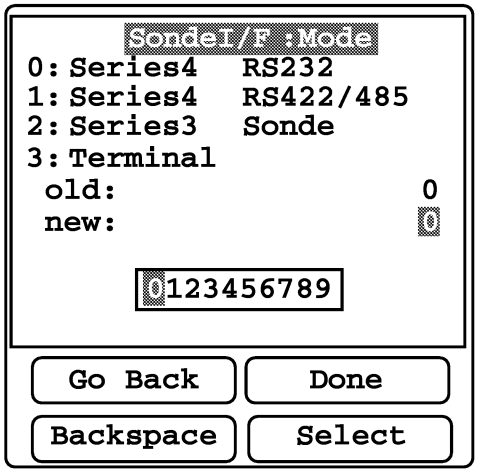
- For the next three interface modes, you need to know that you can have access to the SondeI/F:Mode only when your history line reads NoConn, Series4Sonde, Series3Sonde, or Terminal, and only when you are in security level 2. For security levels, please refer to the previous section "2. Security Levels."

Series4Sonde

The Series4Sonde interface mode needs to be selected from your Surveyor 4's SondeI/F:Mode before it can be displayed on the history line. Then you can connect a calibration cable, detach-

able cable, or fixed cable and also select to use an external power adapter, and turn your Surveyor 4 on. Let's now see how you can choose the Series4Sonde interface mode from the SondeI/F:Mode submenu.

From the Setup/Cal menu in NoConn mode, select Setup and then move to SondeIF/:Mode and press **ENTER**. If you are in Series3Sonde or Series4Sonde mode, press Surveyor after choosing Setup. If you are in Terminal mode, press Setup and then move to SondeIF/:Mode and press **ENTER**. You will access the following screen:



If you select 0, you are telling your Surveyor 4 that it is going to be connected to a Series 4 multiprobe (DataSonde 4 or MiniSonde) equipped with a RS-232 hardware interface. If you choose 1, you are telling your Surveyor 4 that it is going to be connected to a Series 4 multiprobe (DataSonde 4 or MiniSonde) equipped with a RS-422/RS-485 hardware interface. If you select 2, you are telling your Surveyor 4 that it is going to be connected to a Series 3 multiprobe (DataSonde 3 version 1.20 and higher, Recorder, Reporter, H20, or H20G). If you choose 3, your Surveyor 4 will be able to interface with Series 3 multiprobes by using the Terminal mode which we have chosen for our sample screens. Once you have made your choice, press the Done key.

The history line will reflect the interface mode. Series4Sonde will appear on your screen for 0: Series4: RS232 and also for 1: Series4: RS422/485. Series3Sonde will appear on your screen for 2: Series3: Sonde. Terminal will appear on your screen for 3: Terminal.

Your Surveyor 4 will "autobaud," that is to say that your Surveyor 4 will try each baud rate available, starting with the highest one, until it establishes communications with the Series 4 multiprobe.

Series3Sonde

The Series3Sonde interface mode needs to be selected from your Surveyor 4's SondeI/F:Mode before it can be displayed on the history line. Then you can connect a calibration cable, detachable cable, or use a Surveyor 4 adapter and a Series 3 underwater cable and also select to use an external power adapter, and turn your Surveyor 4 on. To choose the Series3Sonde interface mode from the SondeI/F:Mode submenu, follow the directions in the previous section.

Make sure to press the Done key once you have made your choice.

Your Surveyor 4 will "autobaud," that is to say that your Surveyor 4 will try each baud rate available, starting with the highest one, until it establishes communications with the Series 3 multiprobe.

NOTES:

- When you connect your Surveyor 4 to a Series 3 instrument, and the interface mode is 2: Series3Sonde, a "translation" goes on in the background.
- In order to perform this translation, the Surveyor 4 will reconfigure the following Series 3 multiprobe settings:
  - enables all the parameters;
  - selects conductivity in the conductivity/resistivity column;
  - selects salinity in the salinity/TDS column;
  - enables conductivity autoranging;
  - enables turbidity autoranging (if the DataSonde 3 revision is $\geq$ 1.40 or the H20 revision is $\geq$ 2.00);
  - selects %Sat in the %Sat/mg/l column (if the DataSonde 3 revision is $\geq$ 1.40 and $<$ 1.60, or the H20 revision is $\geq$ 2.00 and $<$ 2.10).

Terminal

The Terminal interface mode needs to be selected from your Surveyor 4's SondeI/F:Mode before it can be displayed on the history line. Then you can connect a calibration cable, detachable cable, or use a Surveyor 4 adapter and a Series 3 underwater cable and also select to use an external power adapter, and turn your Surveyor 4 on. To choose the Terminal interface mode from the SondeI/F:Mode submenu, follow the directions in the previous "Series 4" section.

Your Surveyor 4 will not "autobaud," for Terminal mode. You must match your multiprobe and your Surveyor 4 baud rates to allow communication to take place.

You can manually set your Surveyor 4 baud rate by going to Setup->Baudrate:Terminal and press Select. This command sets the baud rate at which your Surveyor 4 will operate in Terminal mode.

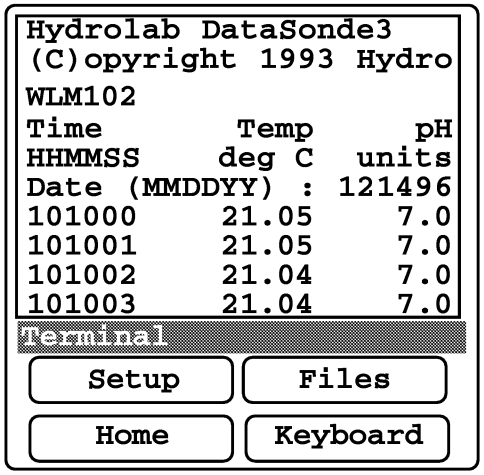
If you already are in Terminal mode and want to set the baud rates, you need use your Surveyor 4's "virtual" keyboard to send a <space> command, type "V" then "U" and select a baud rate.

The Surveyor 4 and the multiprobe baud rates must match for data to be readable.

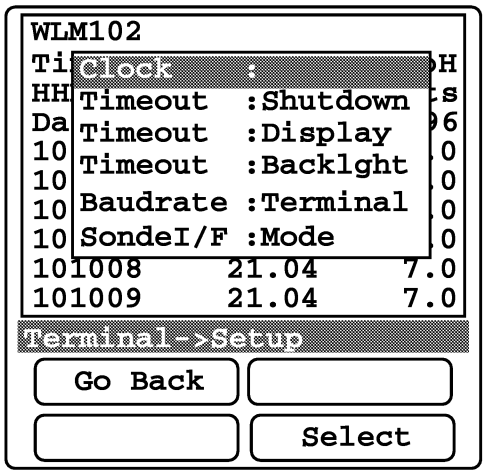
We recommend that you choose the highest baud rate that your multiprobe can accept. This will become an important speed factor when dealing with file handling and transfers.

To have access to your Surveyor 4 "virtual" keyboard, please follow the next directions.

Once you have selected the `Terminal` interface mode and established communications, your Surveyor 4 screen changes to a similar representation:



To access the `Setup` submenu press the `Setup` key. From the screen below, you can configure some of your Surveyor 4 options and the interface modes.

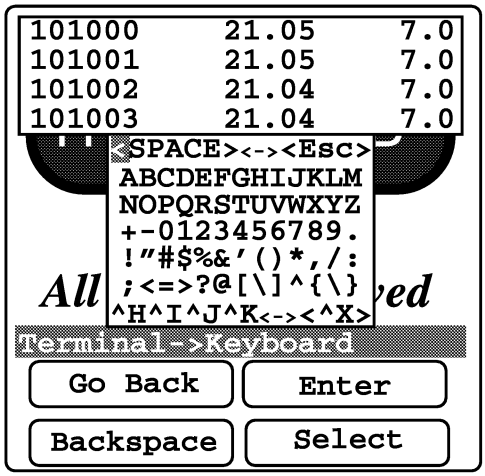


As you might have noticed from the screen at the bottom of the previous page, the Terminal emulator display covers more than the width of your Surveyor 4 screen. You can use the up, down, left and right arrow keys to see more of the screen. The Home key returns you to the bottom left - or "home" position - of the terminal screen.

The header - with Time/HHMMSS, Temp/°C, pH/units, etc - is printed every 24 lines. See your multiprobe for configuration details.

For the description of the Files key and its functions in Terminal mode, please refer to chapter 4.

Press the last key - Keyboard - to bring up the next screen:



Use the keyboard like the other similar keyboards that you have encountered in this manual. It allows you to use the commands needed to interact with Series 3 multiprobes. For specific character and the associated software commands, please refer to the multiprobe manual corresponding to the instrument you are using.

4. Surveyor 4 "Setup" Submenu

In chapter 1, we explained how to configure your instrument's tabular display. If you do not remember how to configure your first screen in tabular mode, please review exercise 2 in the first chapter. In exercise 1, we learned how to set the Surveyor 4 Clock feature in the Setup submenu. Now, let's see the other Setup submenu options.

You will find, after each title, a representation of your Surveyor 4 history line - e.g. NoCom - indicating in which configuration(s) or interface mode(s) you can find each item described, and the corresponding security level - e.g. SL2 (Security Level 2) - which lets you access each

item described.

Setup -> Surveyor4

From the Setup submenu, press the Surveyor4 key to access the next items.

Display:Tabular

NoConn PC Series3Sonde Series4Sonde SL2

This first display mode, called the tabular display mode, is the default mode when your instrument is turned on. Your data is displayed either in lines or in columns, depending on the size of the characters and the number of parameters present on the screen. For details and examples, please refer to chapter 1.

Display:Graph

NoConn PC Series3Sonde Series4Sonde SL2

The second display mode is a graph, which is configured from the Surveyor 4 Setup submenu. The Graph/Tab key toggles between the tabular and graph modes.

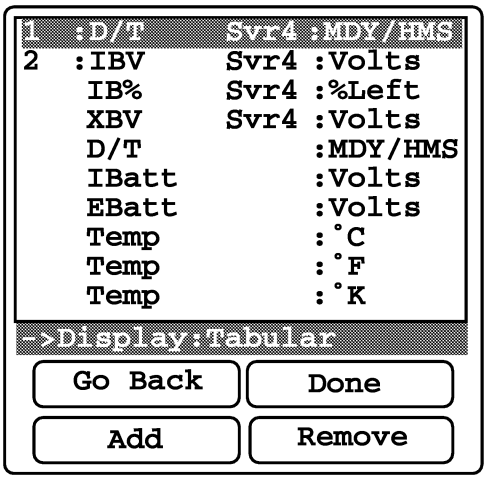
The following explanation will be based on a new Surveyor 4 coming from the factory. Should you have a Surveyor 4 that has already been in use in your organization for some time, the following sections might apply only in part to your instrument. You can still follow the explanations and learn how to set the axes and orientation of your graph.

NOTES:

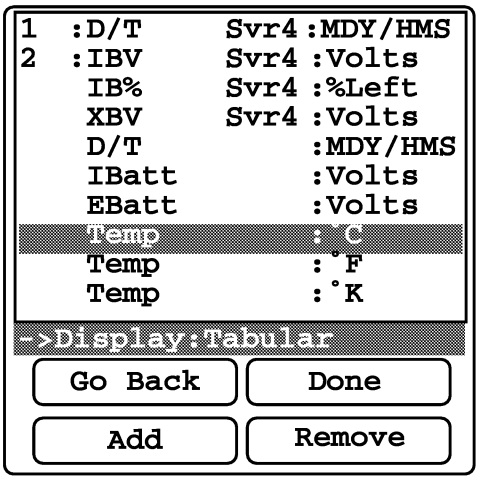
- If you switch to the graph mode, using the Graph/Tab toggle key, and you have removed a graph parameter from the tabular display, the Surveyor 4 will display an error message across the graph, as follows: Graph Parameter N/A. It will appear in the middle of your screen. You will have to restore the deleted parameter to the tabular display or change the graph display setup.
- On the same note, if you go to Setup and choose Display:Graph, and no parameter is available for this specific display mode, the following message will appear at the bottom of your screen: No suitable X-Axis Parameter! Press any key... or No suitable Y-Axis Parameter! Press any key... After pressing a key, you will be returned to the X- or Y-Axis selection, you will need to press the Go Back key and go to Display:Tabular to select parameters.

To learn how to select parameters for your graph's X and Y axes, please follow the next series of steps.

STEP 1: Due to the different configuration possibilities, you may need to add one or more parameters to your tabular display to allow the graph mode to be activated. If you do not need to add any parameters, skip to Step 4. Let's press the following sequence of keys: `Setup/Cal`, then `Setup`, next `Surveyor 4`, and finally `Select`.

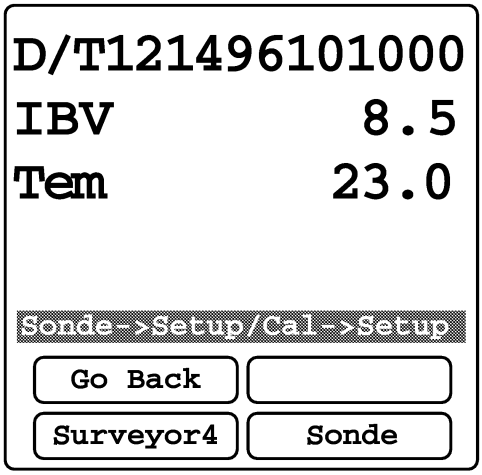


STEP 2: From the menu above, move your cursor (using the cursor keys) to the parameter(s) you want to display - in our example below `Temp:˚C` - and press the `Select` key. The next (or similar) screen will appear:



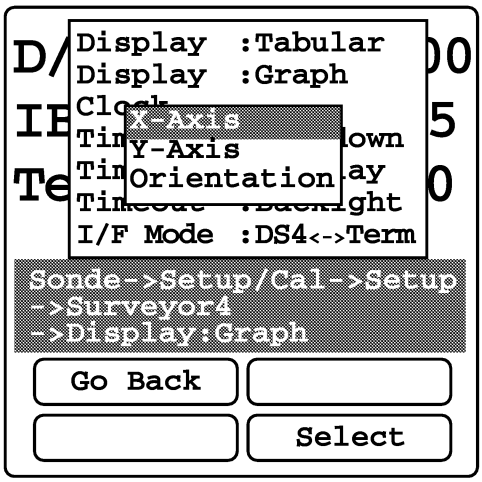
Press the `Add` key, then the `Done` key, and finally any key, as prompted.

STEP 3: Now, press the `Go Back` key once. You can see the addition of the temperature parameter to your screen:



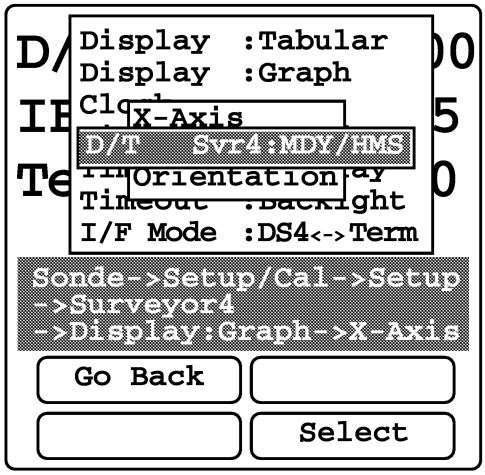
If you need to add additional parameters, repeat the steps used to add temperature.

STEP 4: From the screen above, press the `Surveyor4` key, move the cursor to `Display:Graph` and press `Select`. A new screen will come up on top of your Surveyor 4 setup screen:



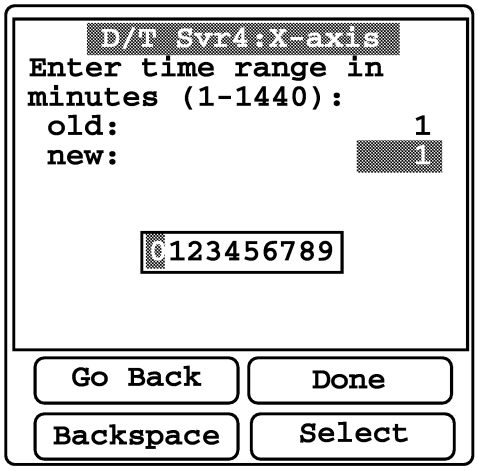
This new screen provides you with three choices, `X-Axis`, `Y-Axis`, and `Orientation`. Use these choices to configure your graph and its orientation. Let's see how this is done.

STEP 5: Press the `Select` key. For our example, the `D/T Svr4:MDY/HMS` parameter appears. Your display may have `D/T Svr4:MDY/HMS` and `Depth` as choices for example.

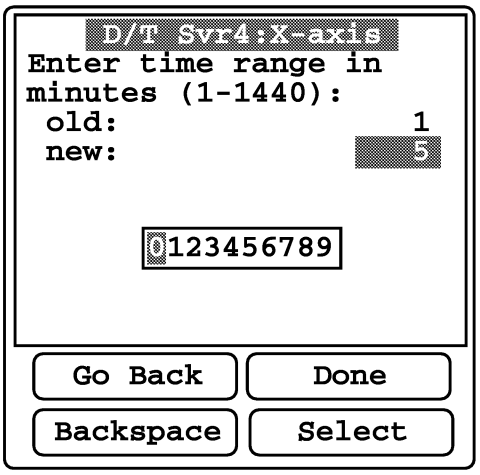


STEP 6: Let's press `Select` on `D/T Svr4:MDY/HMS`, or you can also choose one of the parameters on your screen, and press `Select`.

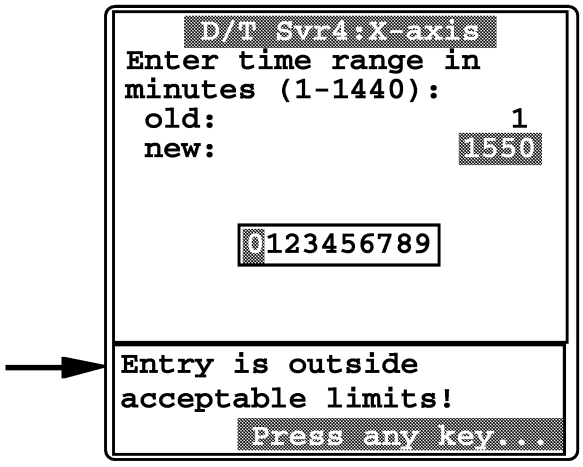
A new screen appears:



STEP 7: The range specified is in minutes, 1440 minutes amounts to one day (24 hours). If you select 5 minutes, like the example below, your graph will show a reading span of five minutes on the X axis (usually, the horizontal line on a graph). Then, press `Select` and `Done`.



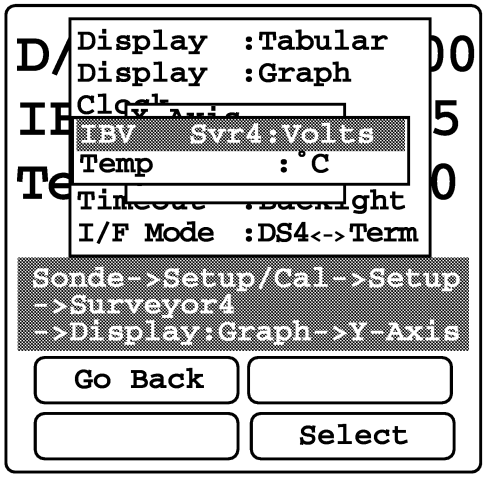
Should you enter a figure outside of the setup range, the following message will appear:



Press any key and repeat the setup using a correct entry.

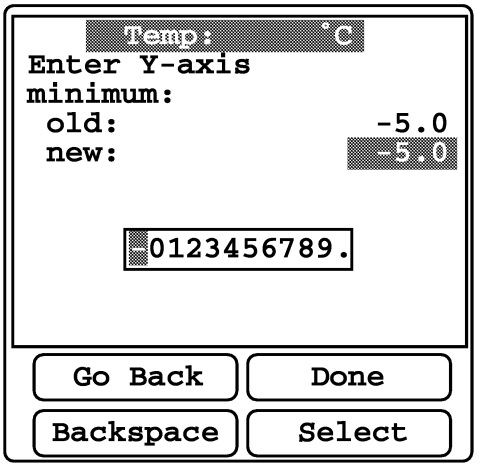
Note that if you make a mistake, you can clear your entries one by one using the `Backspace` function key. Press `Done` when you are finished, then press any key, as prompted. You will be returned to the axis setup.

STEP 8: Now, move the cursor down to `Y-Axis` and press `Select`. For our example, the `IBV Svr4:Volts` and `Temp:˚C` parameters appear, your screen may vary, depending on the parameters you have chosen.

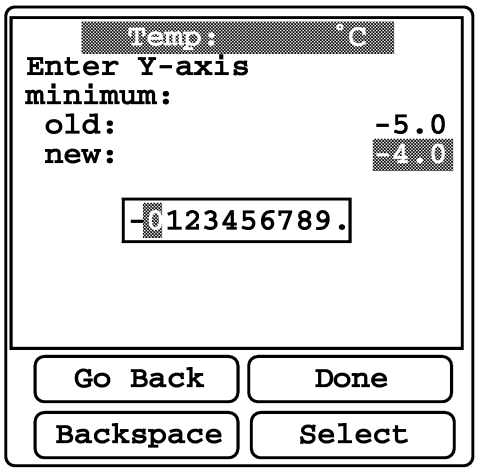


STEP 9: Let's move to `Temp:°C` and press `Select`. You can also choose among the parameters on your list and then press `Select`.

A new screen appears:

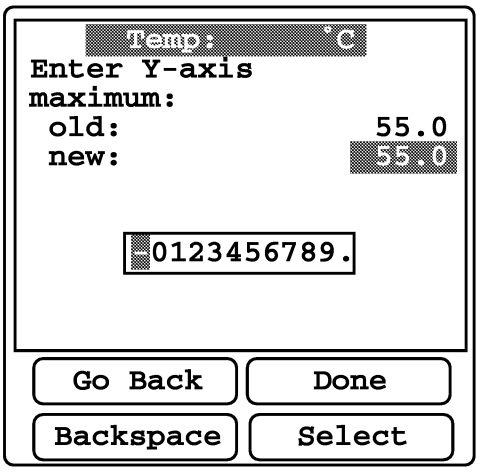


STEP 10: You need to enter the minimum temperature desired for your graph on the Y axis (usually, the vertical line on a graph). The old setting is `-5 °C`, you can now move the cursor (highlighted area on the dash before the numbers from 0 to 9 and the period) to your new number or symbol. Then, you need to press `Select`. Let's select `-4.0` for the example below:



If you enter a number that does not fit in the range (in this example -5 to 55 °C), the following message will appear: `Entry is outside acceptable limits! Press any key...` Press any key and enter an acceptable value.

STEP 11: When you are satisfied with your selection, press the `Done` key. For our example, the next screen will come up:

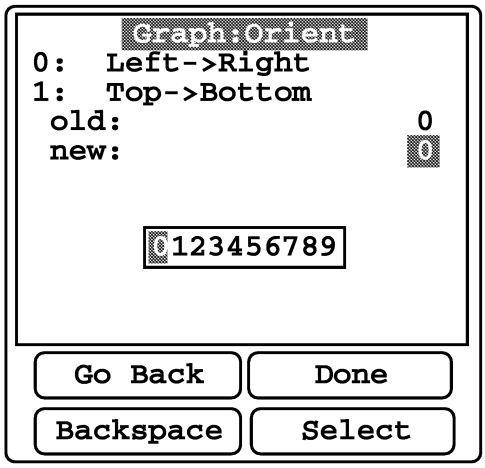


Now, you need to enter the maximum value for your graph's Y axis. In our example, we accepted the default settings: `55 °C`, but you can change the figure (not above 55!)

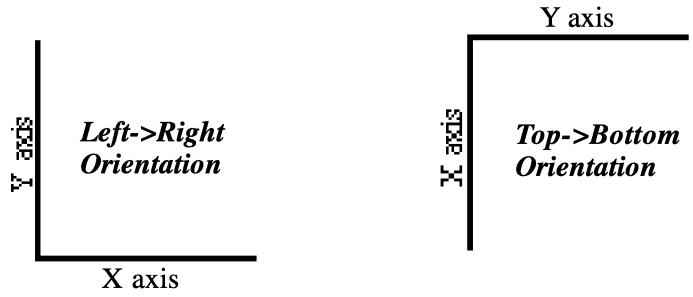
STEP 12: When finished, press the `Done` key. A `Setup Successful!` message will confirm that the Y axis setup was successful. If not, follow the prompts and make sure your values are correct. Press any key to return to the axis setup screen.

STEP 13: Let's move down to `Orientation` and press `Select`.

STEP 14: As you can see on the screen below, the Surveyor 4 offers two orientations `Left->Right` and `Top->Bottom` (the arrow means "to").



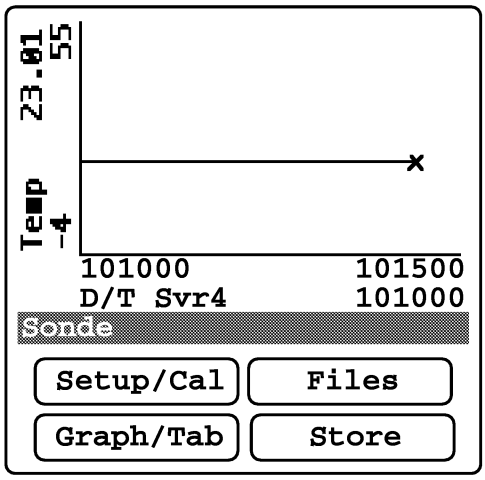
Rather than using a long description, here is a picture to explain the orientation difference:



Using the cursor keys, enter your choice, 0 for `Left->Right` or 1 for `Top->Bottom` and press `Done`. For our example, we will accept the default, since we have chosen time as our X axis, a left to right (or linear) orientation represents time better than a top to bottom orientation (usually chosen for a depth X axis).

STEP 15: Press Go Back four times to return to the tabular display.

STEP 16: We are now ready to switch to the graph mode. Press the Graph/Tab key and the following screen will appear:



You can see the results of your setup. In our example above, the Y axis (vertical) displays Temp as the parameter, with its minimum value (-4) and its maximum value (55), and its current value (23.01). The X axis (horizontal) displays D/T Svr4 as the parameter, 101000 for the current time, the range is 5 minutes (101000 to 101500, scrolling every five minutes).

When the 5 minute interval is over, your graph will scroll a quarter of a screen to the left. The number ranges, for this example, will change from 101000 to 101115 and from 101500 to 101615.

When you are back to the initial screen, you can press Graph/Tab to toggle between the tabular and graph displays.

Congratulations! You can now go back and change the parameters if you want your graph to display other readings. Note that only one parameter can be displayed on the X or the Y axes. You can only view one graph at a time but you can select new parameters from your Display:Graph to create a new graph.

Clock:

NoConn PC Series3Sonde Series4Sonde Terminal SL2

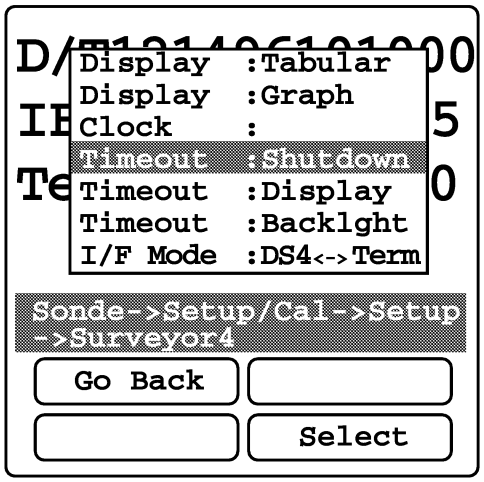
This submenu item, described in "Exercise 1" in chapter 1, allows you to change your Surveyor 4's date and time.

Timeout:Shutdown

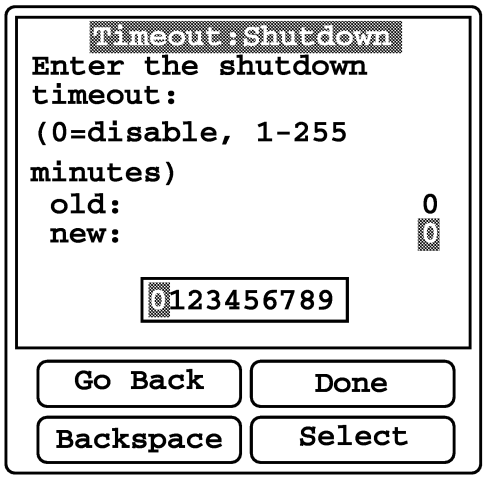
NoConn PC Series3Sonde Series4Sonde Terminal SL2

Before we explain in details how to set this feature, let's define what `Timeout:Shutdown` does. This is an automatic shutdown of your Surveyor 4 to save battery life in case you forget to turn it off after an operation, like calibrating your multiprobe. This feature will turn your Surveyor 4 off if no key is pressed in the programmed amount of minutes following your last key hit. Once your Surveyor 4 shuts down, you need to power it back up by pressing the `Off/On` key.

STEP 1: From your Surveyor 4 setup screen, move the cursor to `Timeout:Shutdown` and press the `Select` key.



STEP 2: Another screen appears. It replaces the previous screen, but your real-time parameter lines are still being updated in the background.



You need to select the appropriate amount of time for your specific operation, otherwise you could have an unpleasant surprise in the middle of a procedure.

The screen on the previous page is made of a title line (`Timeout:Shutdown`). A message appears on the second to fifth lines: `Enter the shutdown timeout: (0=disable, 1-255 minutes). 0=disable` will turn this feature off and will keep the Surveyor 4 on until you press the `Off/On` key.

`Old:0` tells you that the shutdown feature is currently disabled.

`New:0` is the line we are going to change using the numbers in the center of your screen: `0123456789`.

STEP 3: Use the left or right cursor keys to move the cursor (highlighted area on the number 0) to the appropriate first number for the desired shutdown time and press `Select`. When finished, press the `Done` key. A `Setup Successful!` message will appear, press any key to return to the Surveyor 4's setup screen.

You can set the shutdown time to up to 255 minutes. If you go over 255, `Entry is outside of acceptable limits!` is displayed. Press any key and enter an acceptable value.

If you make a mistake, you can clear your entries one by one using the `Backspace` key.

STEP 4: Make sure that you press the `Done` key, when finished. You will get a `Setup Successful!` message. Press any key to return to the Surveyor 4 setup screen.

Timeout:Display

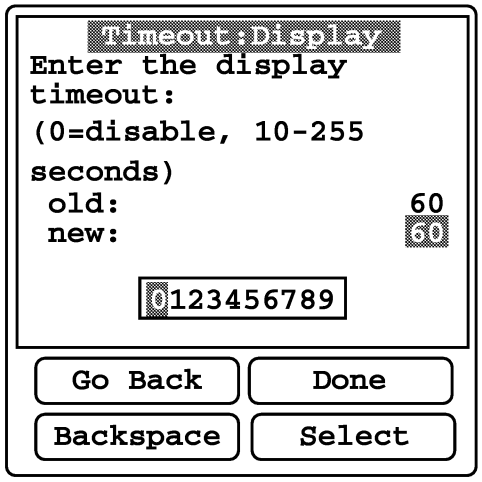
NoComm PC Series3Sonde Series4Sonde Terminal SL2

The next item in line is `Timeout:Display`. Before we explain in detail this screen, let's define what `Timeout:Display` does. This is a power saving feature which, for the example below, will put your Surveyor 4 screen to sleep if no key is pressed in the next 60 seconds following your last key hit. If your screen shuts down, press any key once (twice will perform the function associated with the pressed key) and your screen will reappear where you had "left" it. The real-time data was updated in the background and there is no loss of readings.

NOTE:

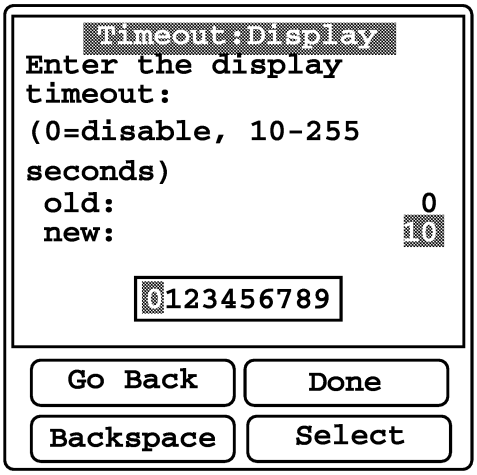
- **If you activate this screen saver option while using your Surveyor 4, you can get up to 80% more battery life than if you disabled this option.**

STEP 1: Let's move the cursor to `Timeout:Display` and press `Select`. The following screen will appear:



Note that this "timeout" is displayed in seconds and not minutes, and you may only enter values from 10 to 255 seconds. A value of "0" disables the display timeout.

STEP 2: Use the left or right cursor keys to move the cursor to the appropriate numbers for the desired shutdown time - 10 in the next example - and press `Select` after each number.



STEP 3: When you have entered all the numbers, press the `Done` function key. The next message will be displayed: `Setup Successful! Press any key...`

STEP 4: Press any key. You will be returned to the Surveyor 4 setup screen.

Timeout:Backlight

NoConn PC Series3Sonde Series4Sonde Terminal SL2

The `Timeout:Backlght` turns off the backlight after a certain time. This feature allows you to conserve power in case you forget to manually turn off the backlight feature.

NOTE:

- **If you activate this backlight auto-shutoff option while using your Surveyor 4, you can get up to 40% more battery life than if you disabled this option.**

STEP 1: Move the cursor to `Timeout:Backlght` and press `Select`.

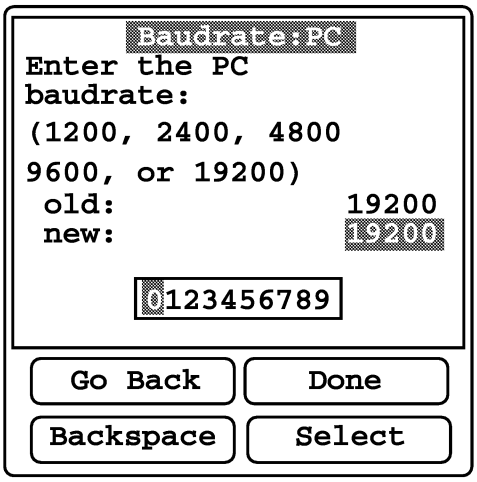
STEP 2: Choose the appropriate shutdown interval, in seconds (from 1 to 255), and then press `Select`. Selecting "0" disables this feature.

STEP 3: When you are finished, press the `Done` key. The `Setup Successful!` message will appear, press any key to continue. You will be returned to the Surveyor 4 setup submenu.

Baudrate:PC

NoConn PC SL2

To access this feature move the cursor to `Baudrate:PC` and press `Select` to get:



Using what you learned in the previous sections, use the right and left arrow keys, the `Select`, and the `Backspace` keys to enter the baud rate your computer uses to communicate with your instrument. This number will depend on the communications program you are using. When you are finished, press the `Done` key.

Baudrate:Terminal

NoConn Terminal SL2

Follow the same instructions above for the next item on the list, `Baudrate:Terminal`. It will allow you to set your Surveyor 4's baud rate (300, 1200, 2400, 4800, or 9600 baud). `Baudrate:Terminal` (in `Terminal` mode only, SL2) also allows you to transfer and capture files from a Series 3 multiprobe.

SondeI/F:Mode

NoConn Series3Sonde Series4Sonde Terminal SL2

For this submenu item, which enables you to change your Surveyor 4 interface modes, please refer to section "3. Connections and Interface Modes" at the beginning of this chapter

Password:Change

NoConn SL3

You or someone in your organization can change the password to limit access to certain Surveyor 4 functions. We recommend that you check with your supervisor before changing the password and to obtain the current password which is required to have access to this submenu. Once you enter the `Password:Change` submenu, you will be able to change or assign passwords for level 1, 2, and 3 Surveyor 4 commands. Note that, if you receive your instrument from the factory, the default security is disabled for levels 1 and 2 and set to "HYDROLAB" for level 3.

Factory:Options

NoConn SL3

To add new options, such as barometer or GPS, to your Surveyor 4, you can go to `Factory:Options`, press `Select`, and have access to the new factory options submenu. To complete the setup, you need to obtain the access password for level 3 from your organization (or you can use "HYDROLAB" if your instrument's default password has not been changed).

The Surveyor 4 `Serial #` is a factory setup function. User access to this function is restricted.

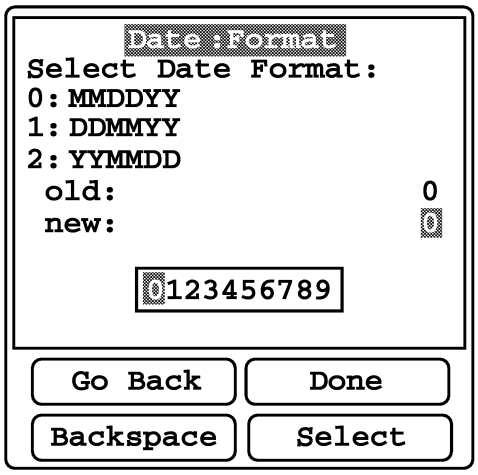
⚠ **WARNING: Your software options need to match the installed hardware (if you do not have a GPS card, do not install GPS). Failure to do so can give misleading data.**

Date:Format

NoConn PC Series3Sonde Series4Sonde Terminal SL2

This feature allows you to specify the date format that will be used by your Surveyor 4 software. The choices are: MMDDYY (English date format), DDMMYY (European date format), and YYMMDD (Japanese date format). Follow the next steps to configure your instrument according to your specific needs.

Move your cursor to `Date:Format` and press `Select`.



From the previous screen, move the cursor to 0, 1, or 2, press `Select`, and then `Done`.

Note that your choice will affect all existing files and all files you will create or transfer. Except files captured or downloaded from `Terminal` mode.

Radix:Delimiter

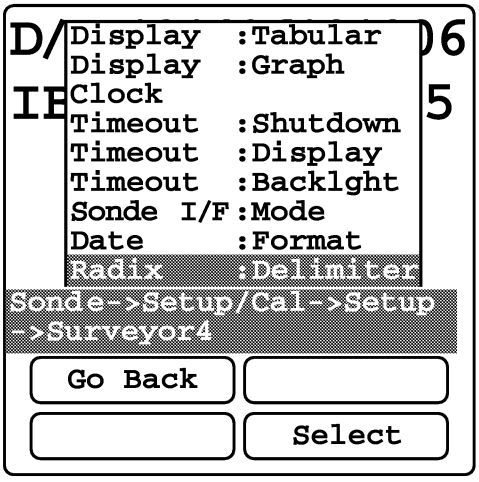
NoConn PC Series3Sonde Series4Sonde Terminal SL2

Your Surveyor 4 offers you the choice of radix (either a decimal point or a comma) within a numeric value. Your instrument also allows you at the same time to select the corresponding delimiter (what will separate your values within a file during spreadsheet-importable file transfer). To choose to display all your values with a decimal point (24.2) or a comma (24,2) and with a comma or tab delimiter, follow the next steps.

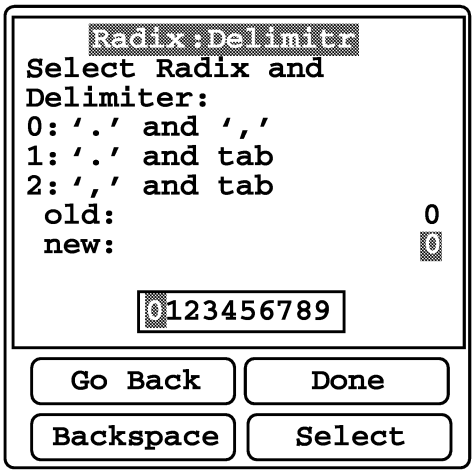
NOTE:

- You need to be aware of the choice you made when you come back from the field and want to transfer your data to a spreadsheet. The radix and delimiter will influence the way your file will be transferred.

STEP 1: From the Surveyor 4 `Setup` submenu, move your cursor to `Radix:Delimiter` and press `Select`.



STEP 2: The next screen appears:



You can leave the cursor on 0 and press `Select` to choose a decimal point radix and a comma delimiter (`0: '.' and ','`). Or you can move the cursor to 1 and press `Select` to choose a decimal point radix and a tab delimiter (`1: '.' and tab`). Or you can move the cursor to 2 and press `Select` to choose a comma radix and a tab delimiter (`2: ',' and tab`). Once you are satisfied with your choice, press `Done`.

Download:Software

PC SL3

This submenu item is a security level 3 restricted function. In the event of a Surveyor 4 software update, you will be able to update your Surveyor 4 software to the current revision using the `Download:Software` function.

For more information and instructions on how to update your Surveyor 4 software, contact Hydrolab Technical Support lines at 800-949-3766 (in the United States of America and Canada only) or (512) 255-8841.

Reset:Setup

NoCom SL3

⚠ WARNING: Before you decide to reset your Surveyor 4 setup, remember that once you have pressed the `Select` key to validate the reset operation, IT CANNOT BE UNDONE.

`Reset:Setup` requires you to enter the password to Security Level 3. You will need to obtain the access password for level 3 from your organization (or you can use "HYDROLAB" if your instrument's default password has not been changed).

`Reset:Setup` allows you to return your Surveyor 4 to its original screen configuration, usually it will remove all parameters displayed on your screen, except for `D/T` and `IBV`, it disables the barometer and GPS, resets the baud rates and user barometer calibration, and returns to `Series4Sonde` mode.

Reset:History

NoCom SL3

⚠ WARNING: Before you decide to reset your Surveyor 4 history, remember that once you have pressed the `Select` key to validate the reset operation, IT CANNOT BE UNDONE.

`Reset:History` requires you to enter the password to Security Level 3. You will need to obtain the access password for level 3 from your organization (or you can use "HYDROLAB" if your

instrument's default password has not been changed).

`Reset:History` cleans all the parameter details stored in your Surveyor 4. This feature is a way to avoid overcrowding your Surveyor 4 with too many options. When a new multiprobe is connected, the surveyor 4 will "learn" the parameter details for that multiprobe.

⚠ WARNING: Logged data may not be reviewable or transmittable if the parameter details are cleared. Use this feature with care.

Reset:Files

NoCom SL3

⚠ WARNING: Before you decide to reset your Surveyor 4 files, remember that once you have pressed the `Select` key to validate the reset operation, IT CANNOT BE UNDONE.

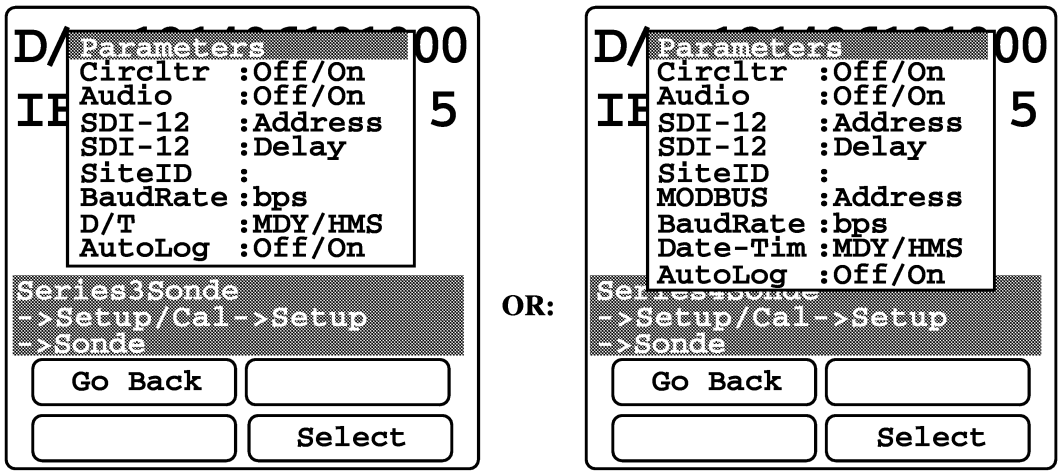
`Reset:Files` requires you to enter the password to Security Level 3. You will need to obtain the access password for level 3 from your organization (or you can use "HYDROLAB" if your instrument's default password has not been changed).

`Reset:Files` will delete all the files stored in your Surveyor 4 memory. If your Surveyor 4 is equipped with a Clipboard memory, the files you stored in your instrument will not be deleted and the following message will appear: `No memory installed!: Call Hydrolab Sales (800) 949-3766`. You will need to go to the initial screen and press `Files`, `Delete`, move the cursor to the Clipboard entry you want to delete and press `Select` to delete the entry.

You have now completed the overview of the Surveyor 4 `Setup->Surveyor4` submenu.

Setup -> Sonde

The versatile Surveyor 4 allows you to setup your multiprobe (for Series3Sonde or Series4Sonde, only). The path to follow is similar to the Surveyor setup. First, you will need to connect your Surveyor 4 to a multiprobe. From the Setup submenu, press the Sonde key to access the next items:



NOTES:

- The Surveyor 4 "learns" the setup features available from a Series 4 multiprobe. At time of printing, the options shown were complete. See your multiprobe user's manual for complete details.
- The Surveyor 4 will only communicate with one multiprobe at a time. The Surveyor 4 will search both address and baud rate to find a Series 4 multiprobe.

Parameters

Series3Sonde Series4Sonde SL2

Parameters allows you to choose some of your parameters' setup options. For instance, if you are connected to a DataSonde 3 and you press the Select key on DO%:Sat or DO:mg/l, you will be given the choice between a LoFlow or a standard membrane (Membrane:LoFl/Std) and enabling or disabling the compensation method for salinity (SalinComp:Enb/Dis).

If you press the Select key on SpCond:mS/cm, SpCond:µS/cm, Res:kΩcm, Sal:ppt, or TDS:g/l, you will be asked to choose between a standard or a fresh water cell block (CellBlck:Std/Frsh), and enabling or disabling the temperature compensation method (TempComp:Enb/Dis).

If you press the Select key on Turb:NTUs, you will be asked to select the method, nephelometric or ratio (Method:Neph/Rat).

For Series4Sonde interface, you will have access to the parameters available in your multiprobe.

Circltr:Off/On

Series3Sonde Series4Sonde SL2

Circltr:Off/On (DataSonde 3 and Recorder only for Series3Sonde interface) allows you to turn the Series 3 multiprobe "stirrer" on and off. For Series4Sonde interface, it allows you to turn your multiprobe's "circulator" on and off.

Audio:Off/On

Series3Sonde Series4Sonde SL2

Audio:Off/On (DataSonde 3 and Recorder only) allows you to turn the Series 3 multiprobe "buzzer" on and off. For Series4Sonde interface, it allows you to turn your multiprobe's "audio" on and off.

SDI-12:Address

Series3Sonde Series4Sonde SL2

SDI-12:Address and SDI-12:Delay (DataSonde 3 and Recorder only) allows you to assign an SDI address and delay to your multiprobe. It performs the same function for the Series4Sonde interface. Remember that the SDI address status is displayed on the bottom right-hand corner of your screen for the Series4Sonde interface.

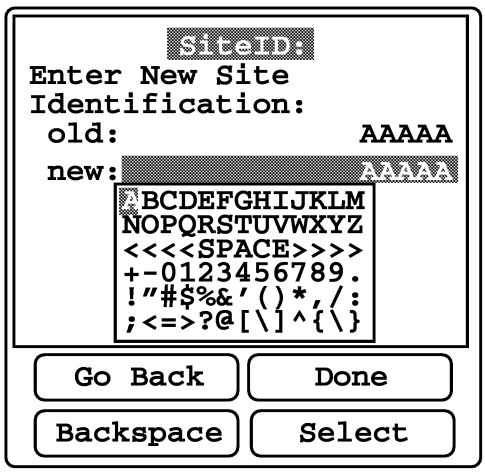
SiteID:

Series3Sonde Series4Sonde SL2

SiteID let's you enter a maximum of 15 letters, numbers, and blanks to assign the "label" field on your Series 3 multiprobe and a "SiteID" for your Series 4 multiprobe.

Let's go through the setup process. SiteID is the same as the multiprobe's Id field. The Surveyor 4 SiteID let's you personalize your configuration.

STEP 1: Let's move the cursor to SiteID and press Select. The following screen will appear:



Should you want to add a space in your site identification name, such as `Hydrolab` *(Space)* `1`, move the cursor to the "`<<<<Space>>>>`" line and press `Select`, even on "`<<<<`" or "`>>>>`". To erase a mistake, press the `Backspace` key. Press the `Done` key when finished.

MODBUS:Address

`Series4Sonde` SL2

`MODBUS:Address` allows you to assign the MODBUS address.

BaudRate:bps

`Series3Sonde` `Series4Sonde` SL2

`BaudRate:bps` allows you to select your multiprobe baud rate. Note that your Surveyor 4 will "autobaud" to match the communications baud rate with your Series 3 instrument when in `Series3Sonde` interface mode. For `Series4Sonde` interface, `BaudRate:bps` gives you 2 choices 9600 and 19200 bps.

D/T:MDY/HMS

`Series3Sonde` `Series4Sonde` SL2

`D/T:MDY/HMS` (DataSonde 3 and Recorder only) let's you specify your multiprobe's date and time. For `Series4Sonde` interface, `D/T:MDY/HMS` is displayed as `Date-Tim:MDY/HMS` (unless you have selected to display your date as DMY or YMD).

AutoLog:Off/On

Series3Sonde Series4Sonde SL2

`Autolog:Off/On` (DataSonde 3 and Recorder only) allows you to turn the AutoLog feature on or off for DataSonde 3 or Recorder multiprobes.

NOTES:

- All the above-mentioned submenu items will depend on the multiprobe that you have connected to your Surveyor 4, since some of these choices and options are not available on some Series 3 multiprobes.
- Please refer to the appropriate Series 3 Operating Manual for details on setup.

Now, it is your turn to configure your Surveyor 4 and your multiprobe according to your specific needs.

5. Surveyor 4 "Files" Submenu

For details on the `Files` submenu, please refer to chapter 4.

3. Maintenance, and Calibration

CHAPTER 3: MAINTENANCE AND CALIBRATION

1. Maintenance

For multiprobe and sensor maintenance, we recommend that you refer to the corresponding chapter in your multiprobe user's or operating manual.

When Do I Need to Service or Maintain my Surveyor 4?

- When returning from deployment and you notice that your unit is dirty (case, screen, and other components)
- When you notice that your batteries need to be replaced

How Do I Clean my Surveyor 4?

You will need to prepare the following items:

- Tap water
- Soap
- Very clean, soft, *nonabrasive* cloths
- Cotton swabs

Clean the case, screen, and other components (except for connectors and plugs!) with a slightly wet cloth. Use soap if you notice grease spots. Use a wet cotton swab for the areas you cannot reach with the cloth.

Surveyor 4 Internal Battery Recharging

NOTE:

- **The Surveyor 4 must be turned on (with a charger cable and a power adapter properly connected) and left on in order to charge.**

You will need the following items to recharge your Surveyor 4 internal battery (IBP):

- Surveyor 4
- Surveyor 4 charger cable (013160)
- 110 or 220* power adapter (013450 or 013460*). * For the 220 power adapter, you need to connect your country's corresponding power cord to the IEC 320 connector.

NOTES:

- We recommend recharging your Surveyor 4 when your instrument internal battery

voltage (IBV) reaches 6.5 volts.

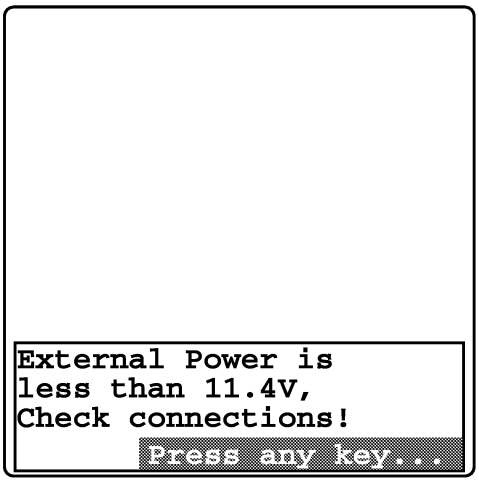
- The recharge time depends on the percent left (IB%) in your battery. Charging is complete in three and a half hours.
- When you first receive your Surveyor 4, we recommend that you go through a complete discharge cycle and become familiar with the instrument. Then, recharge your Surveyor 4 following the next steps.

Before starting the recharge process, carefully read the following warnings.

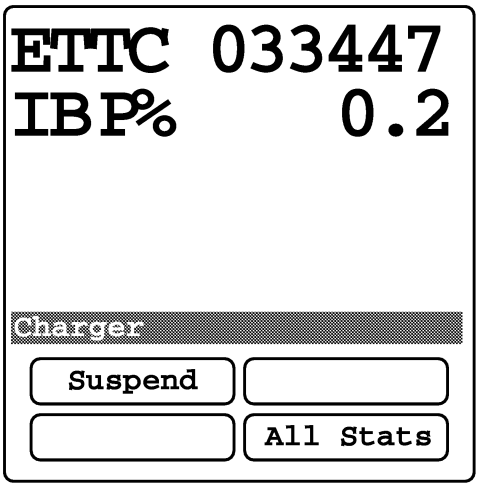
⚠ **WARNING: To avoid potentially fatal electrical shock, never connect your Surveyor 4 to a power source which exceeds 15 volts.**

⚠ **WARNING: To avoid potentially fatal electrical shock, we suggest that you avoid using AC (110 and 220 VAC 12VDC power adapters) to power your multiprobe. When deploying your multiprobe outdoors, you should only use battery power. If you elect to deploy your multiprobe outdoors using any power supply that is in any way connected to the AC mains (110 or 220 VAC), your AC power supply cable MUST be protected by a Ground Fault Interrupt (GFI) device. The installation of the GFI device MUST be done by a licensed electrician. This device may save your life!**

STEP 1: Connect the Surveyor 4 charger cable to your instrument. Attach the 110 or 220 power adapter to the other end of the charger cable. For the 220 power adapter, you also need to connect your country's corresponding power cord to the IEC 320 connector. Turn your Surveyor 4 on. If the following - or similar - screen appears on your display, it means that our instrument is connected to an external power source providing insufficient voltage or you have poor connections. Recheck all connections and try again. Insert the loose end of the power adapter or your country's corresponding power cord into the wall plug. Press any key on your Surveyor 4, and then move to step 2.



STEP 2: After the welcome screen briefly appears, this screen comes up:

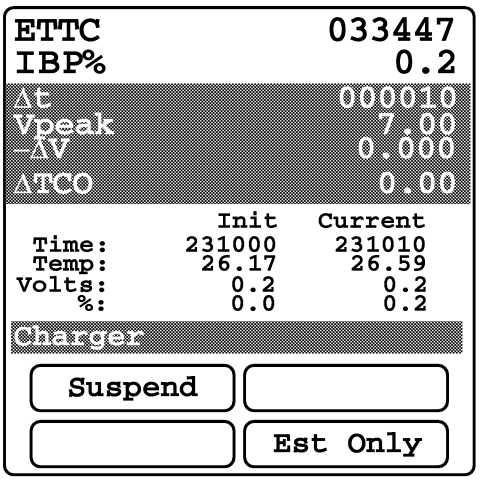


ETTC stands for estimated time to charge, which for our example above is 033447 (3 hours, 34 minutes and 47 seconds). This number will decrease as the full recharge time approaches. IBP% represents the estimated current charge level of the internal battery pack in percent. In our example above, the IBP is only 0.2% charged. This number will change until it reaches full recharge capacity.

NOTE:

- IB% is an estimate. Do not disconnect the Surveyor 4 from charging until prompted to do so. Early disconnect can severely reduce the field operating time.

The history line tells us that we are currently connected to a charger. The Suspend key will pause the recharge process until you decide to start by pressing the Resume key. After you resume the charging process, you will notice that some of your original numbers have been reset. The All Stats key, when pressed, gives you a more detailed account of the recharge process, and is similar to the next screen.



The Suspend function key is available for this screen and All Stats has been replaced with Est Only which, if pressed, brings you back to the first charge mode menu. To return to the first screen, press the Est Only key.

Let's see what the previous screen tells us about the charging process.

First, ETTC and IBP% are the same as for the initial screen. The numbers might have changed while you were following our directions to get to the All Stats screen.

Δt is the elapsed time from the beginning of the charging event. Charging stops when Δt exceeds approximately three and a half hours.

Next, Vpeak is the maximum voltage at any time during the charging event.

Below that is -ΔV which refers to the negative change of voltage (Vpeak minus current voltage reading). Charging stops when -ΔV exceeds 60 mV.

Next, comes ΔTCO which stands for the change in temperature from the beginning of the charging event to the current time. Charging stops when ΔTCO exceeds 15 °C.

The next lines display a table with the initial reading (Init) when you started the charge and the current reading (Current). The parameters displayed are time, temperature, voltage (Volts), and battery percentage capacity (%).

You can now monitor your Surveyor 4 charging process. <u>You need to leave the instrument on to complete the charging process</u>.

Your instrument will let you know when the charge is complete by displaying the following, or similar, message at the bottom of your screen: `Charging complete! Disconnect charger cable for normal operation. Press any key ...`

NOTE:

- Charging is <u>not</u> necessarily done when ETTC=0 or IB%=100. Charging is done when Δt equals or exceeds three and a half hours, -ΔV equals or exceeds 60 mV, or ΔTCO equals or exceeds 15 °C.

STEP 3: Once the IBP is fully recharged, disconnect the Surveyor 4 charger cable from your instrument. The Surveyor 4's screen will display the NoConn message, to let you know that your instrument is not connected to any instrument or external power source. If you decide to turn the Surveyor off, press the Off/On key once. If you decide to proceed with a calibration, setup, or another procedure, such as data transfer to a PC, connect the appropriate cable and go to the corresponding chapter in this manual.

Surveyor 4 Internal Battery Replacement

You will need the following items to replace your instrument's internal battery (IBP):

- Silicone grease
- A replacement battery (Duracell® DR30 7.2 volt nickel metal hydride or equivalent) (HL No. 013230)
- 1 standard screwdriver

⚠ **CAUTION: To avoid water contacts with the Surveyor 4's internal components during battery replacement, we recommend that you avoid replacing the battery close to a water source.**

Follow the next steps with the corresponding illustrations (figures 3-6) on the following pages to replace your Surveyor 4 internal battery.

STEP 1: Make sure that your working surface is clean and dry. Disconnect any cable connected to your Surveyor 4. Turn your Surveyor 4 upside down on the working surface (see figure 3 on the next page). Unscrew the four retaining screws with the standard screwdriver. To facilitate reassembly, do not pull the screws completely out.

STEP 2: Lift the back panel from the bottom part of the Surveyor 4 (see arrow on fig. 3). If you feel some resistance, unscrew the retaining screws some more and try again.

STEP 3: Put the back panel down on the work surface and remove the old battery from its compartment.

STEP 4: Insert the new battery in the battery compartment back panel, aligning the notches on the battery with the notches in the Surveyor 4 case (see figure 5).

STEP 5: Lightly coat the o-ring around the battery compartment with silicone grease. Do not use any other kind of grease and do not over-grease.

STEP 6: Place the back panel over the battery compartment that holds the new battery and screw the retaining screws. Do not overtighten the screws.

Your Surveyor 4 is now operational, if the new battery is charged.

For complete information on expected battery life, refer to chapter 6 under "Expected battery life."

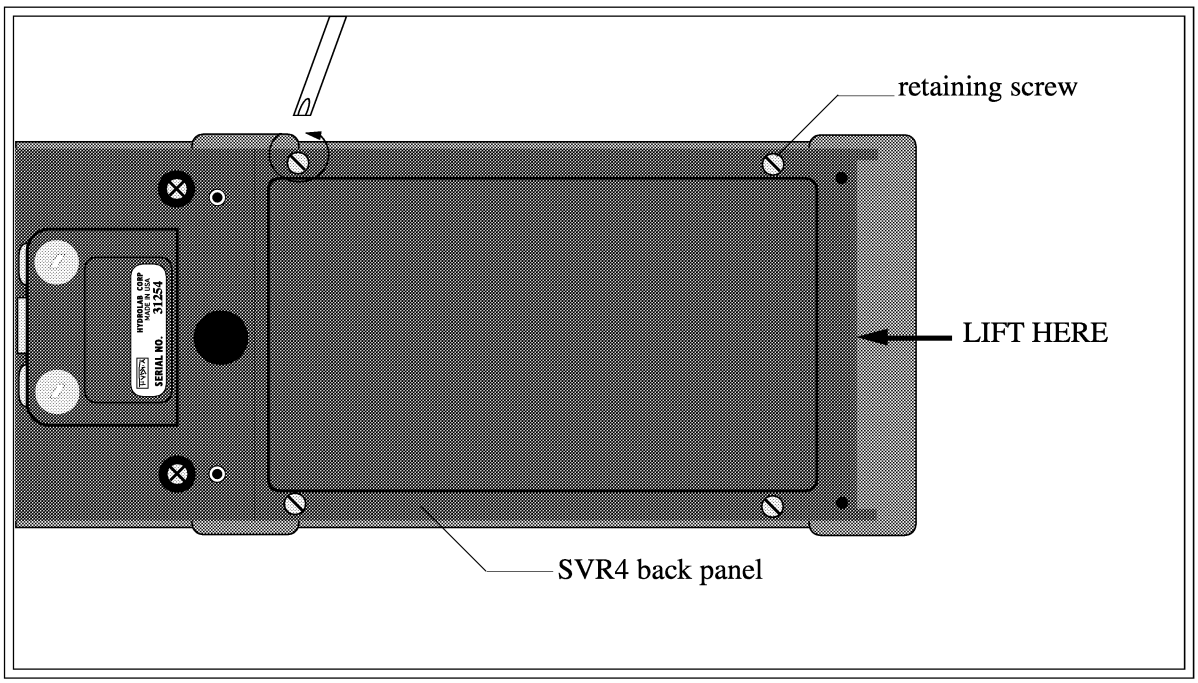


FIGURE 3: OPENING THE SURVEYOR 4 BACK PANEL

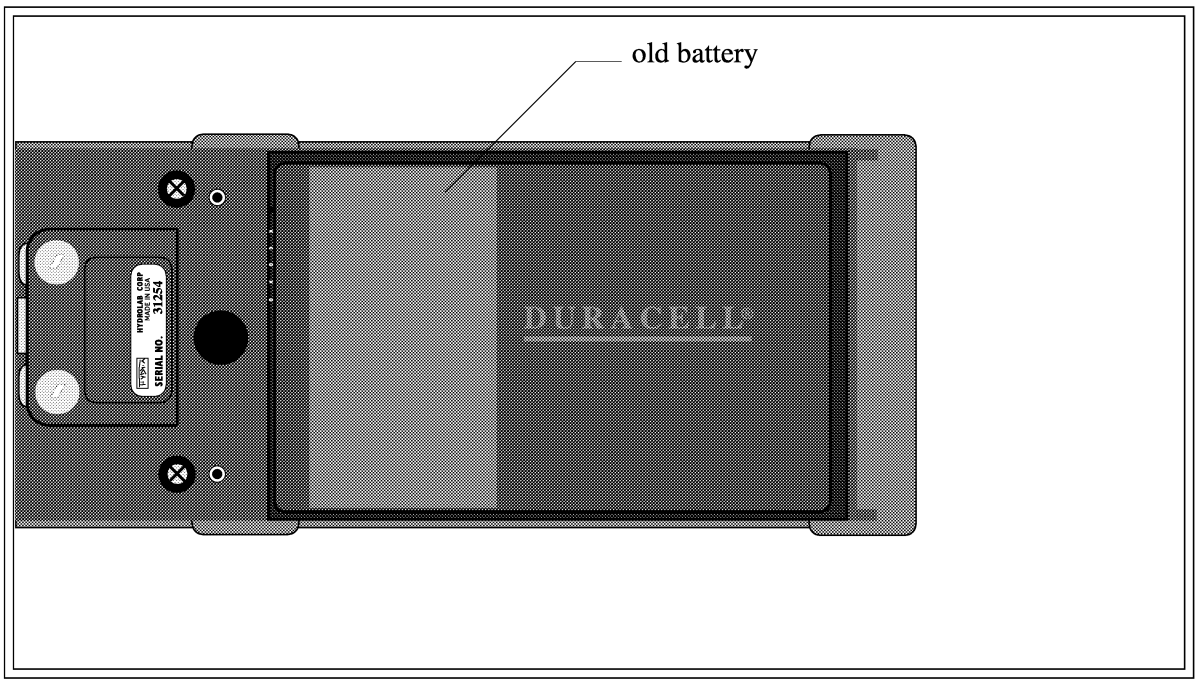


FIGURE 4: REMOVING THE OLD BATTERY

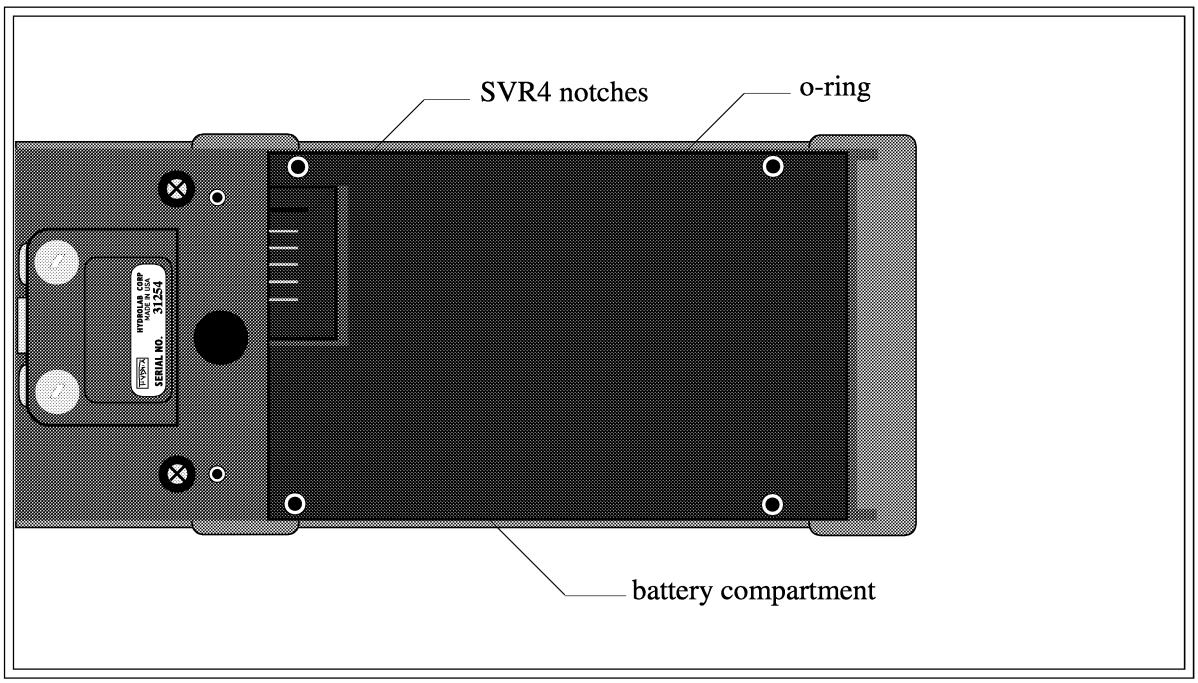


FIGURE 5: IDENTIFYING THE COMPONENTS

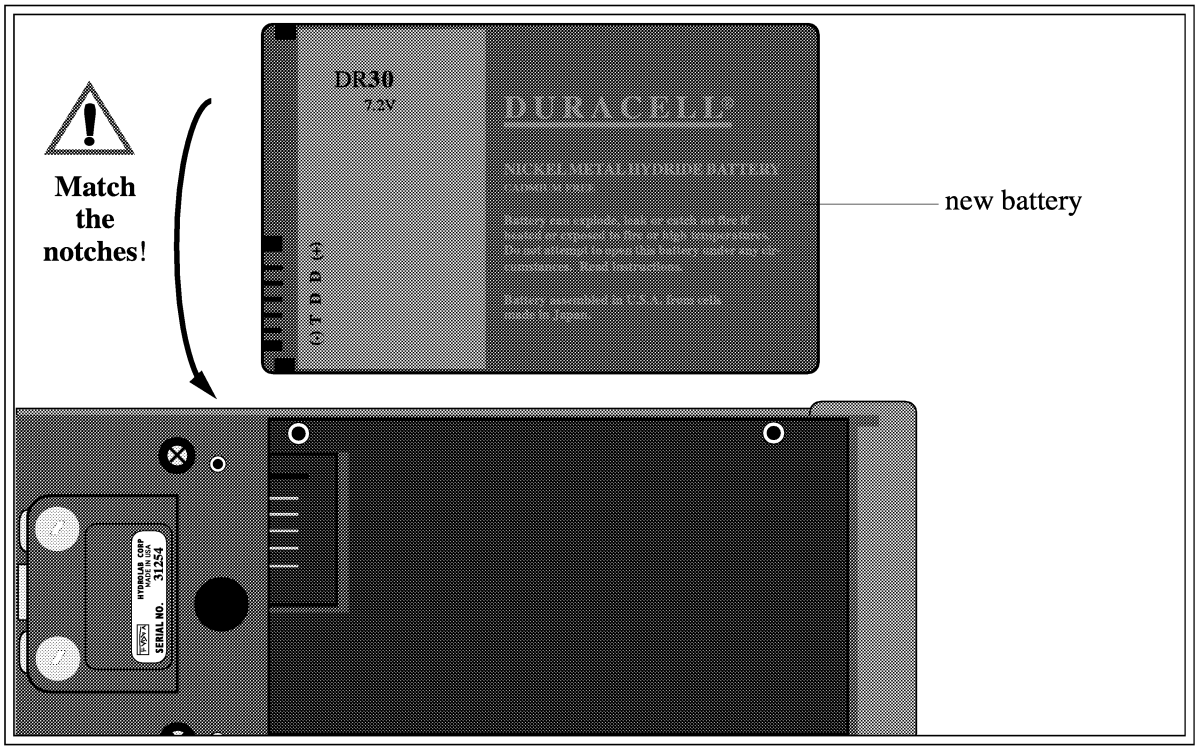


FIGURE 6: INSTALLING THE NEW BATTERY

Duracell Rechargeable Battery Quick Consumer Guide

This quick guide will give you information about performance, care, operation, and other Duracell battery-related information. It was reproduced, in part, by permission of Duracell USA.

Optimum Performance Recommendations

When you charge your battery for the first time, your charge (or ETTC for your Surveyor 4) may indicate that charging is complete after just 10 to 15 minutes. This is normal and can happen with all rechargeable batteries when first charged. You need to remove the battery, reinstall it, and then repeat the charging process. (For Surveyor 4, let the normal charge termination methods work as described on page 3-4.)

Upon first use, or after prolonged periods of storage, you may need to charge and discharge your battery two or three times before obtaining optimum performance.

It is recommended to charge the battery at room temperatures ranging between 15 ˚C (59 ˚F) and 30 ˚C (86 ˚F).

It is normal for the battery to become warm during charging or after use.

It is not necessary to fully discharge your Duracell battery before charging. You can "top-off" the charge (charge your battery when it is only partly discharged) at any time.

A charged battery will gradually lose its charge if left in storage. We suggest that you "top-off" the charge before use.

It is recommended to fully charge the battery once a month, and then fully discharge it until your instrument shuts off automatically.

If the metal terminals become dirty, wipe them off with a soft, dry cloth.

It is recommended to remove the battery from the equipment when not in use. Store at room temperature in a dry place.

It is recommended not to leave the battery in the charger (in an external charger for the Surveyor 4) for an extended period of time.

Safety Precautions and Battery Protection Information

Do not disassemble or attempt to open the battery under any circumstances.

Do not drop the battery or subject it to mechanical shock.

Do not short circuit the battery by directly connecting the metal terminals (+ and -). make sure that no metal objects such as coins, paper clips, etc., touch the terminals.

Do not heat or expose the battery to fire or high temperature. The battery can explode, leak or catch on fire.

Only use the charger recommended by the instrument manufacturer (in this case Hydrolab).

Use the battery only with equipment that specifies its use.

Benefits of Having a Spare Battery

Having a spare battery will allow you to use your instrument for twice as long as with one battery. Often long flights, meetings, or field work where power is not readily available force you to operate your instrument on battery power for extended periods of time. With one battery, you may run the risk of losing power before desired. Carrying a spare battery allows you to continue your work in these situations.

Nickel Metal Hydride Rechargeable Recycling Program

Duracell is committed to environmental responsibility and has a program in place for consumers to dispose of their spent nickel metal hydride (NiMH) rechargeable batteries. When you call your local Duracell customer service representative, Duracell will send you a special postage-paid mailer for returning the spent battery. Approximately 80% of the metals in the Duracell battery can be recovered for use in the production of stainless steel. This program is designed for Duracell NiMH batteries *only* and *under no circumstances* should other batteries be included in the program.

The Duracell Quality Guarantee

Duracell Inc. guarantees their NiMH batteries against defects in material and workmanship. If not completely satisfied with a Duracell NiMH battery, call: 800-551-2355* (9:00 am - 5:00 pm E.S.T.) or contact your nearest Duracell business office. Should any instrument be damaged by a Duracell NiMH battery due to a defect in material or workmanship, Duracell will repair or replace it (at Duracell's option), providing that you have followed both equipment and battery usage instructions. Send the instrument with the battery and prepaid postage to: Duracell USA, Berkshire Corporate Park, Bethel, CT 06801, USA. Attention: Consumer Relations Department.

(*) Number valid in the United States of America and Canada only.

Surveyor 4 Lithium Battery Replacement

Your Surveyor 4 is equipped with a lithium battery which powers the internal clock. The expected life for this battery is 2 years. We recommend replacing the lithium battery before the end of this two-year period. There is no loss of data if the battery "dies," but the internal clock will become inaccurate and time-triggered logging will not operate correctly.

⚠ **WARNING: To avoid damage to the internal components when opening the Surveyor 4, make sure that the instrument is clean and dry and that you have disconnected any cable attached to the unit.**

What Do I Need to Replace the Lithium Battery?

- 1 lithium battery (Panasonic reference: CR 2032, or equivalent)
- 1 Phillips screwdriver

Steps to follow

⚠ **CAUTION: To avoid water contacts with the Surveyor 4's internal components during battery replacement, we recommend that you avoid replacing the battery close to a water source.**

Refer to the figures 7-12 on the following pages, when replacing the lithium battery.

STEP 1: Turn the Surveyor 4 face down, so that the front panel faces the work surface.

STEP 2: Using the Phillips screwdriver, unscrew the retaining screws on the top cover of your instrument's back panel.

STEP 3: Slowly pull the cover, and flip it back on the bottom part of the back panel. The lithium battery is located on the top left-hand corner of the printed circuit board (PCB).

STEP 4: Place one of your hands over the loose top cover and the bottom part of the PCB. Lift the Surveyor 4 to a vertical position over the work surface, lithium battery facing down.

STEP 5: To remove the battery, slide your thumbnail under the battery clip. Pull the clip away from the battery and let the battery slide out of the clip and fall on the work surface.

STEP 6: Insert the new battery. Observe the polarity: match the "+" on the battery with the "+" on the battery clip.

STEP 7: Replace the top cover over the PCB, insert and tighten the four retaining screws.

STEP 8: Reset the time and date after replacing the lithium battery. To do so, press the `Setup/Cal`, and `Setup`, then `Clock`, and finally enter the correct date and time.

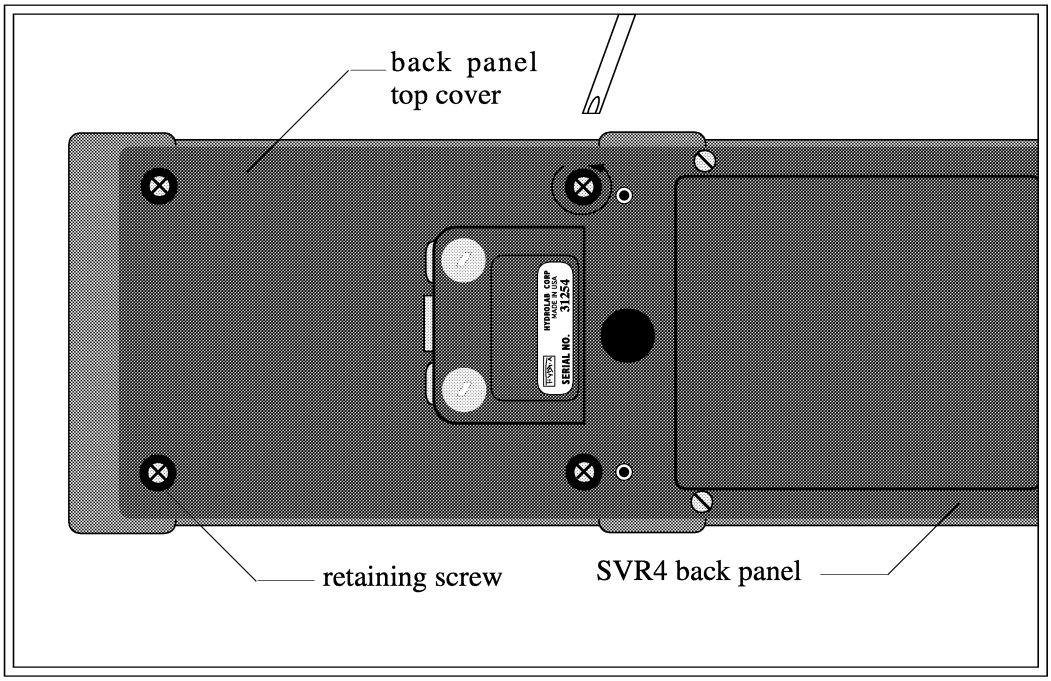


FIGURE 7: OPENING THE TOP COVER

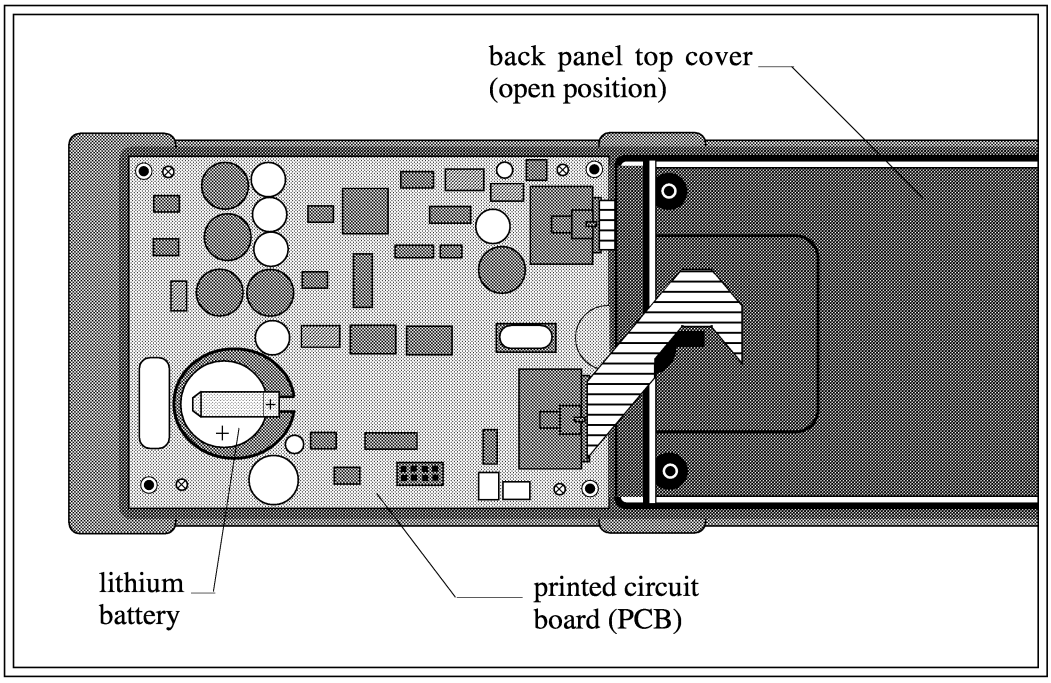


FIGURE 8: LOCATING THE COMPONENTS

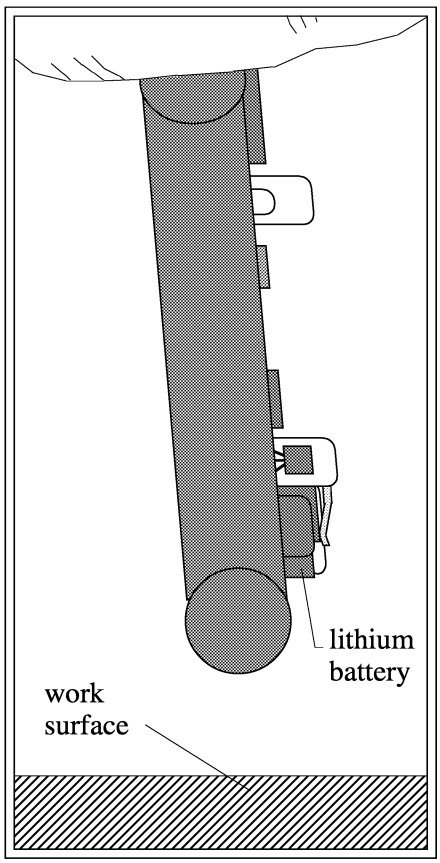


FIG. 9: VERTICAL POSITION

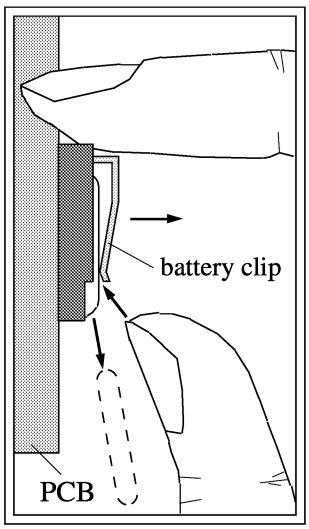


FIG. 10: REMOVAL (CLOSE UP VIEW)

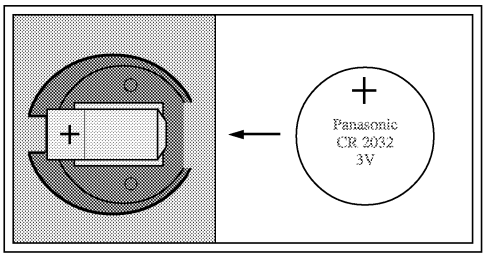


FIG. 11: INSTALLATION (CLOSE UP VIEW)

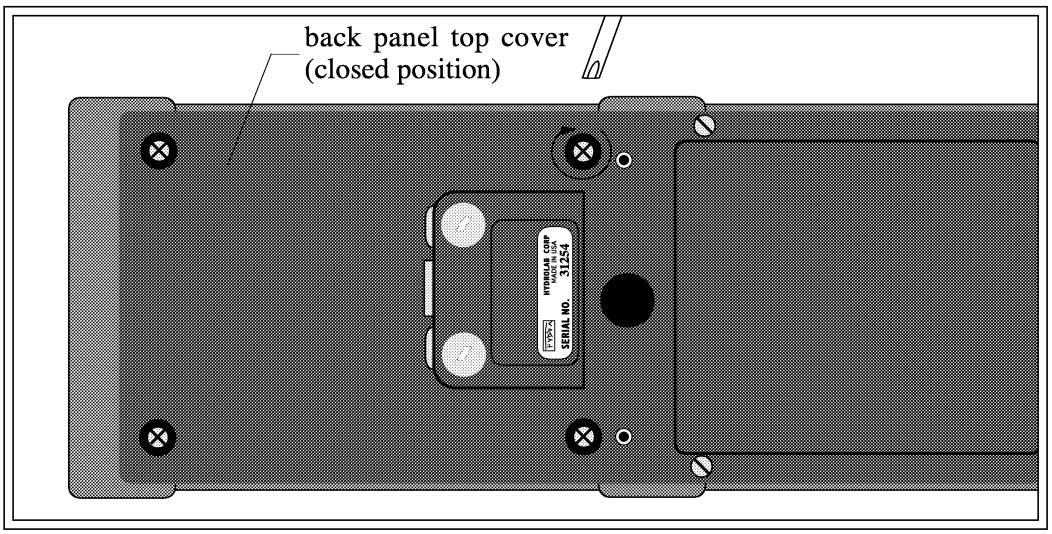


FIGURE 12: CLOSING THE TOP COVER

2. Calibration

Surveyor 4 calibration is not necessary, unless you have an option that requires calibration (e.g. the internal barometer). If this is the case, refer to the corresponding appendix at the end of this manual. Otherwise, if you go to the Surveyor 4 calibration submenu, you will be greeted by the following message: `No Svr4 parameters require calibration! Press any key....`

Your Surveyor 4 allows you to calibrate a multiprobe, just like you would with a computer. In this section we are going to show you how you access the multiprobe calibration submenu.

⚠ **WARNING:** **When loosening removable parts from a multiprobe or any instrument, always point those parts away from your body and other people. In extreme conditions, excess pressure may build up inside a housing, causing the caps, sensors, or other removable parts to disengage with force sufficient to cause serious injury.**

Proper maintenance of all sensors should precede calibration. Please refer to your multiprobe user's or operating manual for detailed sensor maintenance procedures.

Calibrating your multiprobe with a Surveyor 4 is quick and easy. We are going to take you to the multiprobe (Sonde) parameter submenu, then you can refer to the multiprobe User's Manual for parameter calibration procedures or to the corresponding operating manual chapters.

Your Surveyor 4 displays a certain character instead of or after a reading to let you know that something is not functioning properly or that it does not have the requested information available yet. Review the table on the next page to locate any visual prompts which will appear on your instrument's screen.

TABLE 3: SURVEYOR 4 SOFTWARE SYMBOLS

Symbols	What does this mean? What should you do?
(Blank)	It indicates that this reading is within expected range and does not present any anomalies. No service is required.
#	It indicates that the reading cannot be taken for this parameter, it is out of range (above or below the multiprobe's measurement capability). For instance, if the Surveyor 4 battery voltage is out of range, your instrument will display # signs on your screen where the reading should be.
X	It indicates that the Surveyor 4 is interrogating the multiprobe for information, or that the parameter will keep a fixed value and will not update.
------	It indicates that the Surveyor 4 is interrogating the multiprobe for information, or that the parameter is not available or is off-line (the reading will not update).
*	It is a reminder that you need to set the time after a clock battery change or a parmeter has never been calibrated after a reset.
&	After "D/T", it indicates that the Surveyor 4 clock is not functioning. Replace the lithium battery. After "IB% Svr4:%Left", it means that the Surveyor 4 battery was removed. You need to call Hydrolab at 800-949-3766 (In the USA and Canada only) or (512) 255-8841.
!	For versions before 1.10 only. When your Surveyor 4 is connected to an external power source, it indicates that your Surveyor 4 internal battery is "dead". You need to recharge the battery.
^	After "D/T", it indicates that the Surveyor 4 clock battery is low. You need to replace the battery. Only for versions < 1.10: after "IB% Svr4:%Left", it indicates that the Surveyor 4 battery was replaced. It can also indicate that your Surveyor 4 cannot detect the estimated battery status. You need to go through a new discharge and recharge cycle.

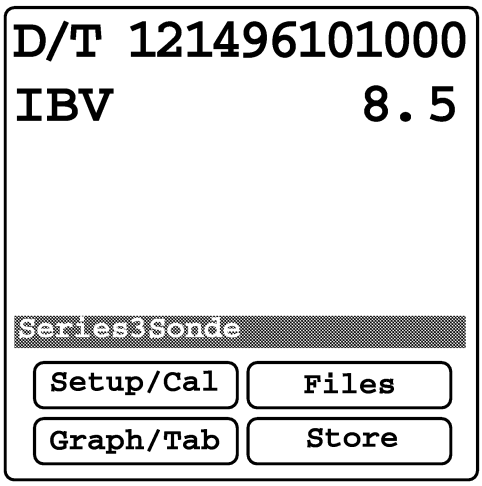
The software symbols used for your multiprobe parameters will also appear on your Surveyor 4 display. Please, refer to your multiprobe manual “Maintenance, calibration, and storage” chapter software symbols table for details. Note that “N/A” will be displayed as “N” on your Surveyor 4 screen.

You are now ready to start the calibration process. Follow the next steps to reach the multiprobe (Sonde) parameter submenu.

Series 3 Calibration

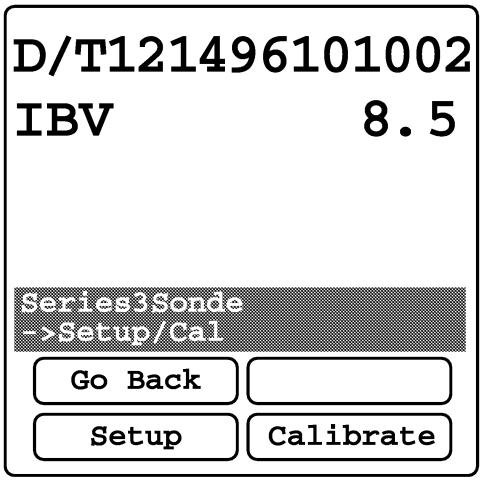
Series3Sonde SL2

After setting the I/F Mode to Series 3, your screen should be similar to this:

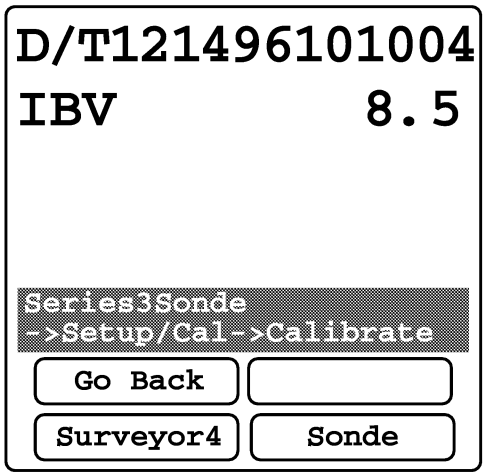


You will notice `Series3Sonde` on the history line which tells you that you are connected to a DataSonde 3, a Recorder, a Reporter, an H20, or an H20G.

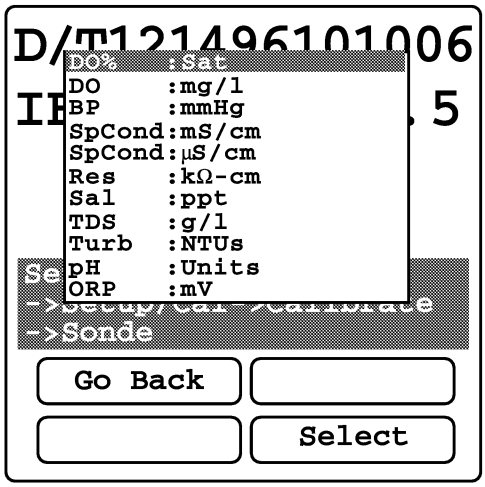
STEP 1: From the initial screen above, press the `Setup/Cal` key, to get:



STEP 2: Next, press the Calibrate key. Your Surveyor 4 will display the next screen:



STEP 3: Then, press the Sonde key and the next or similar screen will appear:



NOTE:

- Before calibrating your Series 3 multiprobe, you may want to go to the Setup->Sonde submenu and choose the appropriate setup for your parameters. For instance, if you have turbidity, you have the choice between "Nephelometric" (Neph) or "Ratio" (Rat) mode. Refer to section 2.4.

You are now in the Series3Sonde (multiprobe) calibration submenu. Your screen may differ (different parameters displayed) from the sample screen above, since your multiprobe configuration may be different from the one used for this sample screen. Move the cursor to the parameter you want to calibrate and press Select. Follow the Surveyor 4 prompts with the maintenance and calibration chapter of the appropriate Series 3 multiprobe Operating Manual.

NOTE:

- For calibration in Terminal mode, refer to the maintenance and calibration chapter of the corresponding Series 3 Operating Manual.

Series 4 Calibration

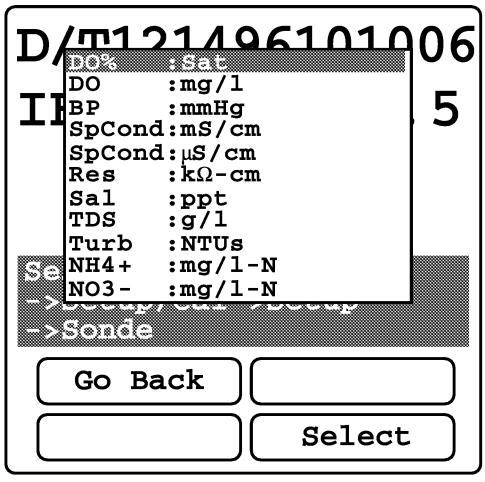
Series4Sonde SL2

To calibrate a Series 4 multiprobe (DataSonde 4 or MiniSonde), follow the next steps:

STEP 1: From the initial Series4Sonde screen, press the Setup/Cal key.

STEP 2: Next, press the Calibrate key.

STEP 3: Then, press the Sonde key and the next screen, or similar, will appear:



You are now in the Series4Sonde (multiprobe) calibration submenu. Your screen may differ (different parameters displayed) from the sample screen above, since your multiprobe configuration may be different from the one used for this sample screen. Move the cursor to the parameter you want to calibrate and press Select. Follow the Surveyor 4 prompts with the calibration sections of the multiprobe user's manual.

4. Logging and Data Transfer

CHAPTER 4:
LOGGING AND DATA TRANSFER

1. Introduction

The Surveyor 4 memory logging system comes in several options. Your instrument's logging capacity will depend on the size of the memory installed. Memory is available in the following sizes: "Clipboard" memory which allows 12 manually stored scans (up to 300 manually entered readings), memory which allows approximately 120,000 readings, or memory which allows approximately 375,000 readings.

`Files` is displayed in the following configurations or interface modes:
NoConn PC Series3Sonde Series4Sonde Terminal

In this chapter we will show you the `Files` submenu options and several connection options for a Surveyor 4 with Clipboard memory and a Surveyor 4 with extended memory. You will be able to create, delete, capture, download, transmit, check the status of files, and use the AutoLog feature. You will first need to establish communications between the Surveyor 4 and either your multiprobe (Series 3 or 4) or your personal computer. Note that the Surveyor 4 "autobauds" when connected to a multiprobe and that you may need to set your Surveyor 4 baud rate when connected to a PC from `NoConn->Setup/Cal->Setup->Baudrate:PC` or `PC->Setup/Cal->Setup->Baudrate:PC`.

2. The Surveyor 4 "Files" Submenu (Clipboard)

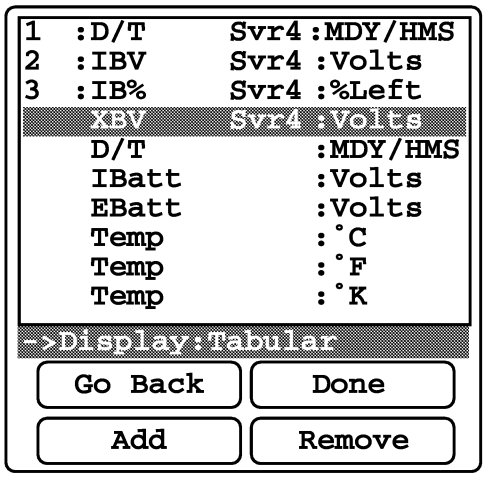
If your Surveyor 4 has Clipboard memory, you can store up to 12 scans (with a maximum of 25 parameter readings per scan) by using the `Store` function. This feature allows you to capture the lines of data displayed at the time you press the `Store` key.

Storing Clipboard Data

NoConn Series3Sonde Series4Sonde SL1

To store data to your instrument's Clipboard memory using the `Store` key, follow the next steps.

STEP 1: First, you need to select the parameters you would like to save to your Surveyor 4 Clipboard memory. To do so, in `NoConn` interface mode, go to the `Setup/Cal->Setup->Tabular:Display` submenu and press `Select`. You will be given a choice of parameters, select those you want to `Add` or `Remove` from your Surveyor 4 screen.



Repeat this procedure to add or remove the parameters of your choice.

STEP 2: Once you are satisfied with your selection, press the `Done` key once and the `GoBack` key three times.

STEP 3: Then, press on the `Store` key. You have now saved 1 scan to your Surveyor 4 memory.

If you see a `Clipboard is full!` message, refer to the next sections "Viewing and transmitting scans" and "Deleting scans."

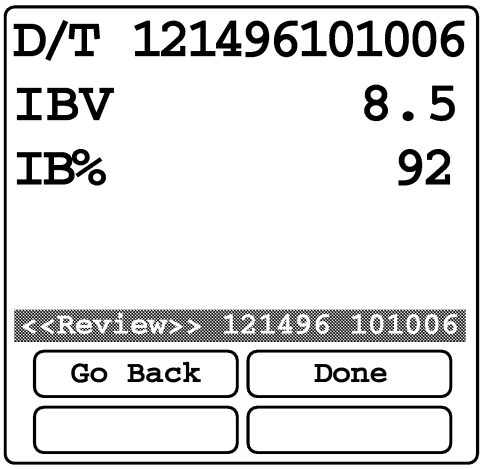
You can repeat this procedure 11 more times for a total of 12 scans.

Reviewing Clipboard Scans

NoConn PC Series3Sonde Series4Sonde Terminal SL1

Should you want to take a look at the scans you created, the `Review` function allows you to check the created files. Follow the next steps to `Review` your files.

STEP 1: From the `Files->Clipboard` (for `NoConn`, `PC`, or `Terminal` modes) screen or the `Files->Surveyor4->Clipboard` screen (for `Series3Sonde`, or `Series4Sonde` modes), press `Select` on `Review` to get:



The screen above is an example of what you would see on your Surveyor 4. In this example, the information displayed is the entire information (the scan) saved to your Clipboard memory when you pressed the `Store` key at 101006 on 121496.

STEP 2: Depending on the number of scans your Surveyor 4 Clipboard contains, you can press the down arrow key and move to the other file(s) to review the information you stored earlier.

Once you have finished reviewing your data, press the `Done` key to return to the `Files` submenu.

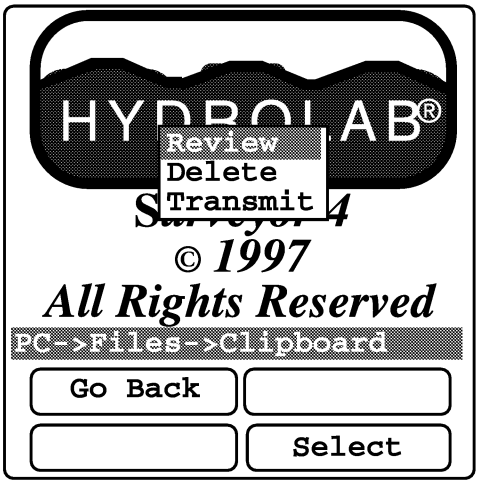
Transmitting Scans

PC SL2 / SL3

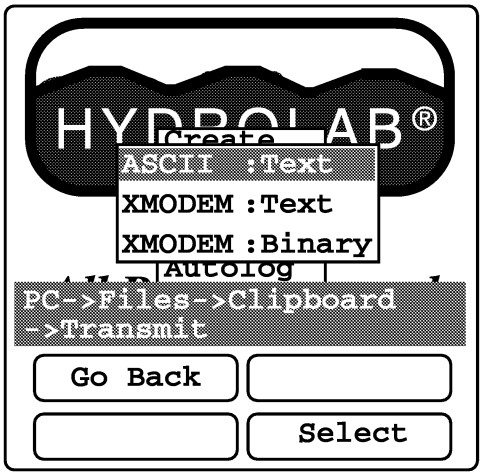
To transmit the stored data, you need to locate the Surveyor 4 to PC adapter, and follow the next steps.

STEP 1: Connect your instrument to your computer with the Surveyor 4 to PC adapter, turn your Surveyor 4 on, if it is not already on. The next - or similar - screen should appear. If this is not the case, check the connections and cables.

STEP 2: Press the `Files` key.



STEP 3: Then, move the cursor to `Transmit` and press `Select` to get:



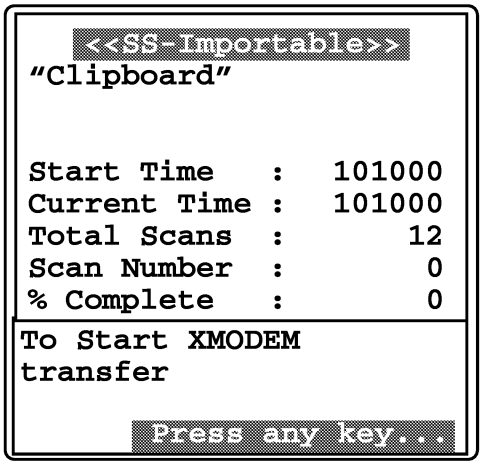
You have three transfer choices: `ASCII: Text`, `XMODEM: Text`, `XMODEM: Text`, `XMODEM: Binary`. The first option will transfer the stored scans as text, using the ASCII communications protocol. The second option will transfer your scans as a spreadsheet-importable text file, using the XMODEM communications protocol. The last option is for factory diagnostic purposes and should be disregarded by the operator and requires Security Level 3.

NOTE:

- Refer to chapter 2, under "Radix and Delimiter" to correctly configure the spreadsheet-importable format.

Before starting the transmit process, please refer to your communications program specific commands or to "ProComm Plus for DOS basic commands" or "HyperTerminal basic commands" in the "Quick Reference" chapter at the end of this manual.

STEP 4: Launch your communications program in your PC. Make sure that you have chosen the correct baud rate for your computer and that you have selected the proper transfer protocol in your communications program setup menus. For this example, we are going to select `XMODEM: Text` and press `Select`. The next screen comes up.



The number after `Total Scans` on the previous screen is the number of scans that are present in the Clipboard memory and that will be transferred to the computer.

STEP 5: From your computer, select the option to receive files in your communications program - for instance, press **PgDn** for ProComm Plus for DOS. Give the file a name and press **ENTER**. Then, press any key on your Surveyor 4 as instructed. The last two lines (with zeros) on your Surveyor screen should start changing to show that the transfer is taking place. Otherwise, you need to check your cables, setup, and transfer procedures. You can also press the `Abort` key to terminate the transfer.

STEP 6: When the transfer is complete, go to the computer directory where you saved your file and open it. Here is an example of what could appear on your computer screen for two scans:

```
"Date", "Time","","D/TSvr4","","IBVSvr4","","temp",""
"MMDDYY","HHMMSS","","MDY/HMS","Volts","","°C",""

121296,014308,"",21296014308,"",8.5,"",23.01,""
-----------------------------------

"Date", "Time","","D/TSvr4","","IBVSvr4","","temp",""
"MMDDYY","HHMMSS","","MDY/HMS","Volts","","°C",""

121296,062323,"",21296062323,"",8.5,"",24.04,""
```

As you can see, all the parameters that were displayed on your screen when you stored the scans have been captured and reproduced in a simple text format.

NOTES:

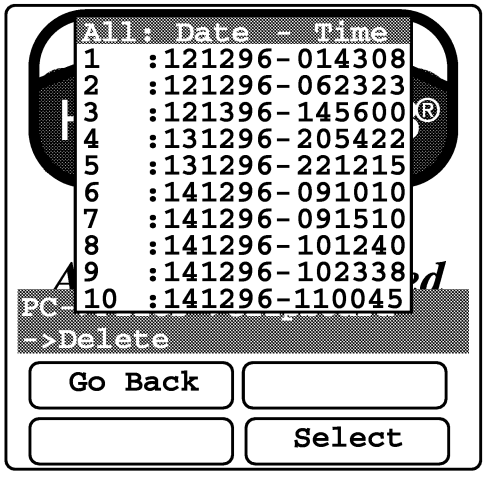
- You need to be aware of the choice of delimiter and radix you made when you come back from the field and want to transfer your data. The radix and delimiter will influence the way your file will be transferred.
- You will not be able to download information from your Series 3 or 4 multiprobes, since the Surveyor 4 Clipboard memory does not have the capacity to receive files. Call Hydrolab Sales at 800-949-3766 (in the United States of America and Canada only) or (512) 255-8841 to inquire about upgrades to your Surveyor 4.
- If your Surveyor 4 is connected to a multiprobe with logging, you can also go to `Sonde` instead of `Surveyor 4` from the `Files` submenu to create, delete, or look at the status of your multiprobe files. To download a file, you need to use a Surveyor 4 with memory. Please, refer to the next section "3. The Surveyor 4 Files submenu (with memory)" under "Downloading and transmitting a file."

Deleting Scans

NoConn PC Series3Sonde Series4Sonde Terminal SL2

To delete the scans you stored in your instrument's Clipboard memory, follow the next series of steps.

STEP 1: Press the `Files` key, or the `Files` key and then the `Surveyor4` key (for the `Series4Sonde` or `Series4Sonde` connections), move the cursor to `Delete` and press `Select` to get the next, or similar, screen.



STEP 2: Make sure that you *really* want to delete the selected scan(s), since there is no going back or undo! Then, either leave the cursor on `All: Date - Time` to delete all the scans, or move the cursor down to select a specific scan, and press `Select`.

You have now covered file handling with a Surveyor 4 equipped with Clipboard memory. Let's see how the same actions work with a Surveyor 4 equipped with extended memory.

3. The Surveyor 4 "Files" Submenu (with Memory)

Before explaining how to handle files with your Surveyor 4, we need to define and explain the different type of Surveyor 4 files.

Surveyor 4 File Types

- "Captured Text": this file is a text file that you created, then added data manually pressing the Store key in `NoConn`, `Series3Sonde`, or `Series4Sonde` mode. Once transferred to your PC, you can open a Captured Text file in your favorite word processing program.

- "Manual File": this file is a file that you created using a Series 3 multiprobe in `Series3Sonde` interface mode. Once transferred to your PC, you can open a Manual File in your favorite word processing or spreadsheet program.

- "Time-Triggered File": this file is a logging event that you created, then added data based on timed intervals. Once transferred to your PC, you can open a Time-Triggered File in your favorite word processing or spreadsheet program.

- "AutoLog File": this file is an automatic back-up logging event that you created/activated. Once transferred to your PC, you can open an AutoLog File in your favorite word processing or spreadsheet program.

- "Downloaded Text": this file is text file that you transferred/downloaded to your Surveyor 4 using a Series 3 multiprobe in `Terminal` interface mode. Once transferred to your PC, you can open a Downloaded Text file in your favorite word processing program.

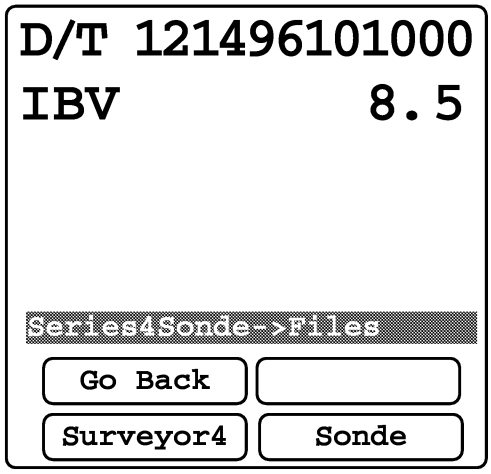
- "Downloaded File": this file is multiprobe file that you transferred/downloaded to your Surveyor 4 using a Series 3 or a Series 4 multiprobe in `Series3Sonde` or `Series4Sonde` interface mode. Once transferred to your PC, you can open a Downloaded File in your favorite word processing or spreadsheet program.

Introduction

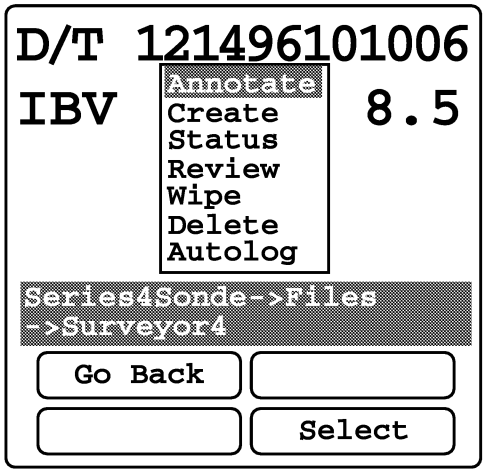
You can set up your Surveyor 4 to store, create, delete, capture, review, annotate, download, transmit, wipe, and view the status of files, and turn the Autolog feature on or off. Carefully follow the steps and explanations to understand the Surveyor 4 `Files` submenu. For an overview of the logging features, refer to the table at the end of this chapter.

NoConn PC Series3Sonde Series4Sonde Terminal SL1 / SL2

STEP 1: From the top level screen (we are using the Series4Sonde interface mode in our examples), press the Files key. The next screen appears:



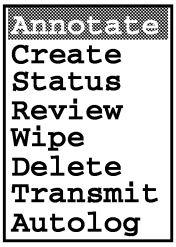
STEP 2: Press the Surveyor4 key and the next screen comes up (skip this step if you are in PC or in Terminal interface mode):



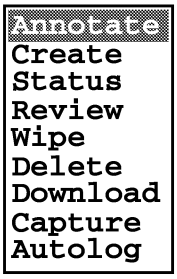
The previous screen allows you to annotate, create, review, wipe, delete files, and view the status of existing files, and turn the AutoLog feature on or off.

In NoConn and Series3Sonde modes, the file choices will be the same as those on the previous screen.

In PC mode, one item is added to the menu, Transmit (to transfer files from your Surveyor 4 to your PC):



In Terminal mode, two items are added to the menu, Download (to transfer files from your Series 3 multiprobe to your Surveyor 4), and Capture (to capture ASCII data from a Series 3 multiprobe):



NOTE:

- Capture is also a Create submenu item in NoConn and PC modes.

In the next sections, we are going to cover all of the Files choices.

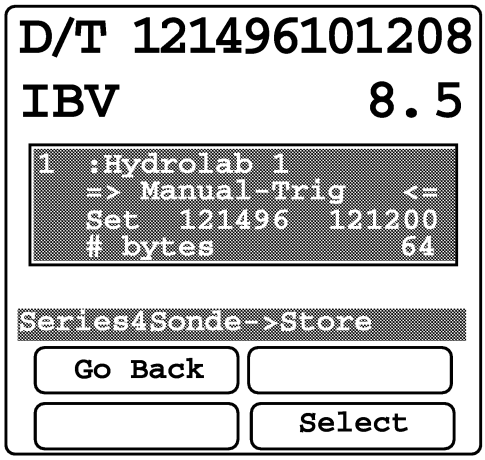
Storing Data

NoConn Series3Sonde Series4Sonde SL1

To store data to your instrument's memory using the Store key, follow the next steps.

STEP 1: First, to be able to store data to a file, you need to create one in your Surveyor 4 memory, otherwise you will get a No Log Files available! message on your screen. To create the file where your date will be stored, refer to the next section "Creating a file" under "Manual file creation."

STEP 2: Once you have created your manual file, go back to the Series4Sonde screen and press the Store key to get:



STEP 3: Either select a manual file (if you have more than one available) and press `Select`, or simply press `Select`. Note that the Surveyor 4 will, by default, select the last manual file where you stored data. The data on your screen is stored to the selected file.

STEP 4: Repeat to store more data to the selected file or another manual file, if available. The `# bytes` field will change as you add data to the file.

Creating a File

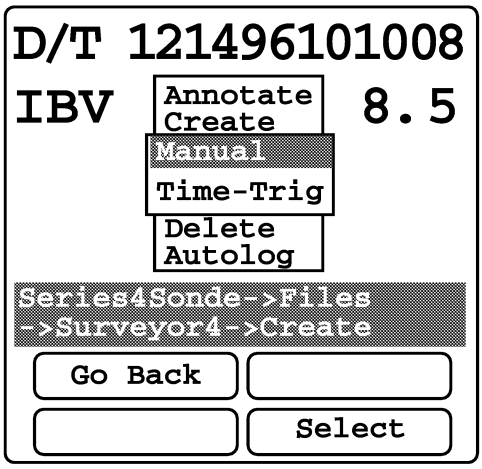
NoComm PC Series3Sonde Series4Sonde SL2

You can create a file within your Surveyor 4. You can save up to 24 files in your Surveyor 4 memory (23 manual or time-triggered files and 1 Autolog file). If your directory is full, follow the instructions under "Deleting a file" later on in this chapter to make room for new files.

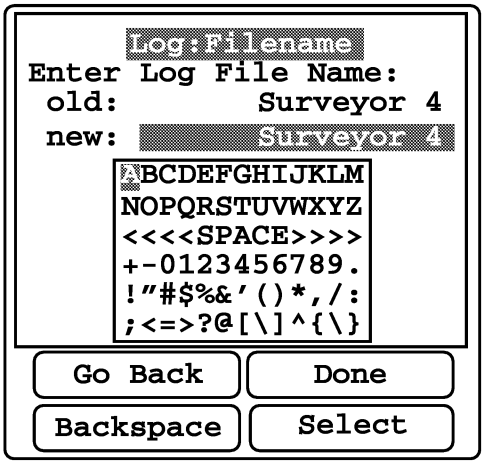
Manual File Creation

This type of file will be used for the `Store` function detailed in the previous section. In the sample screens below, we are connected via the `Series4Sonde` interface mode; your screen may differ.

STEP 1: From the `Series4Sonde->Files->Surveyor4` screen, move the cursor to `Create` and press the `Select` key to get:



STEP 2: If you select the first choice, `Manual`, the Surveyor 4 logging software will create a file to manually store scans of data. Let's press `Select`. The next screen appears.



NOTE:

- If you get a `Directory is FULL!` message, refer to the sections "Deleting a file" and "Downloading and transmitting a file" later in this chapter.

The default file name is `Surveyor 4`. Using the triangular cursor keys (◀ ▶ ▲ ▼) and the `Select` and `Backspace` keys enter your new file name.

NOTE:

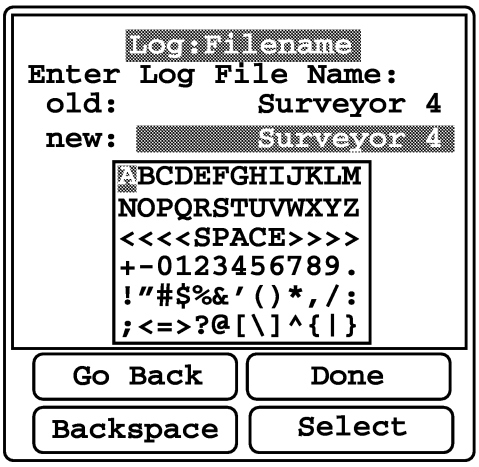
- If the file name you entered already exits in your Surveyor 4 directory, the new file will not replace the existing file. You will have two files with the same name but different data, so you can still tell them apart.

STEP 3: When you have entered the file name, press the `Done` key. A screen of parameters appears with the default selection that matches your Surveyor 4 tabular display. You can add or remove parameters to suit your needs. Once you configured your new display, press the `Done` key, and the message `File Created!` will briefly appear on your screen. Press any key as instructed to return to the `Files->Create` window. Note that the additions or removals from the parameter menu did not affect your tabular display, for our example it will still show `D/T` and `IBV` only.

Time-Triggered File Creation

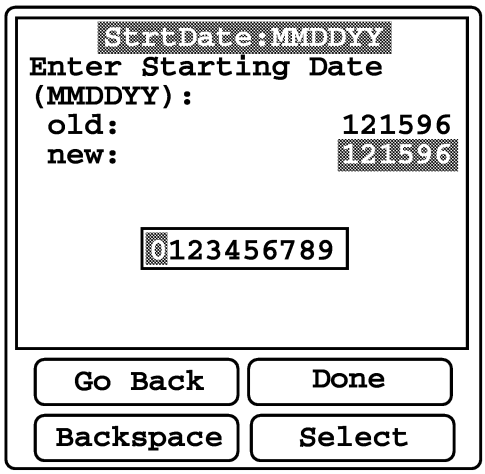
Your Surveyor 4 can log data automatically. To set its logging schedule, please follow these steps.

STEP 1: From the `Files->Create` screen, move the cursor to `Time-Trig` and press `Select`. The next screen appears:

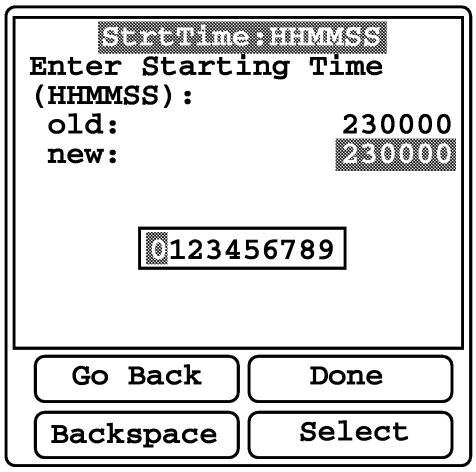


This second choice, `Time-Trig`, allows you to specify when your file will automatically start and stop acquiring data. Using the triangular cursor keys (◀ ▶ ▲ ▼) and the `Select` and `Backspace` keys enter your new file name.

STEP 2: When you have entered the file name, press the `Done` key. The next screen appears:



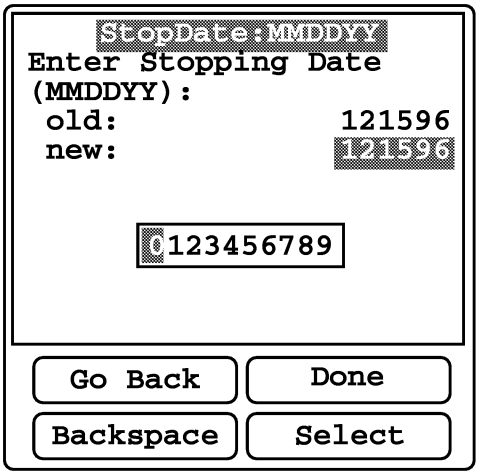
You are prompted for your new file's starting date. Enter the new date and press Done. The following screen comes up:



NOTE:

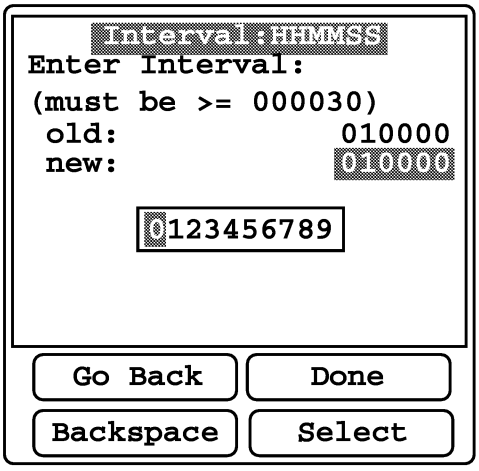
- If you are not satisfied with your choice at any time during these selections, you can press the Go Back key to return to the previous screen to change your selection.

STEP 3: Enter your file's starting time and press Done when you are satisfied with your starting time choice. The next screen appears:



STEP 4: Follow the prompts on your screen and repeat the steps above to set your file's stopping date and time. If you enter an incorrect date or time, the following messages will appear: `Start must be before Stop!` or `Invalid or incomplete text!`. Press any key and go back, check your time and date, and enter an acceptable value.

STEP 5: Once finished, the following screen comes up and prompts you for the time (in hours, minutes, and seconds) for the `Interval` between each parameter reading.

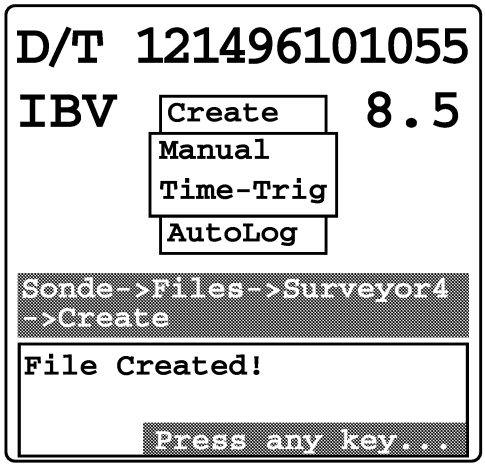


Note that the interval MUST be 30 seconds or more. Should you enter an interval below 30 seconds, the following message will appear at the bottom of the screen: `Entry is outside acceptable limits! Press any key...` Press any key and enter an acceptable interval. Our screen above shows a 1 hour interval (`010000`). Press the `Done` key.

STEP 6: The next screen appears and prompts you for the multiprobe warm-up time. The warm-up time refers to the time it takes your multiprobe sensors to be ready to record accurate data. Warm-up time will vary according to the sensors you are using and your field conditions (e.g. temperature).

For this selection, the value MUST also be 30 seconds or more. The screen above shows a 2 minute interval (`000200`).

STEP 7: When your are finished, press the `Done` key. A screen of parameters appears with the default selection that matches your Surveyor 4 tabular display. You can add or remove parameters to suit your needs. Once you configured your new display, press the `Done` key, and the message `File Created!` will briefly appear on your screen.



Press any key as instructed to return to the `Files->Create` window. You can now either create another file or press the `Go Back` key to return to any previous screen.

If your Surveyor 4 files directory has reached full capacity (24 files: 23 and 1 for AutoLog), the following message will appear at the bottom of the screen: `Directory is FULL! Press any key...` Later in this chapter, you will learn how to transmit and delete a file in order to make more room for new files in your Surveyor 4 memory.

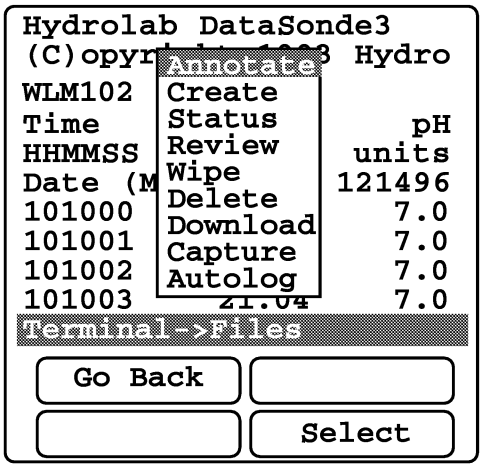
The Capture Feature

NoConn PC Terminal SL2

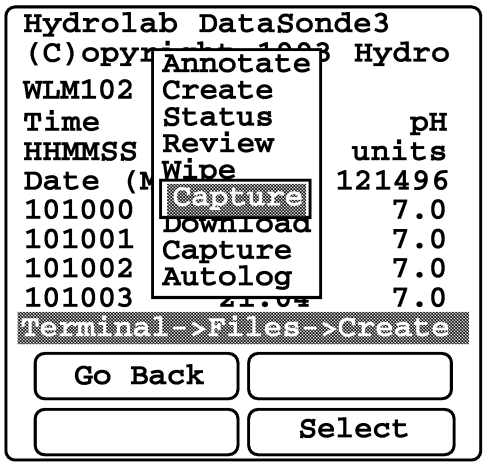
If your Surveyor 4 is connected to a Series 3 multiprobe model and you are using the `Terminal` interface mode, file creation has an additional submenu item, called `Capture`. This option allows you to capture ASCII data from a Series 3 multiprobe, much like PC terminal emulators do ASCII capture. `Capture` is also a `Create` submenu item in `NoConn` and `PC` modes. However, you can only send data to the capture file in `Terminal` mode.

Follow the steps below to start the saving process of your capture file.

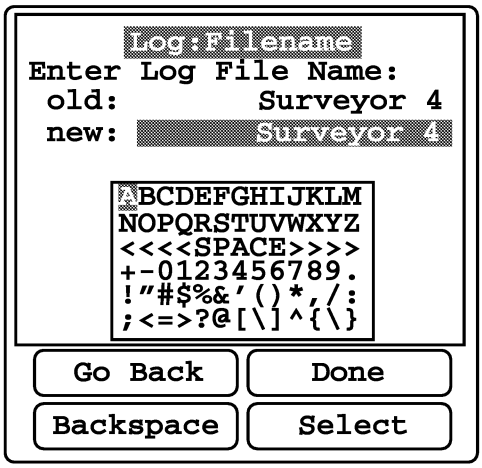
STEP 1: To be able to capture text, you need to *create* a capture file. To do so from the screen displaying `Terminal` on the history line, press `Files`. Your screen will be similar to this next representation.



STEP 2: Move the cursor to `Create` and press `Select` to get:



STEP 3: Press `Select` on `Capture`. The next screen appears:



You are now prompted to enter the file name of your capture file. For example, let's enter "Capture 1". Press `Done` when you have entered your file name.

If you have entered a valid file name, you will get the `File Created! Press any key...` message. Otherwise, go back and enter an acceptable file name.

NOTE:

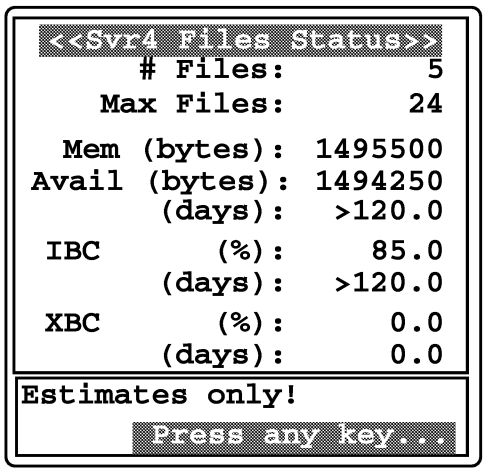
- To capture data to the capture file, refer to "Capturing Real-Time Data" in the "Downloading Data from a Series 3 Multiprobe in Terminal Mode" section at the end of this chapter.

Checking the Status of a File

NoConn PC Series3Sonde Series4Sonde Terminal SL1

There are three ways to check the status of your files. The first one checks the status of all the files currently stored in your Surveyor 4.

From any `Files->Surveyor4` submenu, move the cursor down to `Status` and press `Select`. The next, or similar, screen appears:



The previous screen gives you information about the number of files present in your Surveyor 4 directory (5 in our example) and the maximum number of files you can store in your instrument (24).

Then, you also have the amount of formatted memory installed in your Surveyor 4 (1495500), the memory currently available (1494250), and the number of days available (more than 120) with the present amount of memory left. Our Surveyor 4 has most of its memory available.

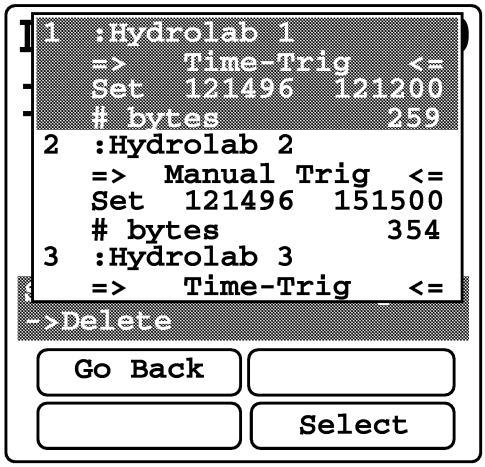
NOTE:

- The formatted memory capacity is less than the raw memory capacity. To determine the raw memory capacity, press the Hydrolab key from any top level screen.

Next, you are given the internal battery capacity (`IBC`) in percent and in days left before your Surveyor 4 runs out of power. The same applies to the external battery capacity (`XBC`). The Surveyor 4 we used in the example above has 85% of its internal battery left and is not connected to an external battery, which explains the `XBC (%): 0.0` and `(day): 0.0`.

You can now press any key to return to the Surveyor 4 `Files` submenu and move on to the next option.

A way of checking individual file status is to go to the `Delete` submenu option and press the `Select` key. All files will appear listed with the file type and its corresponding size. Take a look at an example of the screen you could see on your Surveyor 4:



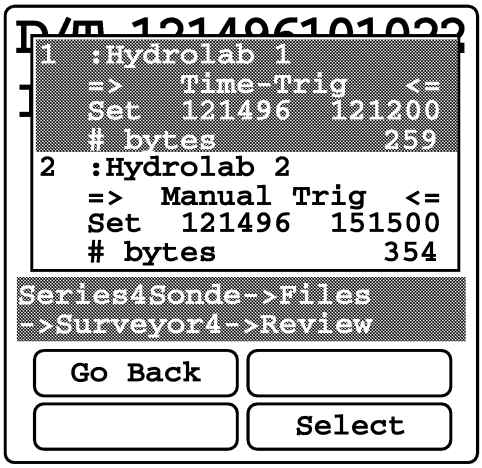
Press the `GoBack` key to prevent deleting any file.

Reviewing a File

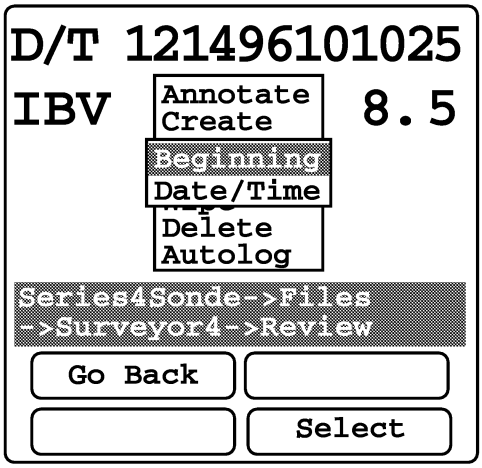
NoConn PC Series3Sonde Series4Sonde Terminal SL1

The Review function allows you to view the contents of any manual, time-triggered, or AutoLog file. You can also use this function as another way to check the status of these file types.

STEP 1: From the Files->Surveyor4 submenu, in Series4Sonde interface mode, press the Review key to get:

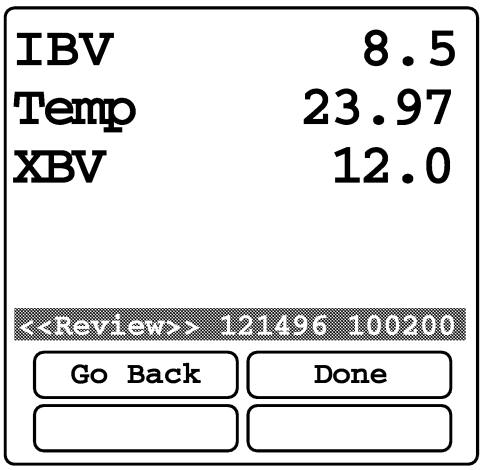


STEP 2: Choose a file you want to review and press the Select key to get:



The previous window gives you the choice between reviewing the contents of your file from the top (Beginning) or from a specific date and time you will be prompted to enter (Date/Time).

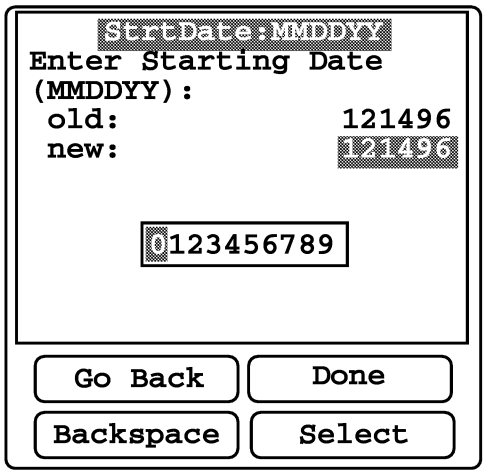
STEP 3: Let's select Beginning. The next, or similar, screen appears:



Now, you can see the information contained in the file in tabular display format. For our example, we have the internal battery voltage (IBV), the temperature (Temp), and the external battery voltage (XBV) on a specific day (121496) and at a specific time (100200).

STEP 4: You can press the down arrow key on your Surveyor 4 to review the next scan that was saved to this file. You can also press the up arrow key to go to the previous scan. Once you have reached the end of the file and press the down key again, you will be taken back to beginning. Likewise, if you are at the beginning and press the up key, you will be taken to the end. If you want to return to the Beginning/Date/Time submenu, press GoBack. If you want to go back to the Review submenu, press Done.

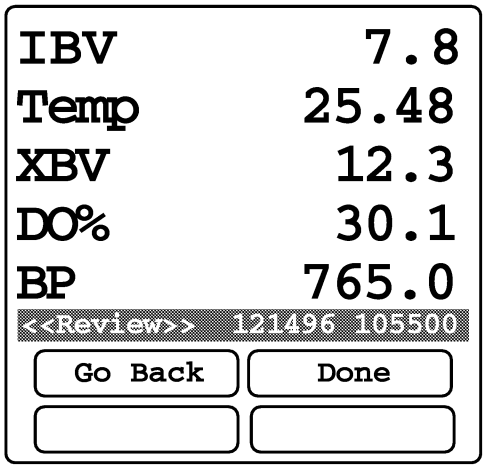
STEP 5: Should you decide to press Date/Time instead of Beginning from the Review submenu, the next screen will appear:



Enter the date where you want to review the data and press Done. Note that the default date is the file's setup date.

STEP 6: Then, you are prompted to enter the time where you want to start your review. When you are satisfied with your entry, press Done. Note that the default time is the file's setup time.

The next menu is a representation of a sample file.



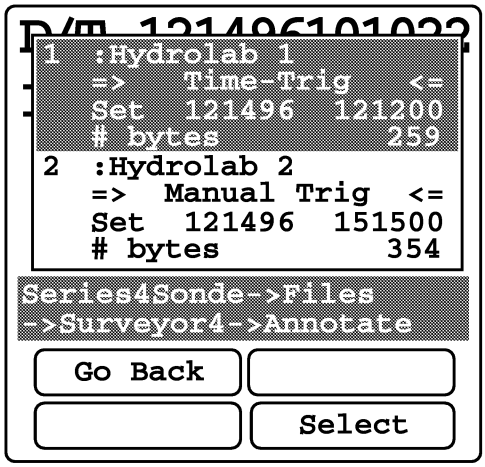
You can press your Surveyor 4 up or down arrow keys to move through the file. If you want to return to the Beginning/Date/Time submenu, press GoBack. If you want to go back to the Review submenu, press Done.

Annotating a File

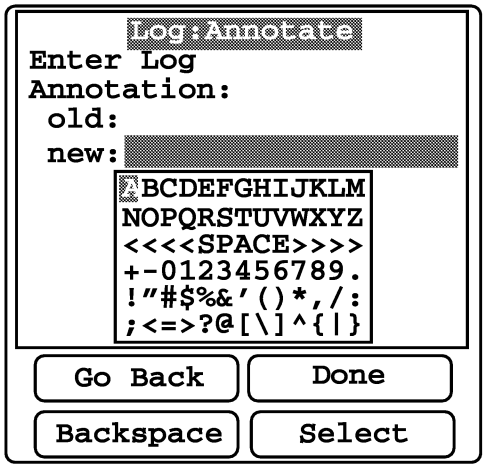
NoConn PC Series3Sonde Series4Sonde Terminal SL2

Once you have created files, you can add comments to these files with the `Annotate` feature which is detailed in this section. Annotate will only allow comments to be added to manual, time-triggered, or AutoLog files.

STEP 1: From the `Files->Surveyor4` submenu, in Series 4 interface mode, press the `Annotate` key to get:



STEP 2: Choose a file you want to annotate and press the `Select` key to get:



Use the Surveyor 4 "virtual" keyboard to enter your comments (up to 80 characters).

STEP 3: Once you are satisfied with your entry, press the `Done` key to return to the `Files` menu.

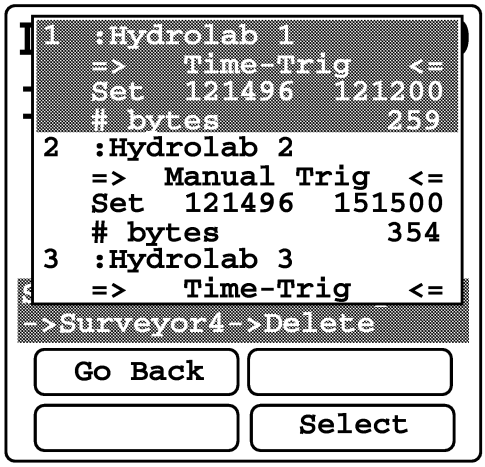
You can then decide to add another annotation to the same file or move to another file.

Deleting a File

NoConn PC Series3Sonde Series4Sonde Terminal SL2

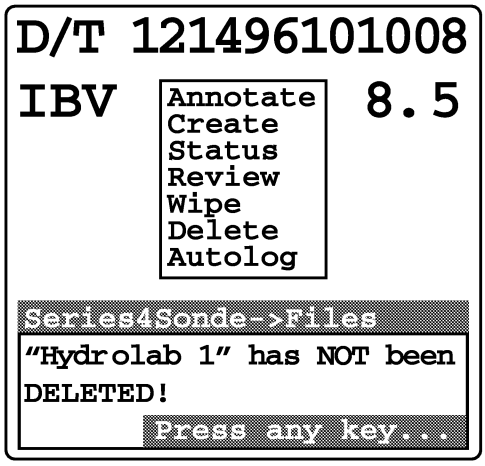
You might want to delete a file to make more room for new files or just erase files you do not want to keep stored in your instrument's memory. Follow the next steps to erase a file. In this example, we have connected our Surveyor 4 to a multiprobe Series 4 multiprobe.

STEP 1: From the `Files->Surveyor 4` submenu, move the cursor down to `Delete` and press `Select`. The next, or similar, screen will appear:

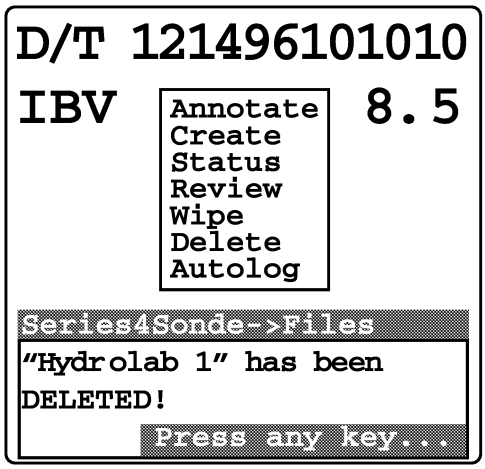


STEP 2: Move your cursor (highlighted area on the first file, called `Hydrolab 1` above) to the file you want to delete. Press the `Select` key to get:

Should you select "0," the following, or similar, screen will appear:



Should you select "1," you will get:



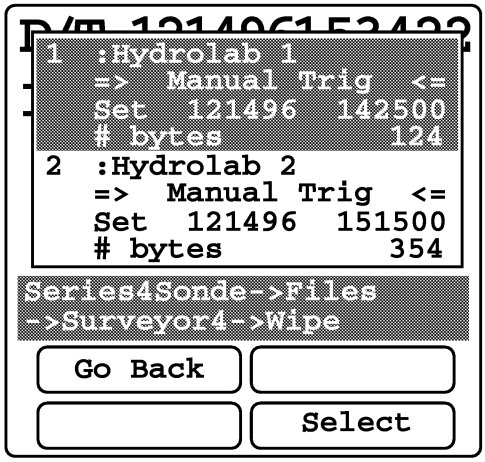
Press any key to return to the `Files` submenu. You can now delete another file, go to another option, or go back to the previous screen(s).

Wiping Manual-Triggered Files

NoConn PC Series3Sonde Series4Sonde Terminal SL2

As the title indicates, your Surveyor 4 has a function, called `Wipe`, which allows you to erase the contents of any manual-triggered files saved in your Surveyor 4 memory. It only keeps the file name and the parameter settings, and resets the date to the day when you "wiped" the contents of the file. This allows you to quickly delete information in your manual files and saves you time by letting you use the empty file template for future operations. This function only applies to manual files.

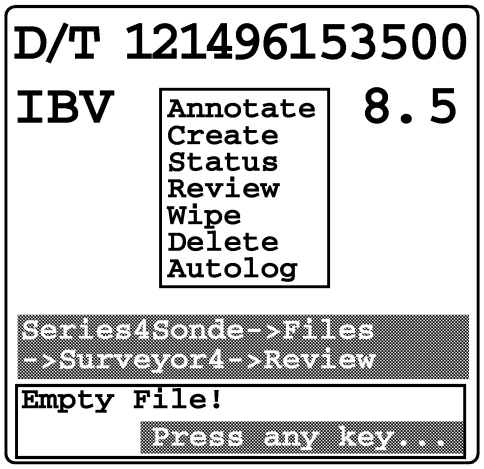
STEP 1: From the `Files->Surveyor4` submenu, move the cursor down to `Wipe` and press `Select`. The next screen will appear:



STEP 2: Move your cursor (highlighted area on the first file, called `Hydrolab 1` above) to the file you want to "wipe." Press the `Select`.

STEP 3: You are prompted: "Are you sure you want to wipe "*(your file name here)*" ?" Make your selection and press `Done`.

You have now "wiped" all manual file data from your selected manual file.



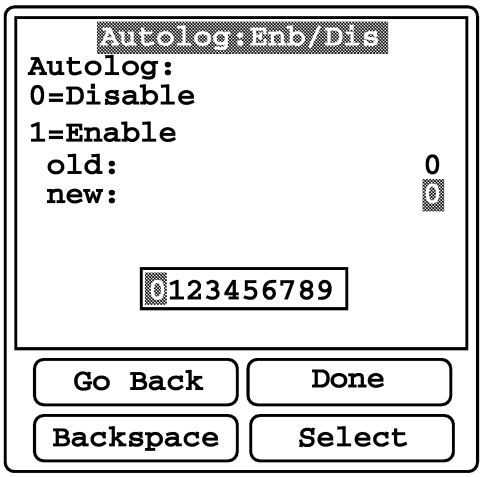
You can repeat this procedure for all your Surveyor 4's manual-triggered file.

The AutoLog Feature

NoConn PC Series3Sonde Series4Sonde Terminal SL2

AutoLog is another feature of the `Files` submenu. Once turned on, AutoLog works as a backup logging file, in case you make mistakes with your log files. The AutoLog feature captures - once every hour with a two-minute warm-up - a reading of each parameter contained in the Surveyor 4 history the first time when AutoLog is enabled.

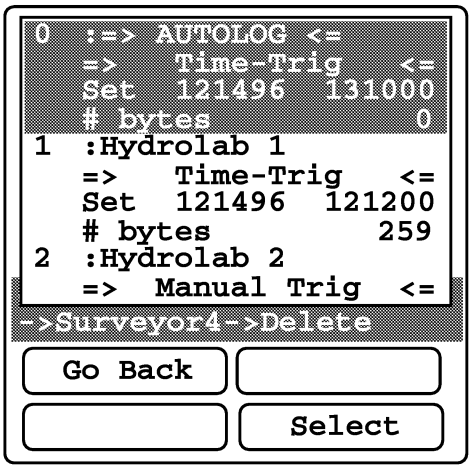
STEP 1: To turn on or "enable" AutoLog, from the `Surveyor 4->Files` submenu, move your cursor to `AutoLog` and press `Select`. The next screen appears:



STEP 2: Then, using the right cursor key, move the cursor to 1 and press `Select` and then `Done`.

The AutoLog file has been enabled. If it did not already exist, then it will be created Press any key, as instructed.

To check if your AutoLog feature was enabled, go to the `Files` submenu, move the cursor to `Delete`, and press `Select`. The next screen appears:



If Autolog is enabled, the corresponding file appears on top of your screen as `0 :=> AUTOLOG <=`. If you disable the AutoLog feature, the file description (second line above) will change to `=>`

`Disabled File <=.`

Should you decide to resume the AutoLog feature, the AutoLog file you initially created is reopened or "enabled," and all new data is added to the same `0 :=> AUTOLOG <=` file.

NOTES:

- If you want to delete the AutoLog file from your Surveyor 4 memory, you need to disable the AutoLog file before you can remove it using the `Delete` option. If you try to delete an "enabled" AutoLog file, your Surveyor will delete it and recreate a new one, since the Autolog feature is enabled.
- If you enable this feature and plan on using it, make sure you connect your Surveyor 4 to a multiprobe.

Transmitting a File from a Surveyor 4 to a Computer

PC SL1

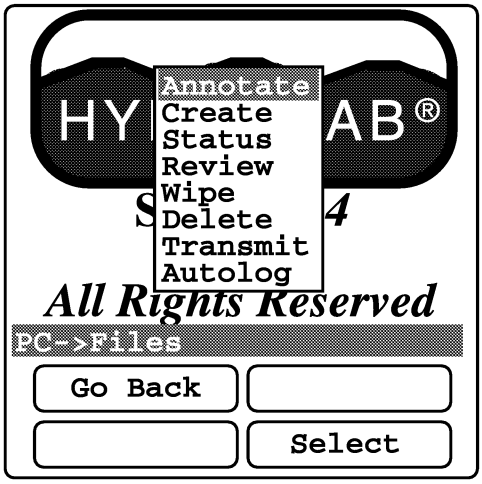
This transmission configuration involves connecting your Surveyor 4 to your computer with the Surveyor 4 to PC adapter cable. You should have files saved in your Surveyor 4 memory, either created from logging with a multiprobe, captured when connected to a Series 3 multiprobe, or transferred ("downloaded") from a multiprobe.

Before you start, you need to launch your favorite communications program (such as ProComm Plus for DOS) and setup your program to interface with the Surveyor 4 (a baudrate to match `Setup->Baudrate:PC` (19200 is the default) N, 8, 1), under **Alt+P** for ProComm Plus for DOS. Refer to the "Quick Reference" chapter at the end of this manual for ProComm Plus for DOS and HyperTerminal instructions.

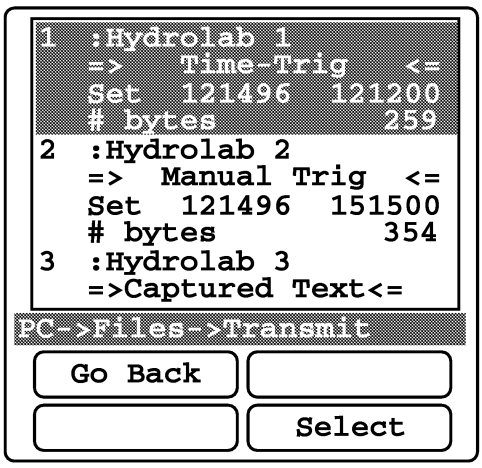
NOTE:

- You need to be aware of the choice of delimiter and radix you made when you come back from the field and want to transfer your data. The radix and delimiter will influence the way your file will be transferred. Refer to Chapter 2, under "Radix and Delimiter."

STEP 1: From the initial screen (which now displays `PC` on the history line instead of `Sonde`), press the `Files` key to get:



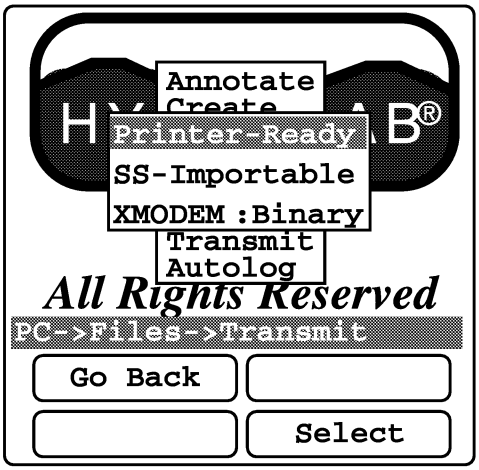
STEP 2: Move the cursor down to `Transmit` and press `Select`. The next, or similar, screen appears:



If you are transmitting a `Time-Trig`, a `Manual Trig`, or a `Download` file (see second line of your file description on your Surveyor 4 screen), follow the "Time-Trig, Manual Trig, and Download file transmission" section. If you are transmitting `Captured Text`, or `Downloaded Text`, refer to the "Captured and Downloaded Text transmission" after the next section.

Time-Trig, Manual-Trig, and Download File Transmission

Leave the cursor on the first file or move to the file, that you want to transmit and press `Select`. The following screen appears:

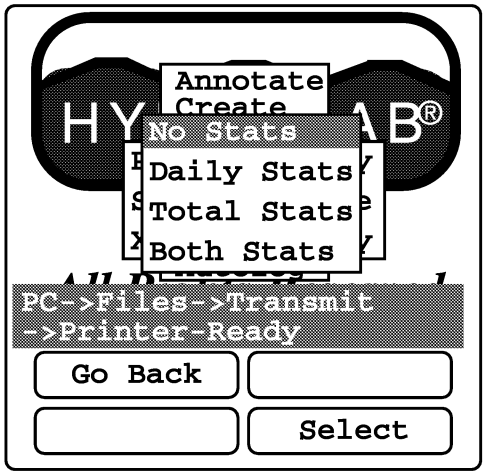


You have a choice between `Printer-Ready`, `SS-Importable`, and `XMODEM:Binary`. `Printer-Ready` will send the file you select to a printer or create a text file. `SS-Importable` will create a spreadsheet-importable file. `XMODEM:Binary` is for factory diagnostic purposes and should be disregarded by the operator.

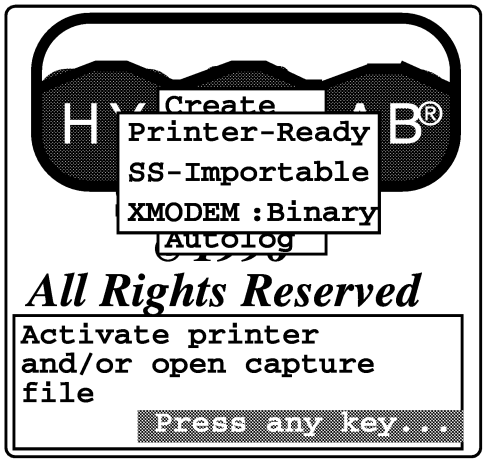
Let's now see the first two choices.

Printer-Ready Transmission

STEP 1: Leave the cursor on `Printer-Ready` and press `Select`. The next screen appears:



STEP 2: After you have chosen to send your file in a printer-ready format, you are prompted to choose the type of statistics which will appended to the printer-ready output. Leave the cursor on `No Stats` and press `Select`. The following message will appear just before the data transfer:



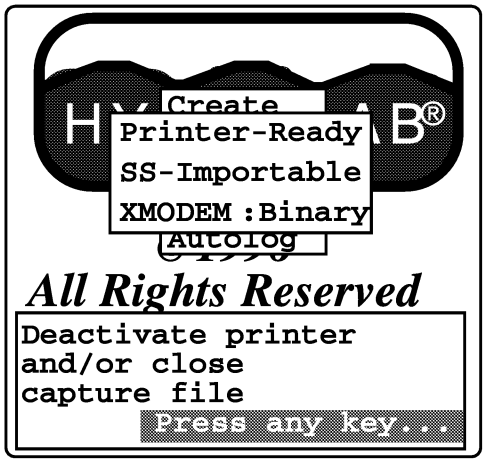
Combine the appropriate keys for your communications program to turn the printer on or open a capture file (**Alt + F1** for ProComm Plus for DOS; at the prompt, type the path and file name and press **ENTER**). Then press any key, as instructed, on your Surveyor 4.

If you selected `No:Stats`, information similar to the following will be sent to the printer and/or to the capture file.

```
Log File Name:  Hydrolab 1
Setup Date (MMDDYY): 041296
Setup Time (HHMMSS):  232000
Starting Date (MMDDYY):  041296
Starting Time (HHMMSS): 232000
Stopping Date (MMDDYY):  011333
Stopping Time (HHMMSS):  122459
Interval (HHMMSS):  001000
Warmup (HHMMSS):  000200

  Time     Temp     DO
HH:MM:SS    °C    %Sat
Date (MMDDYY) :  041296
Late probe turn on at 041296  232002
23:21:15   24.59   48.3
23:22:16   24.59   48.3
23:23:17   24.59   48.3
Recovery finished at 041296  235000
```

A transfer process screen will appear on your Surveyor 4 to show you that the file transfer is taking place.

After the transfer is complete, the following screen appears on your Surveyor 4:



Combine the appropriate keys for your communications program to turn the printer off or close the capture file (**Alt + F1** for ProComm Plus for DOS).

You can alternatively move the cursor to `Daily Stats` and press `Select`. The same message (`Activate printer and/or open capture file`) will be displayed in your Surveyor 4.

Information similar to the following about your file's statistics for each day will be sent to the printer and/or to the capture file showing each day's data. You will be able to see information regarding the number of readings, the minimum value and the time it was recorded, the maximum value and the time it was recorded, the maximum change between two points and the time it was recorded, the mean, and the standard deviation for that day's data. The printout will be similar to:

```
Log File Name:  Hydrolab 1
Setup Date (MMDDYY): 041296
Setup Time (HHMMSS):  232000
Starting Date (MMDDYY):  041296
Starting Time (HHMMSS): 232000
Stopping Date (MMDDYY):  011333
Stopping Time (HHMMSS):  122459
Interval (HHMMSS):  001000
Warmup (HHMMSS):  000200

  Time     Temp     DO
HH:MM:SS    °C    %Sat
Date (MMDDYY) :  041296
Late probe turn on at 041296  232002
```

```
23:21:15   24.59   48.3
23:22:16   24.59   48.3
23:23:17   24.59   48.3
Recovery finished at 041296  235000
```

Daily Stats	Time HH:MM:SS	Temp °C	DO %Sat
Out rng	0	0	0
Num rdg	5	5	5
Minimum	0.00	24.59	48.3
MMDDYY	041296	041296	041296
HHMMSS	232115	232116	232116
Maximum	0.00	24.59	48.3
MMDDYY	041296	041296	041296
HHMMSS	232115	232116	232116
Max chg	0.00	0.00	0.0
MMDDYY	041296	041296	041296
HHMMSS	232115	232116	232116
Mean	0.00	0.00	0.0
Std Dev	0.00	0.00	0.0

You can also choose `Total Stats` and press `Select`.

`Total Stats` are similar to `Daily Stats`. The difference is that `Total Stats` give you the overall statistics over the entire logging run and not just on a daily basis.

Finally, you can choose `Both Stats` and press `Select`. If you chose `Both Stats`, daily and overall statistics will be calculated.

Just after the data transfer has taken place, the same message (`Deactivate printer and/or close capture file`) will be displayed at the bottom of your Surveyor 4 screen. Combine the appropriate keys for your communications program to turn the printer off or close the capture file (**Alt + F1** for ProComm Plus for DOS). Then, press any key on your Surveyor 4 to return to the active screen and another key to perform another transfer or to go back to a previous screen.

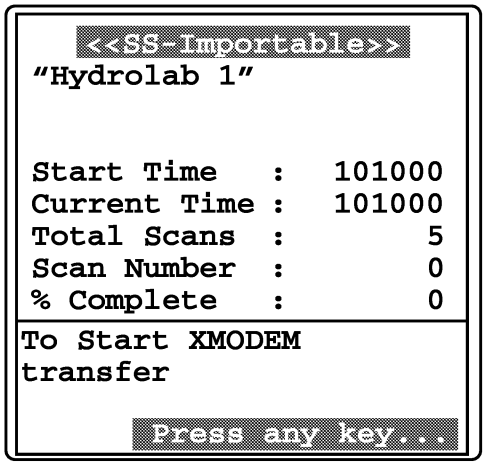
NOTES:

- If you are transferring files downloaded from a Series 3 multiprobe into a Surveyor 4, and you selected to save temperature as a parameter, both °C and °F will be included in the file. If you selected SpCond:mS/cm, SpCond:µS/cm, Res, and TDS will be included in the file. If you selected Depth, both Depth:Meters and Depth:Feet will be included in the file. If you selected DO%Sat, both DO:%Sat and BP:mmHg will be included in the file. After the transfer process to the PC is complete, you might want to open your file within your PC and "clean up" the parameters and readings you do not want to keep. Note that only the first 80 columns of the file transferred to your computer.
- At the bottom of the file, you will also notice a `Recovery finished` line.

Spreadsheet-Importable Transmission

STEP 1: From the `Printer-Ready`, `SS-Importable`, and `XMODEM:Binary` screen, move the cursor to `SS-Importable` and press `Select`.

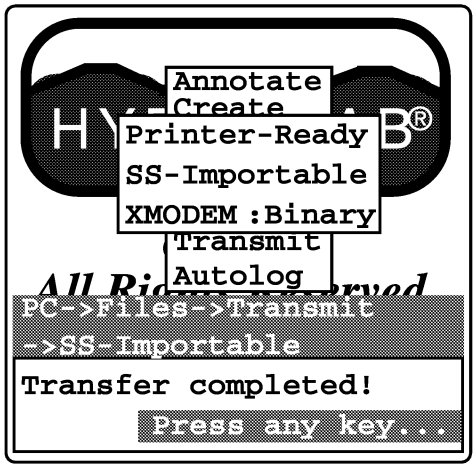
STEP 2: After you have chosen to send your file in a `SS-Importable` format, the following message appears on your Surveyor 4 screen:



If you are using ProComm Plus for DOS communications software, press the **PgDn** key to start the downloading process and select the **X** option for Xmodem protocol. Type the path and file name when prompted and press **ENTER**. Then, press any key on your Surveyor 4 to start the XMODEM transfer. Refer to the "Quick Reference" chapter at the end of this manual for ProComm Plus for DOS and HyperTerminal instructions. If you are using another communications software, follow your software's prompts.

Press **Esc** from your computer keyboard or the `Abort` key from your Surveyor 4 to abort the file transfer.

STEP 3: When the file transfer is complete, the following screen comes up:



Press any key to return to the `Printer-Ready`, `SS-Importable`, and `XMODEM:Binary` screen. You can either transmit other files or go back to previous screens.

To view the file you just transmitted, go to the computer directory where you saved your file and open it.

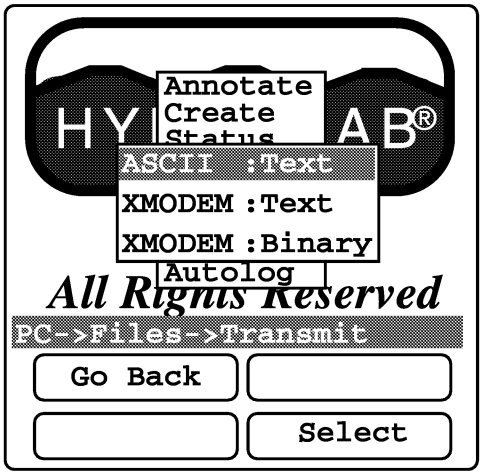
NOTE:

- If you are transferring files downloaded from a Series 3 multiprobe into a Surveyor 4, and you selected to save temperature as a parameter, both °C and °F will be included in the file. If you selected SpCond:mS/cm, SpCond:µS/cm, Res, and TDS will be included in the file. If you selected Depth, both Depth:Meters and Depth:Feet will be included in the file. If you selected DO%Sat, both DO:%Sat and BP:mmHg will be included in the file. After the transfer process to the PC is complete, you might want to open your file within your PC and "clean up" the parameters and readings you do not want to keep.

Captured and Downloaded Text Transmission

If you are transmitting `Captured Text`, you are dealing with a file that was created when your Surveyor 4 was connected to a Series 3 multiprobe in `Terminal` mode.

From the `Files->Transmit` submenu, leave the cursor on the first file or move it to the Captured Text file you want to transmit and press `Select`. On the next screen, you have three file transfer choices: `ASCII: Text`, `XMODEM: Text`, `XMODEM: Binary`. The first option will transfer the stored files as straight text files. The second option will also transfer your files as text files, using the XMODEM communications protocol.

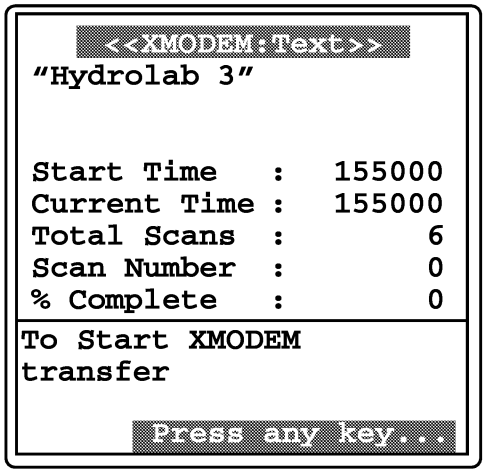


The last option is for factory diagnostic purposes and should be disregarded by the operator.

For the steps you need to follow, we have chosen to transmit a file using the XMODEM:Text option.

Before starting the transmit process, please refer to your communications program specific commands or to "ProComm Plus for DOS basic commands" or "HyperTerminal basic commands" in the Quick Reference chapter at the end of this manual.

STEP 1: As a reminder, make sure that you have chosen the correct baud rate for your computer and that you have selected the proper transfer protocol in your communications program setup menus (a baudrate to match `Setup->Baudrate:PC` (19200 is the default), N, 8, 1). For this example, we are going to select `XMODEM: Text` from the last menu above and press `Select`. The next screen comes up:



STEP 2: Select the apropriate downloading process sequence and press any key on your Surveyor 4.

STEP 3: When you are finished, press any key on your Surveyor 4 as prompted.

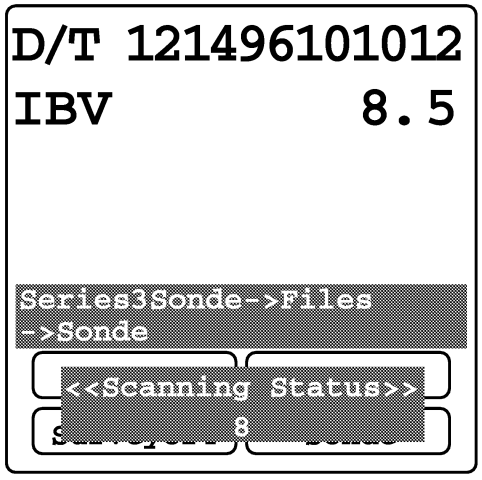
4. The Multiprobe "Files" Submenu

Series3Sonde Series4Sonde SL2

Creating a File

To create a file in your multiprobe, follow the next series of steps.

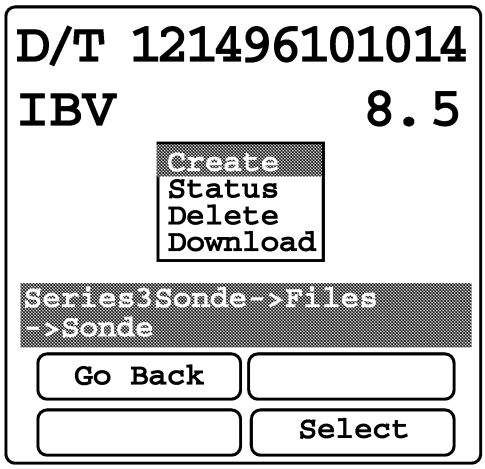
STEP 1: From the Series3Sonde->Files submenu, press Sonde. The next, or similar, screen appears:



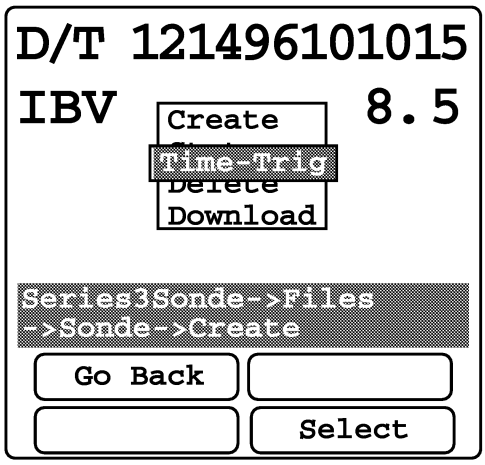
A "scanning" process goes on after you press the Sonde key. On our sample screen, your Surveyor 4 `<<Scanning Status>> 8` represents the progress in reading Series 3 logging information and will count down to "0." The next screen that appears lets you choose between `Create`, `Status`, `Delete`, and `Download`.

NOTE:

- If you have a Series 4 multiprobe connected to your Surveyor 4, there will not be a scanning process. You will be taken to the next screen.



STEP 2: Press `Select` on `Create` and the next screen appears:



STEP 3: You are then prompted to enter a file name, a file starting time date and time, a file stopping date and time, an interval, a warm-up time, an audio (or buzzer) choice (On/Off), a circulator (or stirrer) choice (On/Off), and a choice of the parameters you want recorded. For detailed screens, please refer to section 3 "The Surveyor 4 "Files" submenu" under "Creating a file."

NOTES:

- If you are creating a file with a Series 3 multiprobe in `Series3Sonde` mode , and you selected to save temperature as a parameter, both °C and °F will be included in the file. If you selected SpCond:mS/cm, SpCond:µS/cm, Res, and TDS will be included in the file. If you selected Depth, both Depth:Meters and Depth:Feet will be included in the file. If you selected DO%Sat, both DO:%Sat and BP:mmHg will be included in the file. If you choose to

transfer your file(s) to a PC, you might want to open your file within your PC and "clean up" the parameters and readings you do not want to keep.

STEP 4: Once finished, remember to press the `Done` key to validate your choice. A `File Created!` message appears. Press any key, as instructed, to return to the `Files->Create` window.

NOTE:

- If you get a `Directory is FULL!` message, you will need to delete at least one file. Since you deleted a file, your multiprobe file status has changed and needs to be updated, your Surveyor 4 will scan the files again. Note that every time you change the file structure in your multiprobe, your Surveyor 4 will scan the multiprobe files for an update.

Checking the Status of a File

To check the status of the files in your multiprobe, you can go to the `Files->Sonde` submenu and then press `Select` on `Status`.

`Series3Sonde` interface:

```
<<Sonde Files Status>>
      # Files:        4
    Max Files:        6

  Mem (bytes): ≥108032
Avail (bytes):   55552
       (days):  >120.0

 IBC      (%):  ------
       (days):  ------

 XBC      (%):  ------
       (days):  ------

Estimates only!
        Press any key...
```

`Series4Sonde` interface:

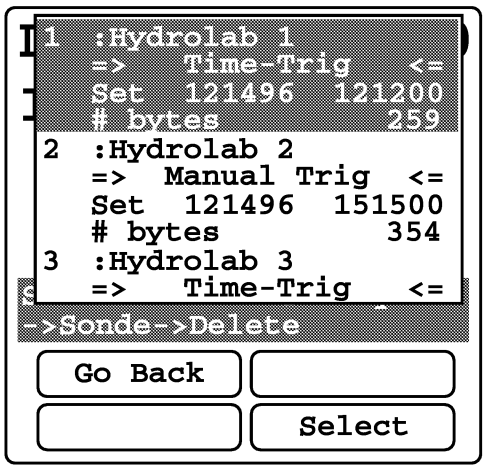
```
<<Sonde Files Status>>
      # Files:        4
    Max Files:        5

  Mem (bytes):  497750
Avail (bytes):  334750
       (days):  >120.0

 IBC      (%):    66.0
       (days):  >120.0

 XBC      (%):     0.0
       (days):     0.0

Estimates only!
        Press any key...
```

For the `Series3Sonde` interface, the file information not displayed (-----) is either not available or cannot be emulated. Press any key to be returned to the `Files` submenu.

Deleting a File

Follow the next series of steps to delete a file from your multiprobe's memory. For detailed screen samples, refer to section 3 "The Surveyor 4 "Files" submenu (with memory)" under "Deleting a file."

STEP 1: From the `Files->Sonde` submenu, move the cursor to Delete and press `Select`. The next or similar screen appears:



STEP 2: Move your cursor to the file you want to delete and press the `Select` key.

STEP 3: You are prompted to validate ("Yes") or cancel ("No") your choice. Make your selection, press `Select`, and then press the `Done the` key.

Should you select "`0`," a *`(File name)`* `has NOT been DELETED!` message will appear. Press any key to return to the `Files` submenu.

Should you select "`1`," a *`(File name)`* `has been DELETED!` message will appear. Press any key to return to the `Files` submenu.

NOTE:

- If you are connected to a Series 3 multiprobe and are in the `Series3Sonde` interface mode, if you decide to delete a file, you will notice a scanning process (the same as in the" Creating a file" section on the previous pages). When you select `Delete`, another scanning process takes place. Your Surveyor 4 scans the files in your multiprobe's memory. Once the information is acquired, you can follow the instructions above to delete your Series 3 multiprobe file(s). The scanning process will be repeated every time you change the file structure, either by deleting or creating files.

Downloading a File from a Multiprobe to a Surveyor 4

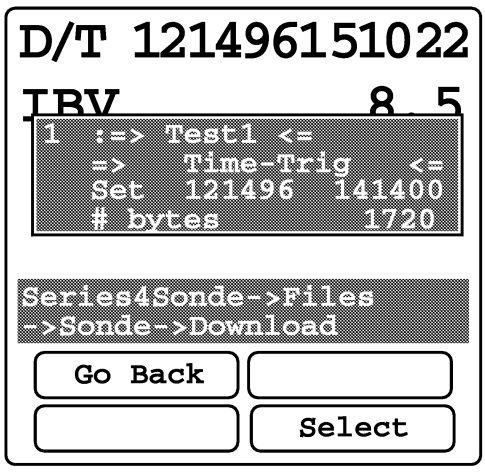
The last option on the `Files->Sonde` submenu allows you to transfer files from a multiprobe with logging to a Surveyor 4.

NOTE:

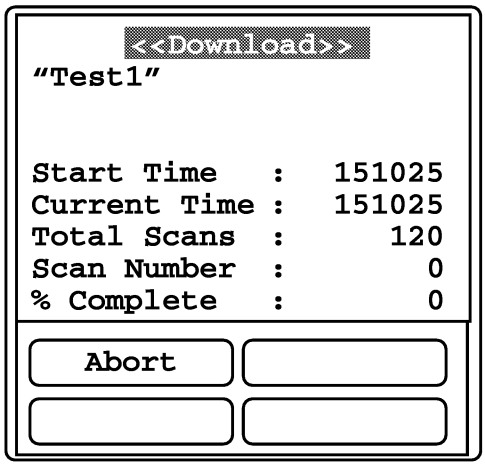
- Before attempting any downloading procedure, you need to make sure that your Surveyor 4 is equipped with memory and not just Clipboard memory, since you need "storage room" in your Surveyor 4 for the files coming from your multiprobe. If your Surveyor 4 is equipped with Clipboard memory, you will not have the option to transfer files from a multiprobe. To upgrade your Surveyor 4, call Hydrolab Sales at 800-949-3766 (in the United States of America and Canada only) or (512) 255-8841.

To download files, follow the next series of steps:

STEP 1: From the `Files->Sonde` submenu, go to `Download` and press `Select` to obtain:



STEP 2: If you have several files, select the one that you want to transfer and then press `Select`. The next, or similar, screen appears:



NOTE:

- In Series3Sonde mode, Total Scans and % Complete will display as "----."
- When choosing the Files menu, your Surveyor 4 will first scan the multiprobe files, e.g.: <<Scanning Status>> 8 . The number "8" - which represents the progress in reading Series 3 logging information and will count down to "0." Then you will see a screen similar to the previous representation.

STEP 3: During the transfer process the last two lines (Scan Number and % Complete) will show the file transfer progress. You can press the Abort key to cancel or interrupt the transfer. The Transfer terminated! Press any key... message will appear, and when you press a key as instructed, you will be returned to the Files menu.

STEP 4: When the transfer is complete, you will get a Transfer Complete! Press any key... message. Press any key and you will be returned to the Files submenu.

STEP 5: To check if the file was transferred to your Surveyor 4 memory, press the Go Back key once, and press the Surveyor4 key. Go to Delete and press Select to see the list of the files that are present in your Surveyor 4 memory. Use the arrow keys to move up and down if you have several files, the transferred file will have => Download File <= on its second line. Do not press Select on the highlighted file unless you want to delete the selected file. You can also go to Review to check if your file was transferred. Status will also let you see the number of files in your instrument. To see detailed numbers about the files, you still need to go to the Surveyor 4 Delete or the Review submenus.

We have now covered your multiprobe's file handling from a Surveyor 4.

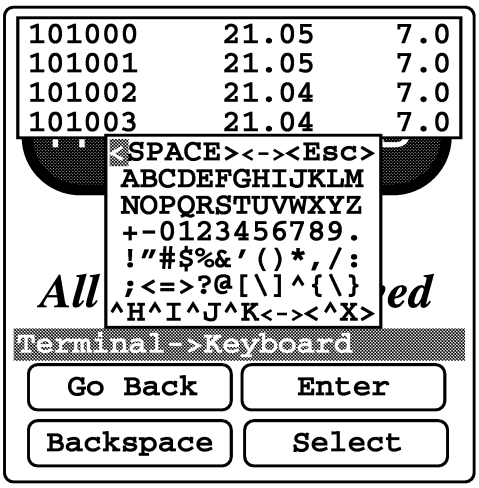
5. The Multiprobe "Terminal->Files" Submenu

After connecting both instruments, we advise you, if you have not done so, to change the interface mode to `3: Terminal` under your the `Setup->SondeI/F:Mode` submenu. Your history line should display `Terminal`, otherwise go back to the `Setup` menu and verify the I/F mode is on `3: Terminal`.

Since your Surveyor 4 will not "autobaud" in `Terminal` mode, we recommend that you match your Surveyor 4 baud rate with your multiprobe baud rate to ensure proper communication. To set your Surveyor 4's baud rate go to `Terminal->Baudrate:Terminal` and select a speed (300, 1200, 2400, 4800, or 9600).

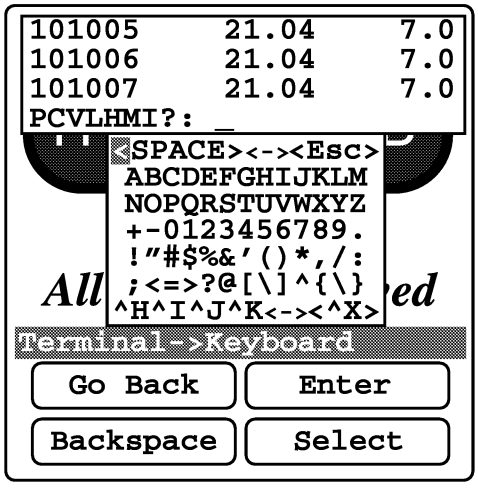
One important feature for file handling in `Terminal` mode is the `Keyboard` key. Please follow the next steps to use this feature.

STEP 1: Once data lines start scrolling on your Surveyor 4 screen, press the `Keyboard` key. The next, or similar, screen appears:



You can use the triangular cursor keys in your Surveyor 4 to move the highlighted "cursor" (placed on "<" on the previous screen) to the character of your choice and press `Select` to validate your entry.

STEP 2: To start interfacing with your multiprobe, you need to move your cursor to `<Space>` and press `Select`. After a few seconds, the next, or similar, line will appear on the top of your screen. In our example, we are connected to a DataSonde 3 with logging memory. The line displayed reads PCVLHMI?: _ (this is known as the "expert" mode in Series 3 terminology).



Refer to the appropriate Series 3 Operating Manual for the keyboard commands used to interface with your multiprobe.

STEP 3: Three more keys are available. Press `GoBack` to return to a previous screen. The `Backspace` and `Enter` keys will perform the same functions as your computer keyboard **Backspace** and **ENTER** keys.

Now that you know how to use your Surveyor 4 "virtual" `Terminal` mode keyboard, we are going to explain file handling with your Series 3 multiprobe in the `Terminal` mode.

NOTE:

- In the `Files` submenu, `Annotate`, `Create`, `Status`, `Review`, `Wipe`, `Delete` and `Capture`, are Surveyor 4 `Files` items. For details on these functions, refer to the appropriate paragraphs in this chapter under section 3 "The Surveyor 4 "Files" submenu (with memory)."

Downloading Data from a Series 3 Multiprobe in Terminal Mode

There are two ways to download data from your Series 3 multiprobe to your Surveyor 4 in `Terminal` mode. The first one downloads log files and follows the `Files->Download` route. The second one records real-time data and uses the capture function.

Downloading Log Files

Once data lines start scrolling on your Surveyor 4 screen, follow the next download steps.

STEP 1: From the top level screen, press the Keyboard key.

STEP 2: On the Surveyor 4 "virtual" keyboard, go to <Space> and press the Select key to get the multiprobe line of commands: PCVLHMI?: (for our instrument, in "Expert" mode).

STEP 3: Go to L for (L)ogging, and press Select.

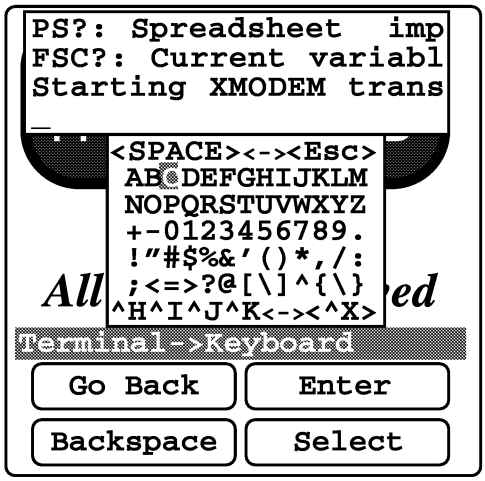
STEP 4: Go to D for (D)ump (i.e. transfer) and press Select.

STEP 5: Answer the question Power down probes during dump NY?: with a Y or an N and press Select.

STEP 6: The log file names saved in your multiprobe appear. Select the log file number you want to transfer, press Select, and press **ENTER**.

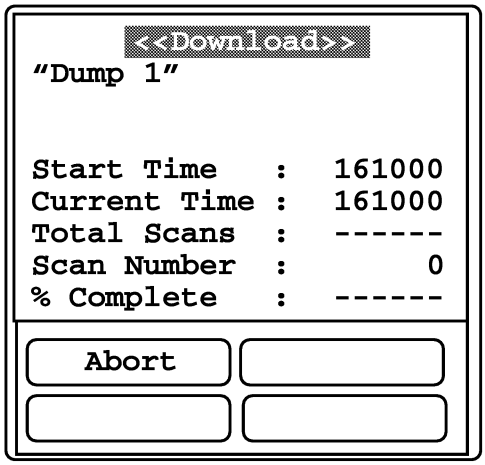
STEP 7: For the next choice (PS: Printer-Ready or Spreadsheet-Importable), go to S for (S)preadsheet-Importable and press Select.

STEP 8: For the FSC (File, Setup, Current variable) choice, refer to your multiprobe Operating Manual, and go to the letter of your choice (C for our example) and press Select. The next message appears: Starting XMODEM transfer.



STEP 9: Press the Go Back key, then press the Files key. Move your cursor to Download and press Select. Name the file you want to transfer ("Dump 1" in our example below). Press the

Done key. The next screen appears:



Note that the Total Scans and the % Complete lines do not have numbers, because the interface with a Series 3 multiprobe does not provide these numbers. You can monitor the transfer progress by keeping an eye on the Current Time and Scan Number lines that will change as the transfer takes place. You can press the Abort key to cancel or interrupt the transfer. The Transfer terminated! Press any key... message will appear, and when you press a key as instructed, you will be returned to the Files menu.

NOTE:

- For Surveyor 4 software V1.10 and lower, the Surveyor 4 appears to lock-up if an XMODEM file download is attempted from Terminal->Files->Download and the attached Series 3 sonde is not transmitting an XMODEM spreadsheet importable file. Under these circumstances, the Abort and power keys are ignored. This situation will only develop if the Surveyor 4 download starts prior to initiating the Series 3 sonde file download. To recover from lock-up, disconnect the underwater cable from either the Series 3 sonde or the Surveyor 4, then press Abort or wait for the transfer to time-out.

STEP 10: When the transfer is complete, you will get a Download completed! Press any key... message. Press any key and you will be returned to the Files submenu. If your Surveyor 4 does not have enough memory for the file, a File is too large for space available! will appear. You need to transfer some file(s) to your PC and delete some file(s) to make room for this new transferred file.

STEP 11: To check if the file was transferred, go to Status and see if the number of files in your instrument has changed. To see detailed numbers about the files, go to the Delete submenu. Your transferred file will display => Download Text <= on its second line. The Review submenu does not allow you to see your downloaded file, since it is in text format (text files cannot be reviewed with your Surveyor 4).

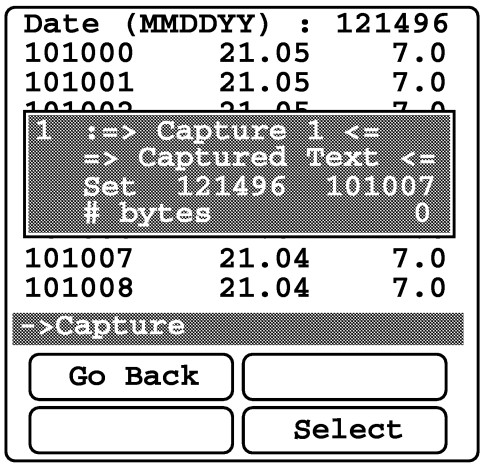
Capturing Real-Time Data

The second way to download data starts from the `Files` submenu screen.

NOTE:

- To create a capture file, refer to "The Capture Feature" under "Creating a File" in section 3 of this chapter.

STEP 1: In `Terminal` mode, security level 1, from the `Files` submenu, move the cursor to `Capture` and press `Select` to obtain the next, or similar, screen:

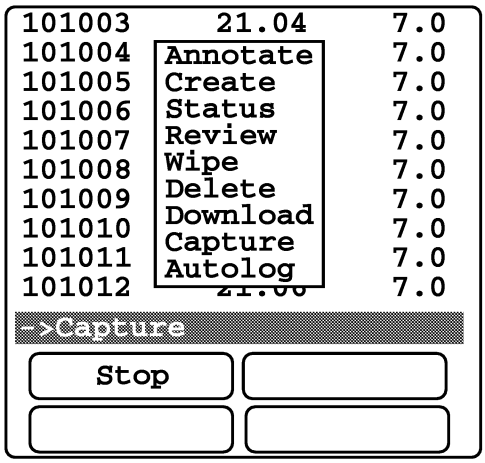


STEP 2: Place or leave the cursor on the capture file you just created - we only have one in our example: "`Capture 1`". Press `Select` to start the capture process.

STEP 3: Now real-time lines of data start scrolling in the background. They are saved, or "captured," to our "`Capture 1`" file.

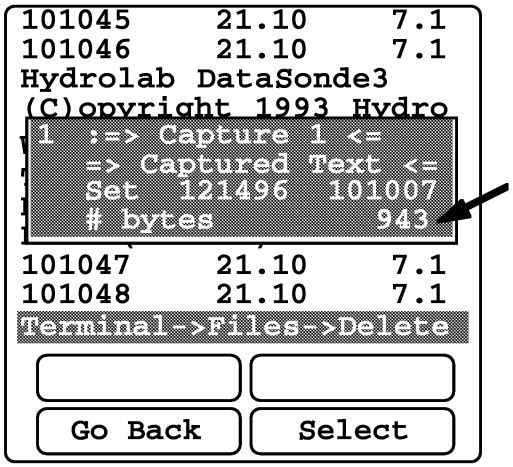
NOTE:

- Data is captured by "lines." Each line starts after a CR/LF (carriage return/line feed) and ends with a CR/LF.



When you decide that you have captured enough data, press the `Stop` key to close the capture file. A message appears on your screen: `Capture stopped! Press any key...`

To check if your file has been successfully saved to your Surveyor 4 memory, press any key, move the cursor to `Delete` and press `Select`. The next screen will appear on your Surveyor 4:



Press the `Go Back` key, to prevent deleting the file you just created.

The AutoLog Feature

To enable or disable the Autolog feature via the `Files` submenu, follow the instructions in section 3 “The Surveyor 4 “File” submenu (with memory)” under “The AutoLog feature.” For

Terminal mode, you will need to select the Files submenu instead of the Surveyor4->Files submenu.

NOTES:

- Should you want to enable or disable your multiprobe's AutoLog file using the Keyboard key, instead of the Files route, go to the Keyboard key and follow the appropriate commands from your Series 3 Operator's Manual for Autolog.

Congratulations, you have successfully mastered file handling with your new Hydrolab Surveyor 4.

TABLE 4: SURVEYOR 4 LOGGING FEATURES

Feature	What it does
Create (Manual)	Creates a file to manually store scans of data.
Create (Time-Trig)	Sets start and stop dates and times for automatic file creation. Prompts you for interval and warm-up times.
Capture	Captures text in ASCII format (for Series 3 multiprobes in Terminal mode).
AutoLog	Works as a back-up logging file, in case you make mistakes with your log files. AutoLog captures - once every hour with a two minute warm-up - a reading of each parameter known to the Surveyor 4.
Status	Gives you general information on the files or scans stored in your Surveyor 4 or multiprobe. It also gives you valuable information about your instrument's memory and its internal and external batteries (if available for your configuration).
Annotate	Allows you to add comments to files that you created.
Review	Allows you to review information in files (parameters/readings) from the beginning of the file or from a specific date and time.
Wipe	Allows you to erase the contents of any manual-triggered files in your Surveyor 4. It only keeps the file name and the parameter settings, and resets the date to the day when you "wiped" the contents of the file.
Transmit	Sends files to a PC in ASCII or XMODEM communications protocol (for a Surveyor 4 with Clipboard and with extended memory). Sends files to a computer, in printer-ready or spreadsheet-importable format (for a Surveyor with extended memory only).
Download	Tranfers your multiprobe files to your Surveyor 4 memory.
Delete	Deletes all or some of the files from a Surveyor 4 or multiprobe memory. You can also check your files status using this feature.

CHAPTER 5: TROUBLESHOOTING

1. Communications

Your Surveyor 4, when connected to a Series 4 multiprobe or a Series 3 multiprobe (in Series3Sonde interface mode) will "autobaud" to match your instrument's baud rate.

However, if your Surveyor 4 is connected to a PC or a Series 3 multiprobe (in Terminal interface mode), your Surveyor 4 baud rate must be set to match your PC baud rate. To change the baud rate, go to Baudrate:Terminal (in Terminal or NoConn mode) or to Baudrate:PC to Baudrate:Terminal (in PC or NoConn mode) and select the matching baudrate.

Symptom:
For Surveyor 4 software V1.10 and lower, the Surveyor 4 appears to lock-up if an XMODEM file download is attempted from Terminal->Files->Download and the attached Series 3 sonde is not transmitting an XMODEM spreadsheet importable file. Under these circumstances, the Abort and power keys are ignored. This situation will only develop if the Surveyor 4 download starts prior to initiating the Series 3 sonde file download.

Possible solution:
To recover from lock-up, disconnect the underwater cable from either the Series 3 sonde or the Surveyor 4, then press Abort or wait for the transfer to time-out.

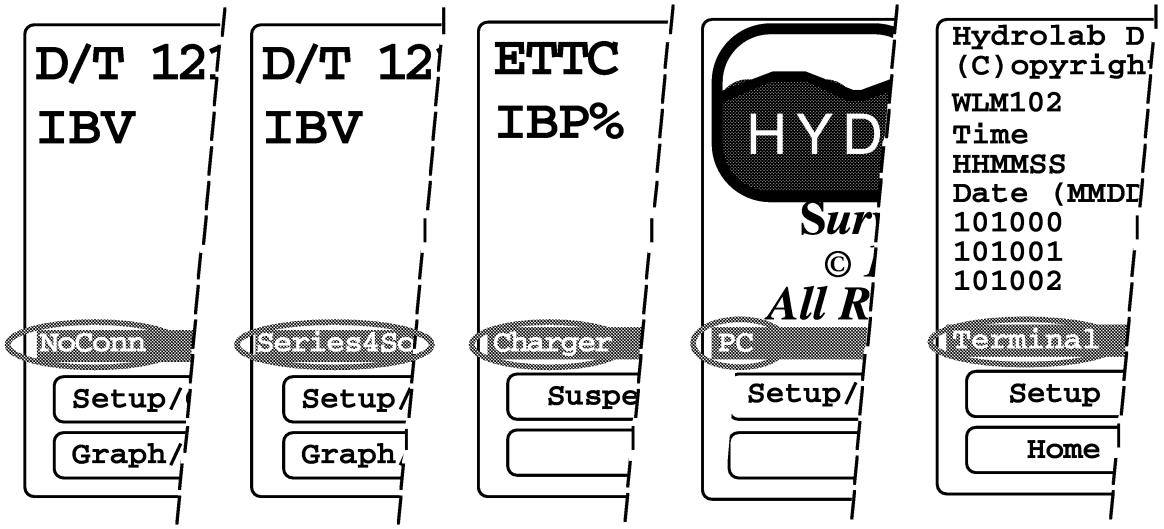
For all Series 4 multiprobes or Series 3 multiprobes (in Series3Sonde interface mode), if you do not see real-time readings from a multiprobe come up on your screen, or if you notice symbols (# signs) instead of readings, after connecting your multiprobe to your Surveyor 4, please check the following items:

Your Surveyor 4 screen for a prompt:

The dark grey line below the real-time parameter lines is the "history line". It shows how your Surveyor 4 is connected. This line can display six basic messages:

- NoConn (if your Surveyor 4 is not connected to any multiprobe, charger, or PC);
- Series4Sonde (if your Surveyor 4 is connected to a multiprobe and configured for Series 4 multiprobes);
- Series3Sonde (if your Surveyor 4 is connected to a multiprobe and configured for Series 3 multiprobes);
- Charger (if your Surveyor 4 is connected to an AC via the Surveyor 4 charger cable to recharge the internal battery);
- PC (if your Surveyor 4 is connected to a personal computer); and
- Terminal (if your Surveyor 4 is connected to a multiprobe and configured for terminal emulation).

Please review the sample screens below.



Depending on the operation you want to perform, you will choose one of the previously shown types of connections. For this example, we chose to select the `Series4Sonde` connection to explain some troubleshooting tips.

If you are using a 100 meter or longer cable, you need to set your terminal baud rate to 9600 to accommodate data transmission over such lengths.

⚠ **WARNING:** **If you are using 100 meter or longer cable and decide to switch to 19200, you may lose communications with your instrument. We advise that you to connect your multiprobe and Surveyor 4 with a shorter cable before switching the baud rate.**

Check your cables and connections.

2. Power Cables and Connections

Verify that your Surveyor 4 and multiprobe are properly connected.

Verify that your Surveyor 4 and multiprobe are properly connected to the wall power outlet or external battery if used. Refer to figure 1 in chapter l, and carefully read all associated warnings in the text.

Symptom:
Your Surveyor 4 won't turn on.

Possible solution:
You need to charge the battery.

Symptom:
Your Surveyor 4 battery "dies" quickly.

Possible solutions:
- You need to check your backlight time out interval. It might be too long. Refer to chapter 2 for details.
- You need to check if your GPS option, if installed, was set to be constantly on. Refer to Appendix 2 for details.
- You need to check your screen shutdown or timeout interval. It might be too long. Refer to Chapter 2 for details.

Verify that the input voltage to the multiprobe is between 6.5 and 15 volts by adding IBV or XBV to your screen. Refer to chapter 1 for directions.

If your Surveyor 4 is drawing its power from its internal battery (IBP), verify the IBV (voltage) reading on your display and also verify that you properly installed the battery. Check the battery's polarity and voltage.

If your multiprobe is equipped with an internal battery (IBP), verify the IBV (voltage) reading and also verify that you properly installed the battery. Check the battery's polarity and voltage.

3. Internal Components

To avoid damage to the internal components when opening the Surveyor 4, make sure that the instrument is clean and dry and that you have disconnected any cable that might still be attached to the Surveyor 4.

Check for the presence of water in the unit. If damp or slightly wet, dry out thoroughly using a hair dryer on low heat, a lint-free cloth, or a towel. Determine where the leak occurred and carry out repairs if possible.

If these checks do not reveal the problem, try to substitute other instruments, cables and terminals to determine the failing component.

For more information, please contact Hydrolab Corporation at 800-949-3766 (in the United States of America and Canada only) or (512) 255-8841.

4. External Components

Symptom:
Your multiprobe's stirrer or circulator does not operate correctly.

Possible solutions:
Your multiprobe's stirrer or circulator needs to be serviced. Refer to the corresponding maintenance chapter in your multiprobe user's or operating manual for details.

5. Additional Troubleshooting

You can find additional troubleshooting reference in the "Maintenance and calibration" chapter of this manual, under "Calibration" where you will find the "Surveyor 4 software symbols" table. You can also refer to the "Quick reference" chapter, under "Surveyor 4 error message directory", for valuable information regarding error messages produced by your instrument and the actions that need to be taken.

6. Quick Reference

CHAPTER 6:
QUICK REFERENCE

1. Introduction

This section of your manual will provide you with important information about detailed Surveyor 4 features and reference. Should you need more extensive reference such as definitions of Hydrolab-specific terms, please refer to your multiprobe user's manual.

We recommend that you detach this reference chapter and place it in a plastic sheet protector. Bring this reference chapter with you when deploying your equipment, collecting or transferring data, or setting up a logging run.

2. Contents

3. Abbreviations

BP	Battery pack; barometric pressure
CC	Calibration cable
˚C	Degrees Celsius (centigrade) (The conversion to obtain the temperature in ˚C: the temperature in (˚F - 32) (5/9); (e.g. 77 ˚F - 32) (5/9) = 25 ˚C)
DS4	DataSonde® 4
Δt	The change in time from the beginning of the charging event to the current time
ΔTCO	The change in temperature from the beginning of an IBP charging event and the current time.
-ΔV	Refers to the negative change of voltage (Vpeak minus current voltage reading)
ETTC	Estimated time to charge (for the IBP)
˚F	Degrees Fahrenheit (The conversion to obtain the temperature in ˚F: 32 + 9/5 of the temperature in ˚C; (e.g. 32 + (9/5 25 ˚C) = 77 ˚F)
GFI	Ground fault interrupt (device).
IBP	Internal battery pack
IBV	Internal battery voltage
IBP%	Internal battery pack percentage (during a charging event)
IC	Interface cable
K	Degrees Kelvin, or kelvin. A unit of absolute temperature.
l or L	Liter
mmHg	Millimeter of mercury (hectoPascal and millibar are also used in Europe)
µm	Micrometer
m℧	Millimho = milliSiemens (mS)
µS/cm	MicroSiemens per centimeter = micromho per cm
m	Meter (1 meter = 3.281 feet; all equivalents in this manual are given based on this conversion and have been rounded off)
MS	MiniSonde®
mS/cm	MilliSiemens per centimeter
mV	Millivolt
PCB	Printed circuit board
ppt	Parts per thousand
psu	Practical salinity unit
psia	Pound per square inch absolute
psig	Pound per square inch gage
RBP	External (rechargeable) battery pack (usu. RBP-6AH (i.e. 6 Ah))
RGA	Returned goods authorization
SDI	Serial-digital interface
CIRCLTR	FreshFlow™ miniature sample circulator, also referred to as circulator
SVR4 / Svr4	Surveyor® 4
VPeak	The maximum voltage at any time during a IBP charging event
WSG	Weighted sensor guard
XBV	External battery voltage
4PF	4-pin female connector
4PM	4-pin male connector
6PF	6-pin female connector
6PM	6-pin male connector
9PF	9-pin female connector
9PM	9-pin male connector

4. Expected Battery Life

Your Surveyor 4 uses two different battery types. These batteries, their corresponding voltage, purpose, equipment they are used in, and their expected life are presented in the chart below. Hydrolab uses Duracell® batteries for its battery tests and estimates, including the following calculations and results. With a different name brand, results may vary.

TABLE 5: EXPECTED BATTERY LIFE

BATTERY TYPE	VOLTAGE	PURPOSE	EXPECTED LIFE	LOCATION
Lithium	3 V	Clock power	2 years	SVR4 PCB
SVR4 IBP	7.2 V	Internal power	(1)	Inside SVR4 back panel

1) *See the next three configuration possibilities for details.*

Here are three typical configurations with a Series 4 multiprobe (at 21˚C) and choose the most suitable one for your instrument. This will help you estimate the expected battery life of your system:

1. The first configuration is composed of a Surveyor 4 and a multiprobe with temperature, D.O., conductivity, and pH sensors and a circulator. The Surveyor 4 display is on continuously and the backlight feature is turned off. The expected battery life for this first configuration is 12 hours of continuous operation.

2. The second configuration consists of a Surveyor 4 and a multiprobe with temperature, D.O., conductivity, and pH sensors and a circulator. The Surveyor 4 display timeout feature (energy saver) is on, allowing only 50% of duty cycle or use. The backlight feature is turned off. The expected battery life for this second configuration is 16 hours of continuous operation.

3. The third configuration is composed of a Surveyor 4 and a multiprobe with temperature, D.O., conductivity, and pH sensors and a circulator. The Surveyor 4 display and the backlight feature are on continuously. The expected battery life for this third configuration is 8 hours of continuous operation.

Here are two typical configurations with a Series 3 multiprobe (at 21˚C) and choose the most suitable one for your instrument. This will help you estimate the expected battery life of your system:

1. The first configuration is composed of a Surveyor 4 (without backlight or GPS) and an H20 (without a stirrer). If the Surveyor 4 display is on continuously, the expected battery life will be 12 hours maximum. If the Surveyor 4 is recording all parameters at hourly intervals (unattended logging mode and two-minute warm-up), the expected battery life will be 14 days maximum.

2. The second configuration is composed of a Surveyor 4 (without backlight or GPS) and a DataSonde 3 (with a stirrer). If the Surveyor 4 display is on continuously, the expected battery life will be 7 hours maximum. If the Surveyor 4 is recording all parameters at hourly intervals (unattended logging mode and two-minute warm-up), the expected battery life will be 8 days maximum.

Surveyor 4 Internal Battery Pack (IBP)

This battery pack is installed in the Surveyor 4. The type of battery used is a nickel metal hydride and the model number for Duracell is DR30 (7.2 volts). The IBP provides operating power for your Surveyor 4.

We recommend recharging your Surveyor 4 when your instrument internal battery voltage (IBV) reaches 6.5 volts. For recharging instructions, refer to chapter 3.

When replacing batteries, make sure that all battery contact areas are free from dirt, oil, or other contaminants. Clean and dry all soiled or wet areas (see chapter 3 under "Surveyor 4 internal battery replacement" for details). You will notice a 10% derating of the IBP if you are operating at 0 ˚C (32 ˚F) and a 20% derating at -20 ˚C (-4 ˚F).

Lithium Battery

This battery has different discharge characteristics from alkaline batteries. Refer to this battery's expected life in table above when determining replacement intervals. For replacement, see chapter 3.

5. Surveyor 4 Error Message Directory

The following table provides you with a quick reference for general error messages that may appear on your Surveyor 4 screen when working with the multiprobe. The menu tree column refers to the general menu where the error message can be found, not to the specific place or places where it is displayed.

TABLE 6: MESSAGE DIRECTORY

Message	Menu tree	Meaning
NoConn	(History line)	Your instrument is not connected to any peripherals. You need to check your Surveyor 4 and peripheral connections.
Graph parameter N/A	Graph/Tab	Appears any time you switch to the graph mode when graph parameters have been removed from the tabular display. You need to add more parameters to your tabular display.
Invalid or incomplete text!	Date & Time (or:) Files	Too few characters entered or invalid entry made. Use backspace key and correct the entry.
No suitable X-Axis Parameter! (or:) No suitable Y-Axis Parameter!	Display:Graph	No tabular display parameter is suitable for this axis. You need to add more parameters to your tabular display.
Directory is FULL! Press any key ...	Files	Your files directory is full. You need to delete one or more files to make room.
Entry is outside of acceptable limits!	Display:Graph (or:) Files	You entered a invalid number or an unacceptable value. You need to go back and enter a correct figure.
No memory installed!	Reset:Files	Your Surveyor 4 is not equipped with any logging memory. You need to call Hydrolab at 800-949-3766 (in the U.S.A. and Canada only) or (512) 255-8841 to order factory-installed memory.
External power is less than 11.4V, Check connections!	(History line) (Charger mode)	Your instrument is connected to an external power source providing insufficient voltage. You need to check your instrument's and peripherals' connections. Use caution!
*Start must be before Stop!	Files	You have entered an incorrect start/stop time/date. Go back and enter correct values.

6. ProComm Plus for DOS Basic Commands

Hydrolab sells and uses Datastorm Technologies, Incorporated's ProComm Plus® communications software. This software provides all features required to communicate with Hydrolab instruments. You will only need a working knowledge of this software to set up communications between your multiprobe and your computer.

When installing ProComm Plus, accept all defaults and let the software update your CONFIG.SYS and AUTOEXEC.BAT files. You should set up for "direct connection". Type **PCPLUS** at the prompt, then press **ENTER**. To enter terminal mode, press any key. Set the terminal to: ANSI terminal emulation, the Surveyor `Baudrate:PC` setting (19200 default), eight bits, no parity, and one stop bit (*the Baudrate*, N, 8, 1). Hardware flow control (RTS/CTS) must be disabled and software flow control (XON/XOFF) must be enabled. To do so with ProComm Plus, press **Alt+S** and select **Terminal options** within this screen. Turn **OFF** the hardware flow control and turn **ON** the software flow control.

After entering terminal mode, connect your multiprobe to the correct communications port of your computer. Note the status line along the bottom of your screen. To display or hide this status line, press ***Ctrl+]***. This line tells you important information about the communications status. To access the on-line help screen, type the following key sequence when in terminal mode, ***Alt+Z.***

The primary commands and setup information for configuring ProComm Plus to communicate with your multiprobe are listed in a table format on the next page.

Although there are many other ProComm Plus commands, setup, and features, the ones listed in the next table should be sufficient to communicate with or recover information from your Surveyor 4.

TABLE 7: PROCOMM PLUS COMMANDS

PRESS OR COMBINE:	TO:
ALT+X	Exit ProComm Plus® .
ALT+Z	Bring up the on-line help screen. Take your time to review the features offered by ProComm Plus.
ALT+P	Bring up the line/port setup menu. To select any parameter press the key(s) located to the left of the parameter. Note **CURRENT SETTINGS** change as you select the various parameters. To save these settings press **ALT+S**.
ALT+S	Bring up the setup menus used to configure ProComm Plus to suit your environment. This feature allows you to select the terminal type and setup default directories for capture files and downloaded files.
ALT+L	Turn the printer on.
ALT+F1	Enable the capture file to store print-ready transfers (or "dumps") from the Surveyor 4, or to log the data being currently received to a disk file. If you only enter a file name when asked for "filename," the data received will be saved under that file name in the current DOS directory (probably the PCPLUS directory). If you just press **ENTER** and accept the default file name, the data will go into the file name specified in the setup (see "**ALT+S**"). If you already have data in the default file, the new data will be added to the existing data.
Page Down or Pg Dn	Open the download file when transferring data from the Surveyor 4 in a spreadsheet format. You must enter a file name or the complete path including the file name. If you only enter the file name, the data will be saved in the default directory identified in your setup under the file name you specified.
ALT+F4	Toggle between the DOS prompt and ProComm Plus without restarting. To return to terminal mode, just type in **Exit** then press **ENTER**. This feature is helpful to check which directory you are in, and to verify if the data was transferred into the specified file. To view the file, just use the DOS command "**TYPE**" followed by the directory path and filename. Ex: **TYPE c:\pcplus\data\filename**.
ALT+V	View a file. This feature can be used to view the results of a recent file transfer. This command can be used instead of the **ALT+F4 "TYPE"** command above.

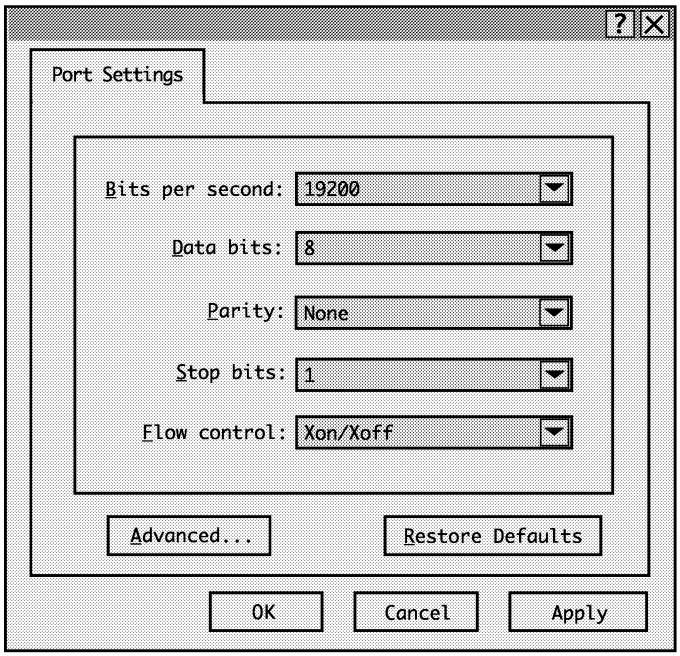
* For a more complete list of ProComm Plus commands, refer to your ProComm Plus User's Manual.

7. HyperTerminal Basic Commands

If you are using Windows 95, you may prefer to use HyperTerminal instead of the communications software you can purchase from Hydrolab. HyperTerminal also communicates with Hydrolab instruments. You only need a working knowledge of this software to set up communications between your Surveyor 4 and your computer.

After launching Windows 95, go to **Start**, **Programs**, **Accessories**, **HyperTerminal**, and click on this last choice. In HyperTerminal, you can create an icon that will preserve your settings for future use. Let's double click on the **Hypertrm** or **Hypertrm.exe** icon and enter a new icon name under **Name** and click **OK**. Then, in the next window, go to **Connect using** and select your **Direct to COM** port (select the COM port you are using) and click **OK**.

Your next window should look like this:



Click **OK** and connect your instrument to your computer. If your are using HyperTerminal default font, you might see the °C and other special characters represented with another symbol (øC). To correct this, go to **View**, **Fonts...**, and select **MS Line Draw**. Your screen should refresh and show lines and all special characters.

Although there are many other HyperTerminal commands, setup, and features, the ones listed above and in the next table should be sufficient to communicate with or recover information from your Surveyor 4.

TABLE 8: HYPERTERMINAL COMMANDS

FOLLOW THE PATH*:	TO:
Help: Help Topics: Index: HyperTerminal	Bring up the on-line help utility.
File: Properties: Phone number: Configure: Maximum speed	Access and select your modem's transfer speed (e.g. 19200 bps).
File: Properties: Phone number: Configure: Connection	Access and select the connection settings (e.g. N, 8, 1).
Transfer: Capture Text	Enable a capture file, to log the data currently received to a disk or to a hard drive. You will be prompted for a file name and a path.
File: Capture to printer	Turn the printer on.
Transfer: Send File	Upload a file and choose the transfer protocol (e.g. Xmodem). You will be prompted for a file name and a path.
Transfer: Receive File	Download a file and choose the transfer protocol (e.g. Xmodem). You will be prompted for a file name and a path.
File: Open	To view a file or find a file you created and saved in your HyperTerminal folder.

* When you are in "HyperTerminal" mode.

NOTE:

- HyperTerminal should be configured so that the functions, arrows, and **Ctrl** keys act as terminal keys, not window keys. Also, be sure to select the ANSI terminal emulation. These setup options are located under the **File: Properties: Settings**.

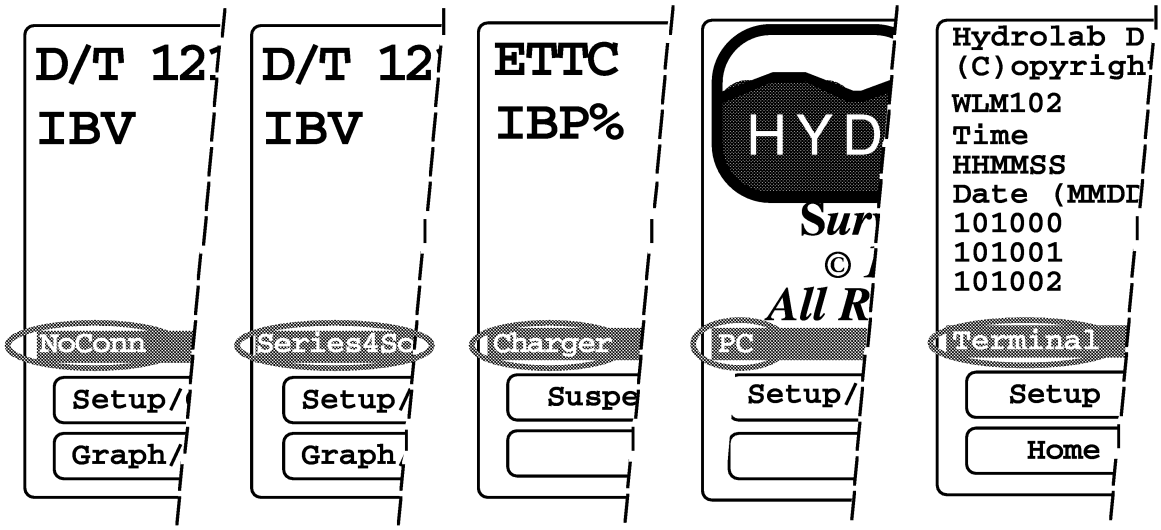
8. Surveyor 4 Menu and Submenu Tree Structure

The next few pages contain the different menu trees that represent the menus and submenus you will find in your Surveyor 4. The way we have chosen to organize this section is mainly based on the type of connection configuration you have selected for your instruments.

As a reminder, there are currently six types of connections:

- `NoConn` (if your Surveyor 4 is not connected to any multiprobe, charger, or PC);
- `Series4Sonde` (if your Surveyor 4 is connected to a multiprobe and configured for Series 4 multiprobes);
- `Series3Sonde` (if your Surveyor 4 is connected to a multiprobe and configured for Series 3 multiprobes);
- `Charger` (if your Surveyor 4 is connected to an AC via the Surveyor 4 charger cable to recharge the internal battery);
- `PC` (if your Surveyor 4 is connected to a personal computer); and
- `Terminal` (if your Surveyor 4 is connected to a multiprobe and configured for terminal emulation).

Please review the sample screens below.



The menu trees on the next pages will reflect these connection configurations (e.g. the "NoConn" menu tree, or the "PC" menu tree).

We have also designed these menu trees to apply to a Surveyor 4 with extended memory. Should your unit be equipped with a Clipboard memory, we have provided footnotes that will explain the differences between your unit and the menu tree for a Surveyor 4 with extended memory.

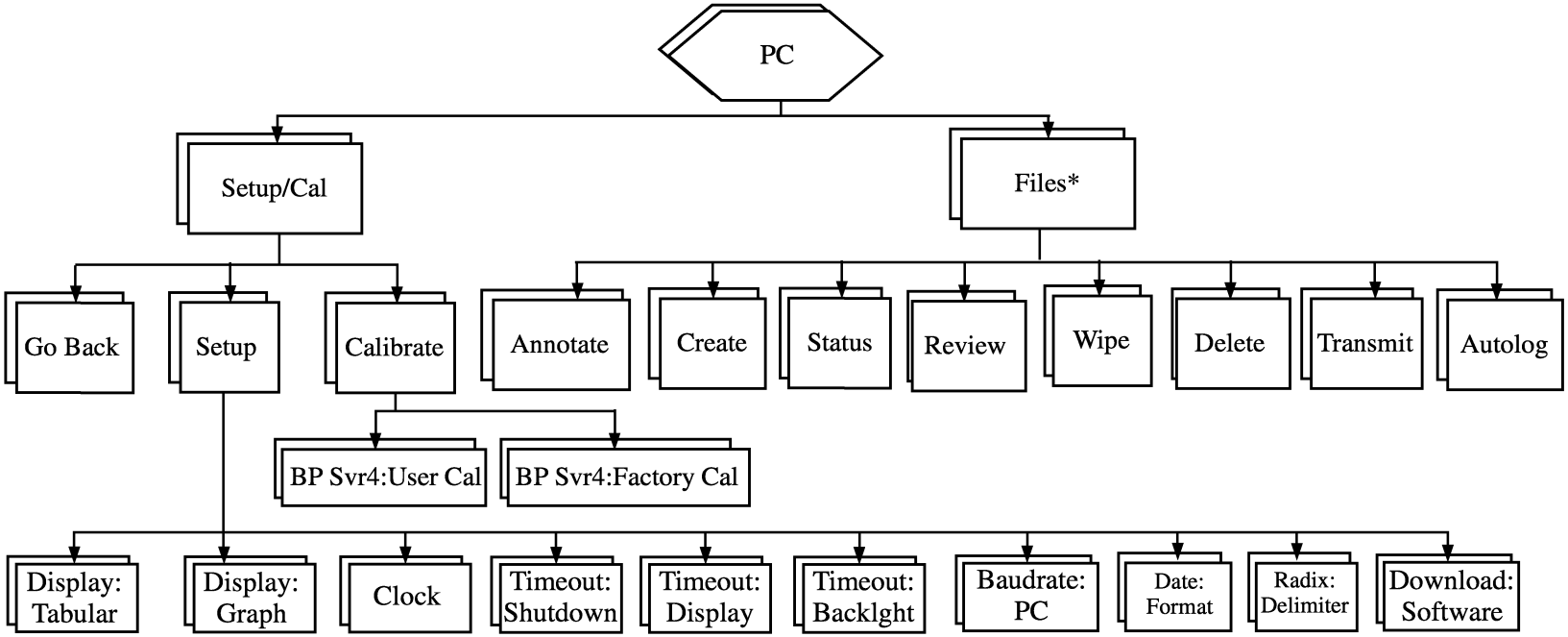
Due to the flexibility of multiprobe sensor configurations, we have decided not to show an extensive list of parameters (e.g. for calibration), but instead we have provided you with a clear description of what you will find when you reach a new menu or submenu level.

Menu Trees

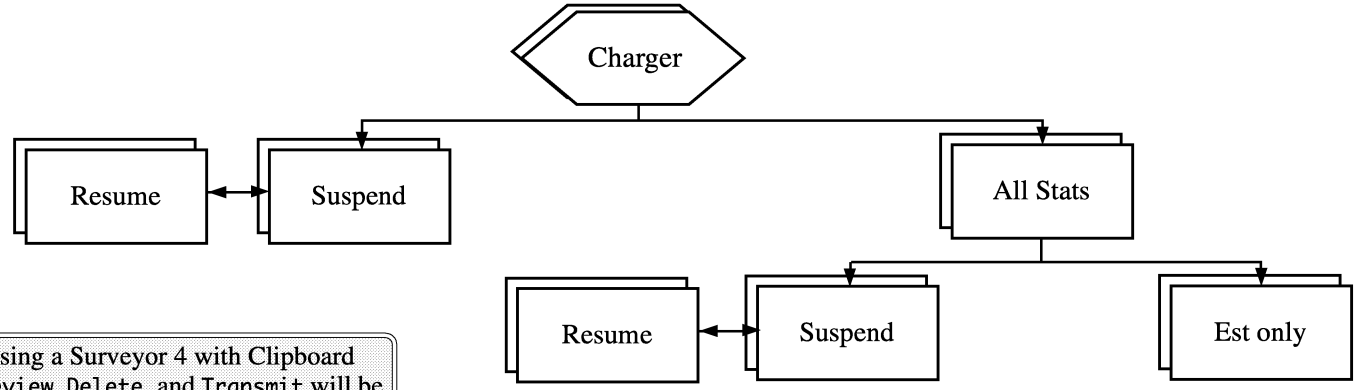
The "NoConn" Menu Tree

* If you are using a Surveyor 4 with Clipboard memory, `Review` and `Delete` will be the only items present for the `Files` submenu.

The "PC" Menu Tree



The "Charger" Menu Tree

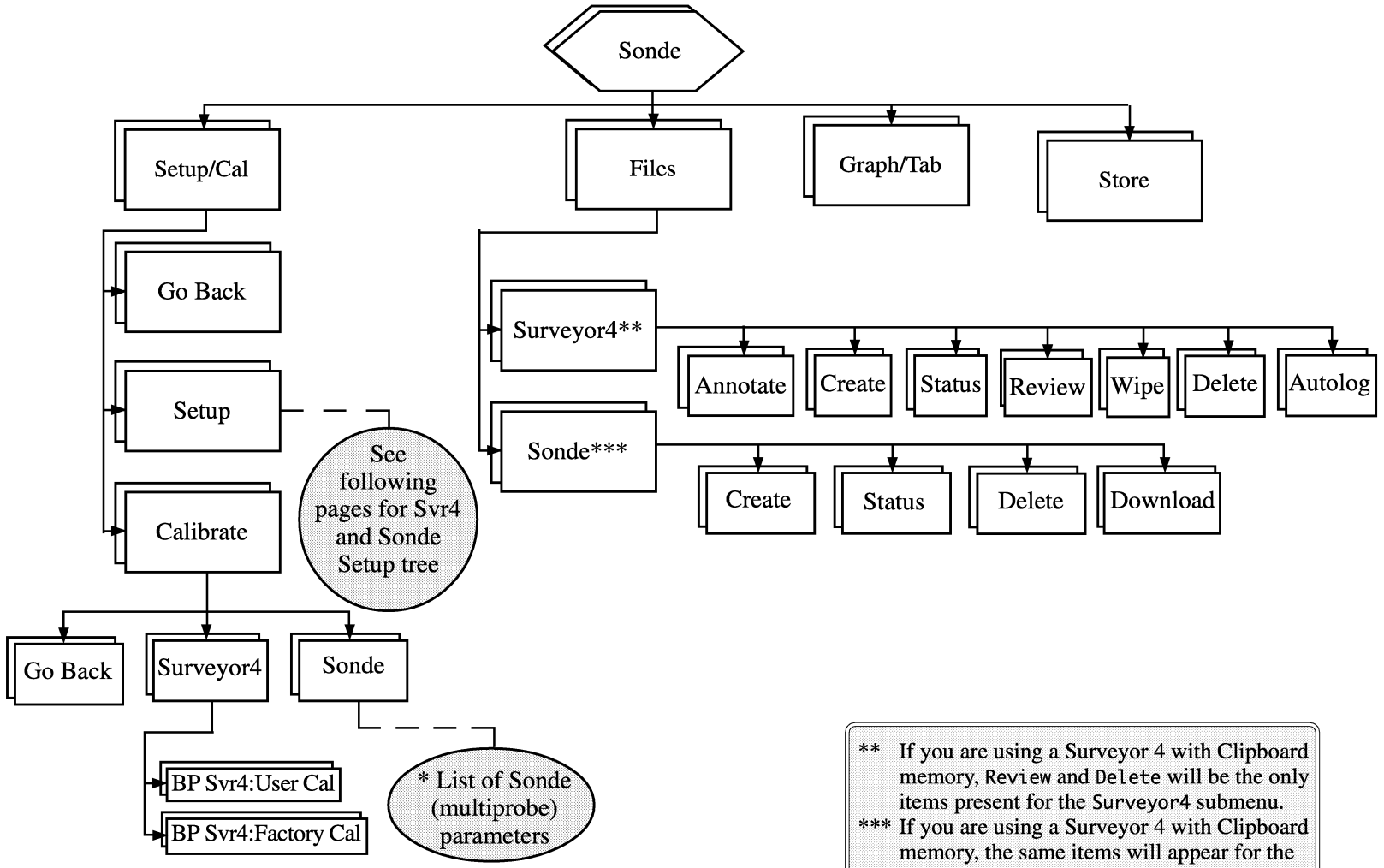


* If you are using a Surveyor 4 with Clipboard memory, `Review`, `Delete`, and `Transmit` will be the only items present for the `Files` submenu.

The "Terminal" Menu Tree

* If you are using a Surveyor 4 with Clipboard memory, the `Files` submenu will have no items available.

The "Series3Sonde" and "Series4Sonde" Menu Tree



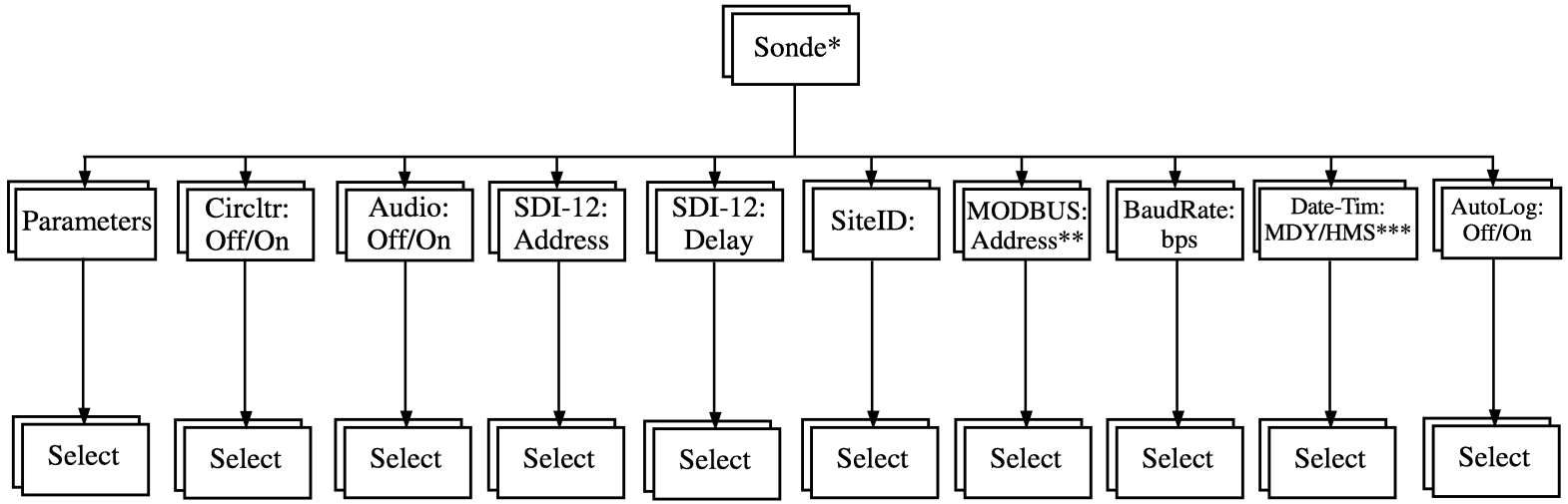
* The parameters' order and number may vary depending on your multiprobe configuration.

** If you are using a Surveyor 4 with Clipboard memory, `Review` and `Delete` will be the only items present for the `Surveyor4` submenu.

*** If you are using a Surveyor 4 with Clipboard memory, the same items will appear for the `Files` submenu. These items are all available if your multiprobe is equipped with logging memory.

The "Surveyor 4" Setup Menu Tree (continuation from "Series3Sonde" and "Series4Sonde" menu tree)

The "Sonde" Setup Menu Tree (continuation from the previous page)



* For DataSonde 4 and MiniSonde versions 1.20 to 1.32 only. Other versions may differ. The menu varies with the multiprobe configuration.
** Not available for `Series3Sonde` interface mode.
*** `D/T:MDY/HMS` for `Series3Sonde` interface mode.

Appendices

A1. Service and Warranty Forms

APPENDIX 1:
SERVICE AND WARRANTY FORMS

This first appendix contains all the necessary forms to return your instruments for service or repairs. Make sure you follow the directions on these forms and fill out all the requested information.

You will also find a limited 2-year warranty form detailing the coverage period, related information, and service and shipping instructions. An extended warranty is now available from Hydrolab Sales Department, please call our toll-free lines at 800-949-3766 (in the United States of America and Canada only) or you can also dial (512) 255-8841.

For your convenience, we have provided some self-adhesive shipping labels placed at the end of this manual in the inside back pocket.

SERVICE, REPAIR, AND RETURN FORM

LOOK When calling, please have the following information readily available to speed up your request:

1. **Instrument type (e.g. Datasonde 4):** _____

2. **Model and serial number:** *(on the tag found on your instrument)*

   ␣␣␣␣␣␣␣
   (5 or 6 Numbers)

3. **Parameters' settings (in the Main Menu, under `Setup` and `Display` for the multiprobes, and under `Tabular:Display` for the Surveyor 4):**
   _____
   _____
   _____
   _____

4. **Deployment and site information:** _____
   _____
   _____
   _____

LOOK When returning your instrument for service, proceed according to the following steps:

STEP 1: Call Hydrolab's Technical Support to obtain a returned good's authorization (RGA) number. Dial 800-949-3766 (in the United States of America and Canada only) or (512) 255-8841.

STEP 2: Complete a service memorandum.

STEP 3: Properly pack and protect all connectors with protective plugs and the sensors with the storage cup (fill the cup with 1 inch of water *maximum*).

STEP 4: Carefully package your instrument for shipping.

STEP 5: Legibly write the RGA number on the outside of the shipping box.

LOOK When calling to inquire about the status of a repair or return, please provide the RGA number.

SERVICE, REPAIR, AND RETURN FORM

☞ LOOK — When calling, please have the following information readily available to speed up your request:

1. **Instrument type (e.g. Datasonde 4):** _____

2. **Model and serial number:** *(on the tag found on your instrument)*

   ␣␣␣␣␣␣
   (5 or 6 Numbers)

3. **Parameters' settings (in the Main Menu, under `Setup` and `Display` for the multiprobes, and under `Tabular:Display` for the Surveyor 4):**

   _____
   _____
   _____
   _____

4. **Deployment and site information:** _____

   _____
   _____
   _____

☞ LOOK — When returning your instrument for service, proceed according to the following steps:

STEP 1: Call Hydrolab's Technical Support to obtain a returned good's authorization (RGA) number. Dial 800-949-3766 (in the United States of America and Canada only) or (512) 255-8841.

STEP 2: Complete a service memorandum.

STEP 3: Properly pack and protect all connectors with protective plugs and the sensors with the storage cup (fill the cup with 1 inch of water *maximum*).

STEP 4: Carefully package your instrument for shipping.

STEP 5: Legibly write the RGA number on the outside of the shipping box.

☞ LOOK — When calling to inquire about the status of a repair or return, please provide the RGA number.

R.G.A. No. _____

Date Shipped to Hydrolab _____

SERVICE MEMORANDUM

The following information is requested in order to process your order for warranty or non-warranty service. Please include this form, fully completed, with your return shipment.

Customer Contact Name _____

Customer Phone Number _____ Ext. _____

Customer FAX Number _____

Customer E-Mail Number _____

I can be reached by phone during these hours : _____

Address for return shipment of repaired equipment.

City _____

State _____

Zip _____

Address for billing (or purchase authority) for repair charges not covered by warranty.

_____

_____

City _____

State _____

Zip _____

In the event that your equipment is NOT under a Hydrolab warranty, please fill in this information:

Method of payment: ❑ VISA/MC ❑ P.O. No. _____

❑ Other _____

❑ If charges are less than $_____ , proceed with work; otherwise please call me first.

SHIPPING INSTRUCTIONS – Please refer to the instructions given under the SERVICE and LIMITED 2-YEAR WARRANTY form (found after this SERVICE MEMORANDUM) before packaging your instrument for shipment to Hydrolab.

Address each carton to:

HYDROLAB CORPORATION
SERVICE DEPARTMENT
12921 BURNET ROAD
AUSTIN, TX 78727 U.S.A.

Note:
Please install protective plugs and fill storage cups with 1 inch of water *maximum*.

Clearly mark each box with: **R.G.A. No. _____**
Carton # _____ of _____

IMPORTANT: Please include RGA# on your purchase order.
Describe equipment symptoms on the reverse side of this memorandum.

HYDROLAB CORPORATION
12921 Burnet Rd. Austin, TX 78727 U.S.A.
Phone (512) 255-8841 or 800-949-3766 • FAX (512) 255-3106

INVENTORY OF EQUIPMENT BEING RETURNED

Instrument Type and Description	Serial No.

Description of Symptom(s) or Explanation
(Thorough descriptions can increase the speed of the repair.)
Please include how the instrument was being used (application) when symptom occurred.

SERVICE and LIMITED 2-YEAR WARRANTY

LIMITED 2-YEAR WARRANTY

THIS WARRANTY IS EXPRESSLY MADE BY HYDROLAB CORPORATION AND ACCEPTED BY PURCHASER IN LIEU OF ALL OTHER WARRANTIES. HYDROLAB EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, WHETHER WRITTEN OR ORAL, EXPRESS OR IMPLIED, OR STATUTORY. HYDROLAB DOES NOT ASSUME ANY OTHER LIABILITIES IN CONNECTION WITH ANY PRODUCT.

What Is Covered

This warranty statement applies specifically to the:

Series 4 DataSonde®4 Water Quality Multiprobe,
Series 4 MiniSonde® Water Quality Multiprobe, and
Series 4 Surveyor®4 Data Display;

and all Hydrolab instruments introduced to market after January 1, 1991, unless specifically excluded in the warranty statement. This warranty specifically excludes batteries of any type. This warranty supersedes any and all warranties, for the above products, of an earlier date.

What Is Not Covered

In addition to batteries, this warranty does not apply to products or parts thereof which may be used or connected to Hydrolab equipment but which are not manufactured by Hydrolab. Our obligation to repair or replace dissolved oxygen sensors, ion-specific electrodes, or batteries of any type does not apply to those that have been consumed through normal use. This warranty also excludes items such as reference electrode junctions and total dissolved gas sensor membranes that may degrade during normal use.

This warranty does not apply to products or parts thereof which have been altered or repaired outside of a Hydrolab factory or other authorized service center, or products damaged by improper installation or application, or subjected to misuse, abuse, neglect or accident.

What We Will Do

All new Hydrolab products listed above are warranted by Hydrolab against defects in materials and workmanship for two years (or for the term of an optional extended warranty) from date of invoice. During the warranty period, we will repair or, at our option, replace at no charge a product that proves to be defective provided that you return the product, shipping prepaid, to Hydrolab. Hydrolab's liability and obligations in connection with any defects in materials and workmanship are expressly limited to repair or replacement, and your sole and exclusive remedy in the event of such defects shall be repair or replacement.

Hydrolab's obligations under this warranty are conditional upon it receiving prompt written notice of claimed defects within the warranty period and its obligations are expressly limited to repair or replacement as stated above.

What We Will Not Do

Hydrolab shall not be liable for any contingent, incidental, or consequential damage or expense incurred by you due to partial or complete inoperability of its products for any reason whatsoever or due to any inaccurate information generated by its products. Hydrolab's obligations and your remedies are limited as described above.

Products are sold on the basis of specifications applicable at the time of sale. Hydrolab Corporation shall have no obligation to modify or update products once sold.

Warranty Information

If you have any questions concerning this warranty, or want to purchase an extended warranty, please call 800-949-3766 (valid in the U.S.A. and Canada only) or 512-255-8841.

SERVICE and SHIPPING

Service

You may have your instrument repaired at Hydrolab any time it needs service, whether it is in warranty or not. There is a charge for repairs after the warranty period.

Hydrolab instruments are normally repaired and shipped (transportation paid, via UPS) within 10 working days of receipt at Hydrolab.

How to Obtain Repair Service

1) Contact Hydrolab by telephone, fax, letter, or e-mail.

   Hydrolab Corporation
   12921 Burnet Road, Austin, TX, 78727, USA
   Telephone: 800-949-3766* or 512-255-8841
   Fax: (512) 255-3106
   e-mail: engineer@hydrolab.com

2) Should you be advised by Hydrolab to return an item, a returned goods authorization number (**RGA No.**) will be issued. The RGA No. must be shown on the Service Memorandum, the address label of each shipping carton, and any correspondence related to the equipment returned for repair.

3) Please carefully pack your equipment in its original shipping case (or other protective package) to avoid in-transit damage. Such damage is not covered by warranty, so we suggest that you insure the shipment. We also recommend that the entire instrument, including the battery pack and charger (when applicable), be returned unless a particular faulty component has been clearly isolated.

4) Send the instrument and a completed Service Memorandum to Hydrolab, using the address shown on the Service Memorandum. For your convenience, several copies of the Service Memorandum are included in your User's Manual.

Whether or not the unit is under warranty, it is your responsibility to pay shipping charges for delivery to Hydrolab.

* ***This number is valid in the United States of America and Canada only.***

All Hydrolab instruments are manufactured in Austin, Texas, U.S.A.
AN EXTENDED WARRANTY IS NOW AVAILABLE, PLEASE CALL HYDROLAB SALES FOR DETAILS.

Call for more assistance: 800-949-3766*

HYDROLAB CORPORATION
12921 Burnet Road / Austin, Texas / 78727
800-949-3766* or 512-255-8841 / FAX 512-255-3106

HYDROLAB®

R.G.A. No. _____

Date Shipped to Hydrolab _____

SERVICE MEMORANDUM

The following information is requested in order to process your order for warranty or non-warranty service. Please include this form, fully completed, with your return shipment.

Customer Contact Name _____

Customer Phone Number _____ Ext. _____

Customer FAX Number _____

Customer E-Mail Number _____

I can be reached by phone during these hours : _____

Address for return shipment of repaired equipment.

City _____

State _____

Zip _____

Address for billing (or purchase authority) for repair charges not covered by warranty.

_____

_____

City _____

State _____

Zip _____

In the event that your equipment is NOT under a Hydrolab warranty, please fill in this information:

Method of payment: ❑ VISA/MC ❑ P.O. No. _____

❑ Other _____

❑ If charges are less than $_____ , proceed with work; otherwise please call me first.

SHIPPING INSTRUCTIONS – Please refer to the instructions given under the SERVICE and LIMITED 2-YEAR WARRANTY form (found after this SERVICE MEMORANDUM) before packaging your instrument for shipment to Hydrolab.

Address each carton to:

HYDROLAB CORPORATION
SERVICE DEPARTMENT
12921 BURNET ROAD
AUSTIN, TX 78727 U.S.A.

Note:
Please install protective plugs and fill storage cups with 1 inch of water *maximum.*

Clearly mark each box with: **R.G.A. No. _____**
Carton # _____ of _____

IMPORTANT: Please include RGA# on your purchase order.
Describe equipment symptoms on the reverse side of this memorandum.

HYDROLAB CORPORATION
12921 Burnet Rd. Austin, TX 78727 U.S.A.
Phone (512) 255-8841 or 800-949-3766 • FAX (512) 255-3106

INVENTORY OF EQUIPMENT BEING RETURNED

Instrument Type and Description	Serial No.

Description of Symptom(s) or Explanation
(Thorough descriptions can increase the speed of the repair.)

Please include how the instrument was being used (application) when symptom occurred.

R.G.A. No. _____

Date Shipped to Hydrolab _____

SERVICE MEMORANDUM

The following information is requested in order to process your order for warranty or non-warranty service. Please include this form, fully completed, with your return shipment.

Customer Contact Name _____

Customer Phone Number _____ Ext. _____

Customer FAX Number _____

Customer E-Mail Number _____

I can be reached by phone during these hours : _____

Address for return shipment of repaired equipment.

City _____

State _____

Zip _____

Address for billing (or purchase authority) for repair charges not covered by warranty.

_____

_____

City _____

State _____

Zip _____

In the event that your equipment is NOT under a Hydrolab warranty, please fill in this information:

Method of payment: ❑ VISA/MC ❑ P.O. No. _____

❑ Other _____

❑ If charges are less than $_____ , proceed with work; otherwise please call me first.

SHIPPING INSTRUCTIONS – Please refer to the instructions given under the SERVICE and LIMITED 2-YEAR WARRANTY form (found after this SERVICE MEMORANDUM) before packaging your instrument for shipment to Hydrolab.

Address each carton to:

HYDROLAB CORPORATION
SERVICE DEPARTMENT
12921 BURNET ROAD
AUSTIN, TX 78727 U.S.A.

Note:
Please install protective plugs and fill storage cups with 1 inch of water *maximum.*

Clearly mark each box with: **R.G.A. No. _____**
Carton # _____ of _____

IMPORTANT: Please include RGA# on your purchase order.
Describe equipment symptoms on the reverse side of this memorandum.

HYDROLAB CORPORATION
12921 Burnet Rd. Austin, TX 78727 U.S.A.
Phone (512) 255-8841 or 800-949-3766 • FAX (512) 255-3106

INVENTORY OF EQUIPMENT BEING RETURNED

Instrument Type and Description	Serial No.

Description of Symptom(s) or Explanation
(Thorough descriptions can increase the speed of the repair.)

Please include how the instrument was being used (application) when symptom occurred.

APPENDIX 2: GPS CARD

1. Introduction

The Global Positioning System (GPS) enhances your Surveyor 4's functions by adding accurate positioning anywhere you go. The Trimble GPS circuit board and software are incorporated into your Surveyor 4 Data Display. If installed, the interface allows you to receive latitude, longitude, altitude, and speed readings based on the Department of Defense (DoD) satellite-based positioning and navigation system.

The uses of GPS for water monitoring include water quality measurement tagging, accurate sampling at the exact same site, precise site location, navigation, and many more. GPS readings can also be logged by the Surveyor 4 giving real-time readings for more accurate and reliable positioning.

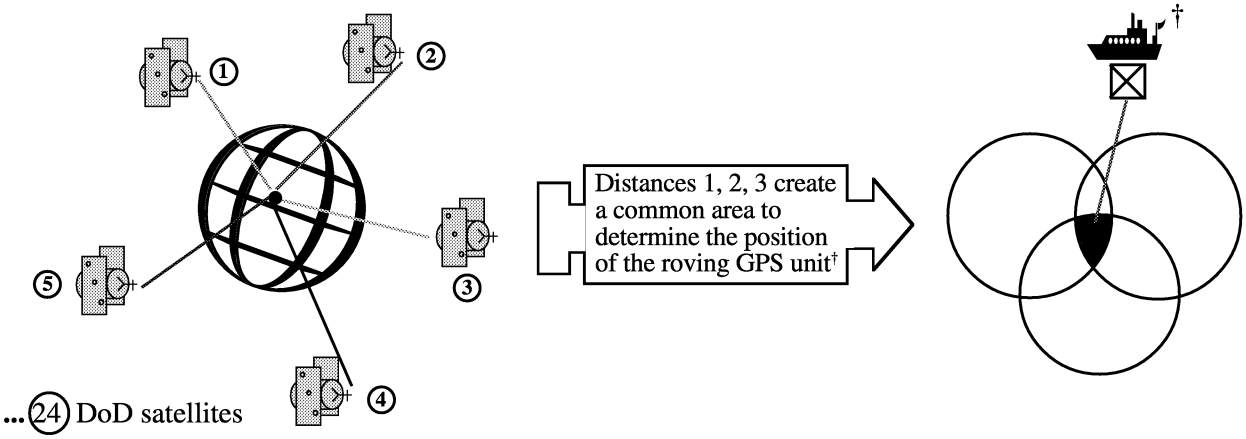


TABLE A2-1: GPS SPECIFICATIONS

Acquisition (typical) cold start	Acquisition (typical) warm start	Acquisition (typical) hot start	Reacquisition	Accuracy (position)	Accuracy (velocity)	Accuracy (time)
2 to 5 min	50 sec	30 sec	< 2 sec	GPS: 25 m SEP* without SA** DGPS: 2 to 5 m (2 sigma)	GPS: 0.1 m/sec without SA DGPS: 0.1 m/sec	GPS: 1 µsec (nominal) DGPS: 1 µsec (nominal)

* SEP: Spherical Error Probability.

** SA: Selective Ability (intentional errors inserted by the DoD to protect its military satellites).

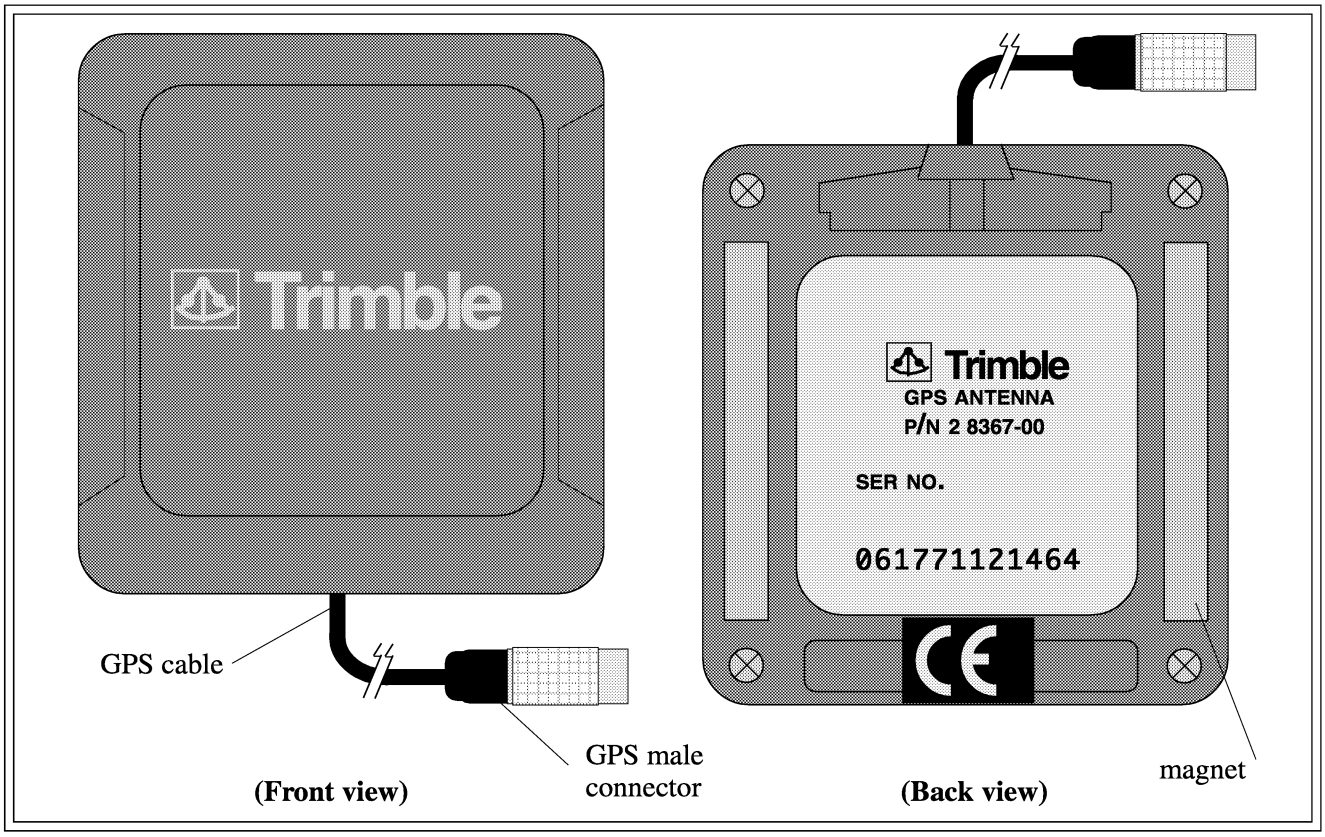


FIG. A2-1: GPS ANTENNA DESCRIPTION (FRONT AND BACK VIEWS)

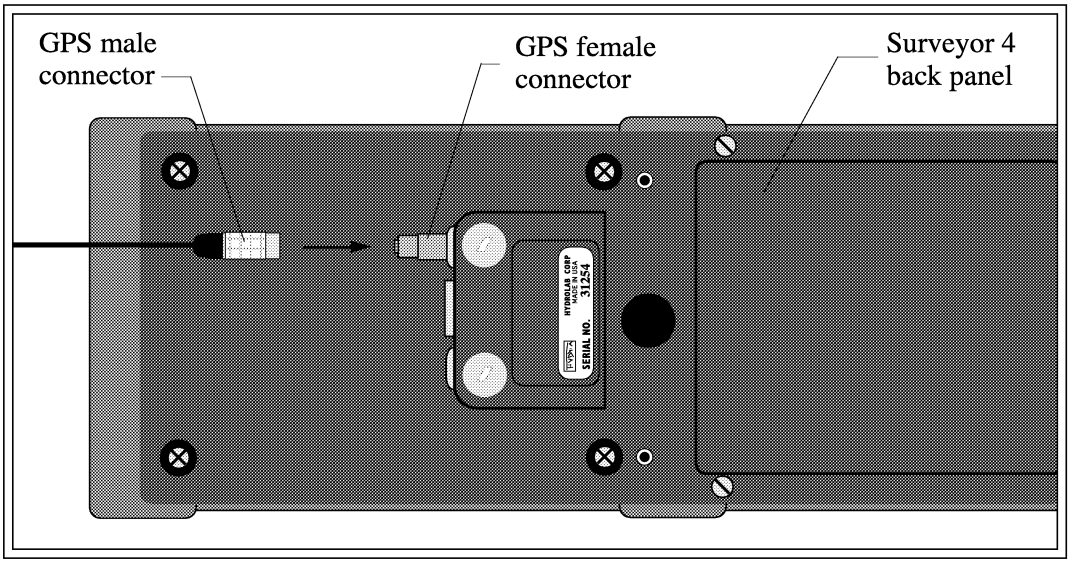


FIG. A2-2: GPS ANTENNA CONNECTION

2. Peripheral Connections

Your Surveyor 4 GPS requires an antenna to be functional. A small magnet-mounted antenna is available from Hydrolab. You can also purchase a GPS antenna - with compatible connectors, such as an M/A-COM, Inc. connector series SMB (e.g. part number B65 A61 G022 X99) - from other GPS suppliers.

For installation instructions, see the figures on the opposite page.

⚠ **WARNING: Avoid pulling the GPS antenna cable when removing the antenna, if you placed the antenna on a metallic surface and the magnets are preventing you from removing the antenna easily.**

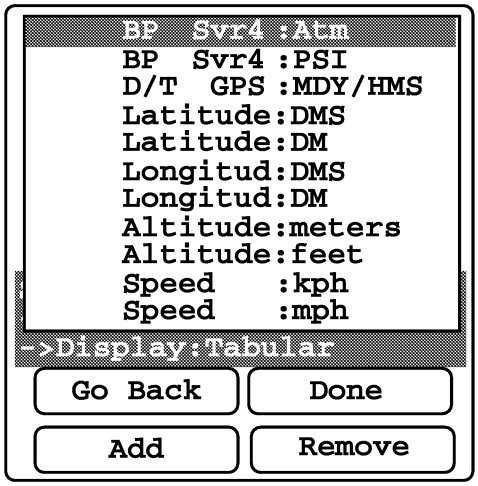
3. GPS Setup and Configuration

In order to see any Surveyor 4 GPS readings on your instrument, you need to configure your Surveyor 4's display to show GPS parameters on your screen. To do so, follow the next series of steps.

NOTES:

- For accurate GPS readings, we recommend that you configure and use your Surveyor GPS outside of a building and away from natural and man-made obstacles.
- To be able to see the setup screens below, your Surveyor 4 should not be connected to any peripherals (`NoConn`) or should be connected to a Series 4 multiprobe (`Series4Sonde`), or a Series 3 multiprobe (`Series3Sonde`). You won't be able to see the screens below if you instrument is connected to a Series 3 multiprobe in `Terminal` mode or a personal computer (`PC`).

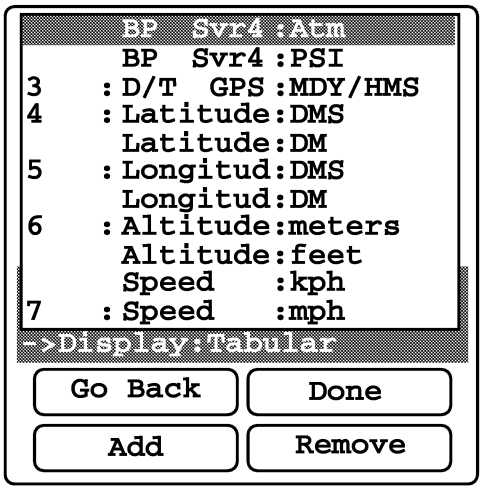
STEP 1: From your Surveyor 4 tabular display, press `Setup/Cal` and `Select`, then `Setup` and `Select`, `Surveyor4`, and finally `Display:Tabular` and `Select`, to get:



STEP 2: With the up or down arrow keys, move the cursor to the desired GPS reading. Your choices are:

- D/T GPS:MDY/HMS (date in month/day/year format, and time in hours/minutes/seconds format);
- Latitude (DMS: degrees, minutes, and seconds; DM: degrees and minutes);
- Longitude (DMS: degrees, minutes, and seconds; DM: degrees and minutes);
- Altitude (meters and feet);
- and Speed (kph: kilometers per hour; mph: miles per hour).

Then, press Add.



On the previous screen, we have added date and time on the third line of the Surveyor 4 display, latitude is in fourth position, longitude in fifth, altitude in sixth, and speed in seventh. Your display may vary, depending on the order you chose.

NOTE:

- D/T GPS:MDY/HMS (date and time), Latitude:, and Longitud: are not displayed in full on your screen when using smaller fonts. If the date and time were 121496101000, the display would show D/T6101000, which stands for the last digit of the date (6) and the time (101000).

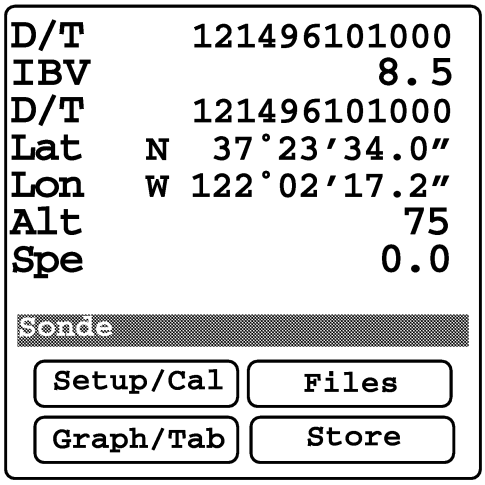
In the same manner, you can remove your GPS reading by pressing the Remove key. As a reminder, you cannot add more than one GPS reading of the same type to your display (e.g. Speed:kph and Speed:mph).

NOTE:

- D/T GPS:MDY/HMS is a good way to troubleshoot your GPS readings, if you doubt the update rate of your readings, we recommend that you keep an eye on the GPS date and time. When the time changes (seconds, minutes, or hours), it means that your instru-

ment has received new data from the satellites. Otherwise, if there is no change, it means that you are not receiving data and need to check your connections, your antenna, and your location (obstacles could be blocking the reception).

STEP 3: Once you have added or removed the parameter(s) of your choice, press the Done key and then the Go Back key to return to the active screen. You need to wait for your instrument to receive data and power up to acquire position coordinates. After a while, your instrument will display GPS readings.



You can now use your GPS readings for your water quality needs or you can also log your instrument's GPS readings. For details on how to save your real-time readings, refer to the "Logging and data transfer" chapter in this manual.

NOTES:

- GPS option consumes a great deal of power. For instance, for a system composed of a Surveyor 4 and a multiprobe with temperature, D.O., conductivity, and pH sensors and a circulator, with the Surveyor 4 display on continuously and the backlight feature turned off, the Surveyor 4 battery life is lowered from 12 hours to 5 hours with GPS on. GPS is "on" whenever it is added to the tabular display, whenever a manual file exists, or a time-triggered file exists within the warm-up period.
- If you have enabled your GPS functions for a logging run, no data will be acquired if you are recharging your Surveyor 4 battery at the time the logging starts.

4. Maintenance and Calibration

Maintenance and calibration are not required for this sensor, except for normal care of the antenna connectors.

As a reminder, the following table will give you GPS symbols that may appear after or instead of the readings, what they mean to you, and what action you should take.

TABLE A2-2: GPS SOFTWARE SYMBOLS TABLE

Symbols	What does this mean? What should you do?
#	It indicates that there is a receiver error, an RTC fault, an incomplete or not current almanac, or a test status error. This symbol will usually appear after you have replaced the Surveyor 4 battery. You should check if the battery comes up on your Surveyor 4 screen (voltage or %Left) and if there is an * after "D/T Svr4:MDY/HMS", which means that you need to set the Surveyor 4 clock.
^	It indicates that there is a reference frequency error or a synthesizer fault. You should call Hydrolab at 800-949-3766 (in the USA and Canada only) or (512) 255-8841.
&	It indicates that an antenna fault was detected. You need to check if your antenna is plugged in properly and/or if you have not shorted the wires when connecting the antenna to your Surveyor 4.
?	It indicates that your GPS card is not in Auto-3D mode (i.e. it is not able to receive data from more than 3 satellites). You need to wait until data is acquired and/or relocate your antenna, since their may be an obstacle in its way.
@	It indicates that your GPS card has received a bad packet. If this comes on only twice or less, you need to wait for your instrument to clear the bad packet and acquire new data. If this symbol appears more regularly, it indicates an internal communications problem. You need to call Hydrolab at 800-949-3766 (in the USA and Canada only) or (512) 255-8841.
$	It indicates that your GPS card has received a bad character (parity, framing, or overrun error). If this only comes on twice or less, you need to wait for your instrument to clear the bad character and acquire new data. If this symbol appears more regularly, it indicates an internal communications problem. You need to call Hydrolab at 800-949-3766 (in the USA and Canada only) or (512) 255-8841.

A3. Internal Barometer

APPENDIX 3: INTERNAL BAROMETER

1. Introduction

Your Surveyor 4 can be equipped with the Foxboro/ICT barometric sensor. This internal barometer is based on an electronic pressure transducer which, through electronic circuitry, measures the electrical signal of changes in barometric pressure and converts them to pressure measurements in engineering units.

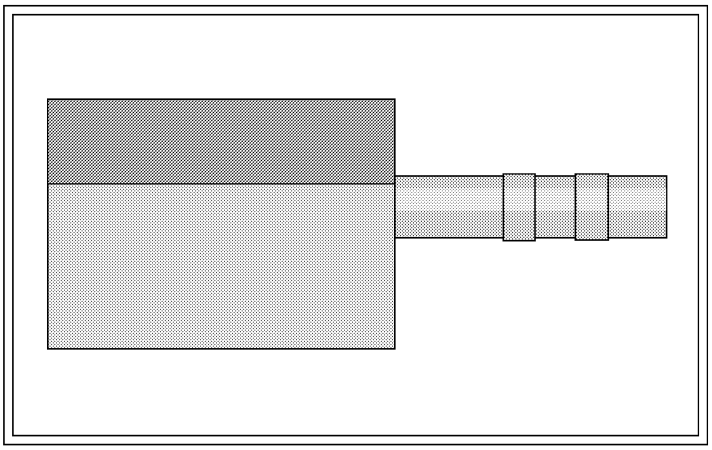


FIG A3-1: THE INTERNAL BAROMETER (MAGNIFIED)

Barometric pressure readings can also be logged by the Surveyor 4 to help with corrections of hydrologic level measurements and/or total dissolved gas measurements.

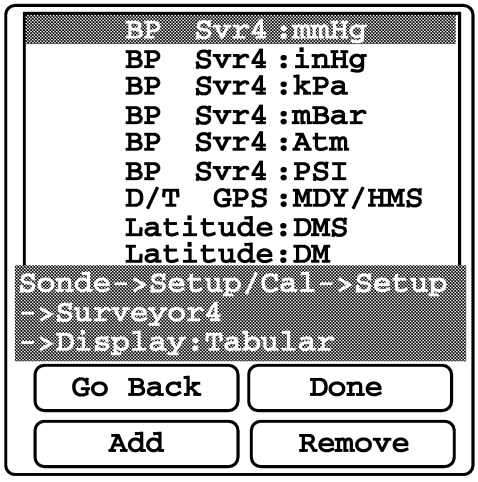
TABLE A3-1: INTERNAL BAROMETER SPECIFICATIONS

Range	Resolution	Response Time	Stability	Accuracy at 25 ˚C	Accuracy 0 to 50 ˚C
500 to 850 mmHg	0.1 mmHg	< 1 minute	6 months	Typical: 1.0 Max: 2.0 (+/- mmHg of zero calibration) Typical: 2.6 Max: 3.5 (+/- mmHg within 6 months of zero calibration)	Typical: 4.3 Max: 8.1 (+/- mmHg of zero calibration) Typical: 5.9 Max: 9.6 (+/- mmHg within 6 months of zero calibration)

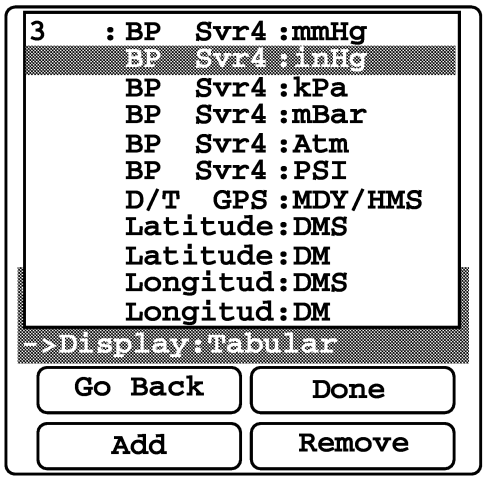
2. Configuration for Barometric Pressure Readings

To display your Surveyor 4 barometric pressure readings, you need to configure your instrument's display to show the barometric pressure (BP) real-time readings (with the history line displaying: `Series4Sonde`, `Series3Sonde`, `NoConn`, or `PC`). To do so, follow the next series of steps.

STEP 1: From your Surveyor 4 first screen, press `Setup/Cal` and `Select`, then `Setup` and `Select`, `Surveyor4`, and finally `Display:Tabular` and `Select`, to get:



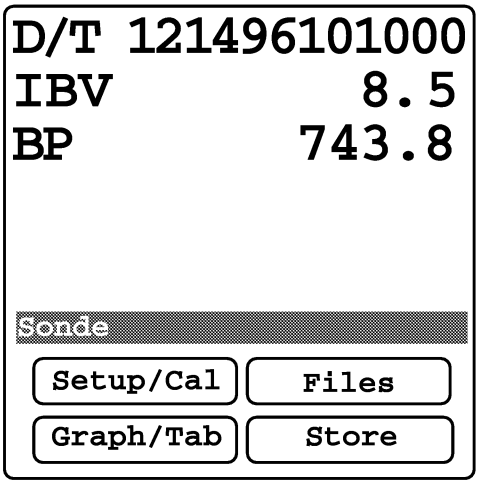
STEP 2: With the up or down arrow keys, move the cursor to the desired BP reading. You can choose between several barometric pressure units: millimeters of Mercury (mmHg), inches of Mercury (inHg), kilo Pascals (kPa), millibars (mBar), atmospheres (Atm), and pounds per square inch (PSI). Then, press `Add`.



Note the number in front of BP Svr4:mmHg (the unit we chose for this example), which means that it will appear on the third line of your instrument's screen.

In the same manner, you can remove your BP reading by pressing the Remove key. As a reminder, you cannot add more than one BP reading to your display (e.g. BP:mmHg and BP:mBar).

Once you have added or removed the parameter(s) of your choice, press the Done key and then the Go Back key to return to the active screen. Your instrument now displays the current barometric pressure.



You can now use your BP readings to calibrate you dissolved oxygen sensor or you can also log your instrument's BP readings. For details on how to save your real-time readings, refer to the "Logging and data transfer" chapter in this manual.

3. Maintenance

Maintenance is not required for this sensor, since it is located inside of the Surveyor 4 case.

4. Calibration

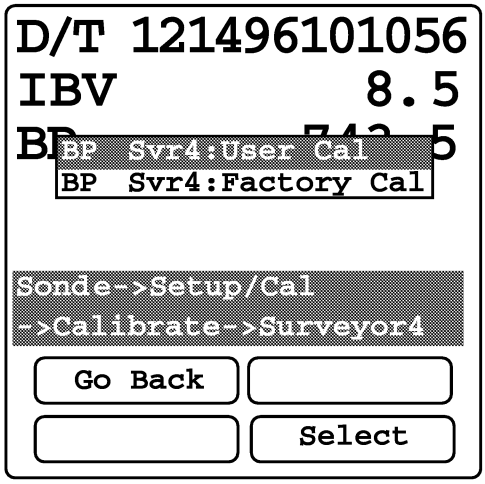
Your internal barometer is factory calibrated for zero and slope. When you receive your Surveyor 4 from the factory, you need to calibrate your barometer to set the zero for *your* specific site. Follow the next steps for "zero" calibration. We have chosen to connect our Surveyor 4 to a multiprobe, but you can also follow the same steps without connecting your Surveyor 4 to any peripherals or by connecting your Surveyor 4 to a PC. If your Surveyor 4 is connected to a Series 3 multiprobe, you need to disconnect the cables to be able to follow the next steps.

As a reminder, the following table will give you BP symbols that may appear after or instead of the readings.

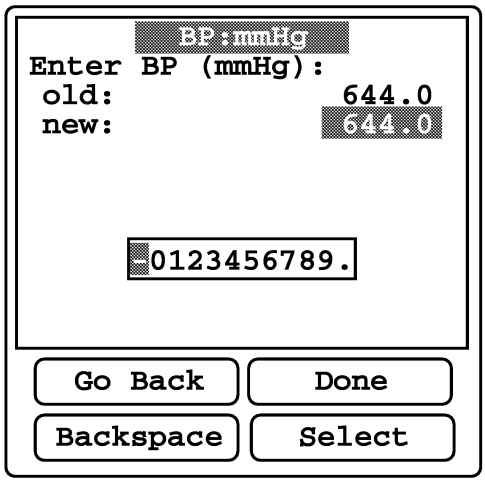
TABLE A3-2: BP SOFTWARE SYMBOLS TABLE

Symbols	What does this mean? What should you do?
*	It indicates that this is the default value for barometric pressure (calibration is required). You need to follow the calibration procedure for this parameter.
#	It indicates that the reading cannot be taken for this parameter, it is out of range (below or beyond the multiprobe's measurement capability). For instance, if the Surveyor 4 battery voltage is out of range, your instrument will display # signs on your screen where the reading should be.

STEP 1: From the first screen, press `Setup/Cal` and `Select`, then `Calibrate` and `Select`, and finally `Surveyor4`, and finally `Display:Tabular` and `Select`, and you will see the similar screen appear:



STEP 2: Next, leave the cursor on `BP Svr4:User Cal` and press `Select`.



STEP 3: Using an accurate mercury barometer or the barometric pressure provided by the local weather station, corrected to your site's altitude, enter the barometric pressure figure in the "`new:`" field above and press `Done` when you are finished. Press any key as instructed to go back to the active screen.

NOTES:

- The stability of readings is estimated to 6 months. After this time period, you should repeat the calibration above to ensure your instrument's accuracy.

- We do not recommend that you change the barometric pressure factory calibration, under `BP Svr4:Factory Cal`. However, if you need to do so, please call Hydrolab Technical Support at 800-949-3766 (in the United States of America and Canada only) or (512) 255-8841, since your Surveyor 4 will display an `Enter Security Password` message.

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