



Catalog Number 003070HY

Surveyor 4a

USER MANUAL

December 2004 Edition 2

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Surveyor 4a

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Section 1 Introduction

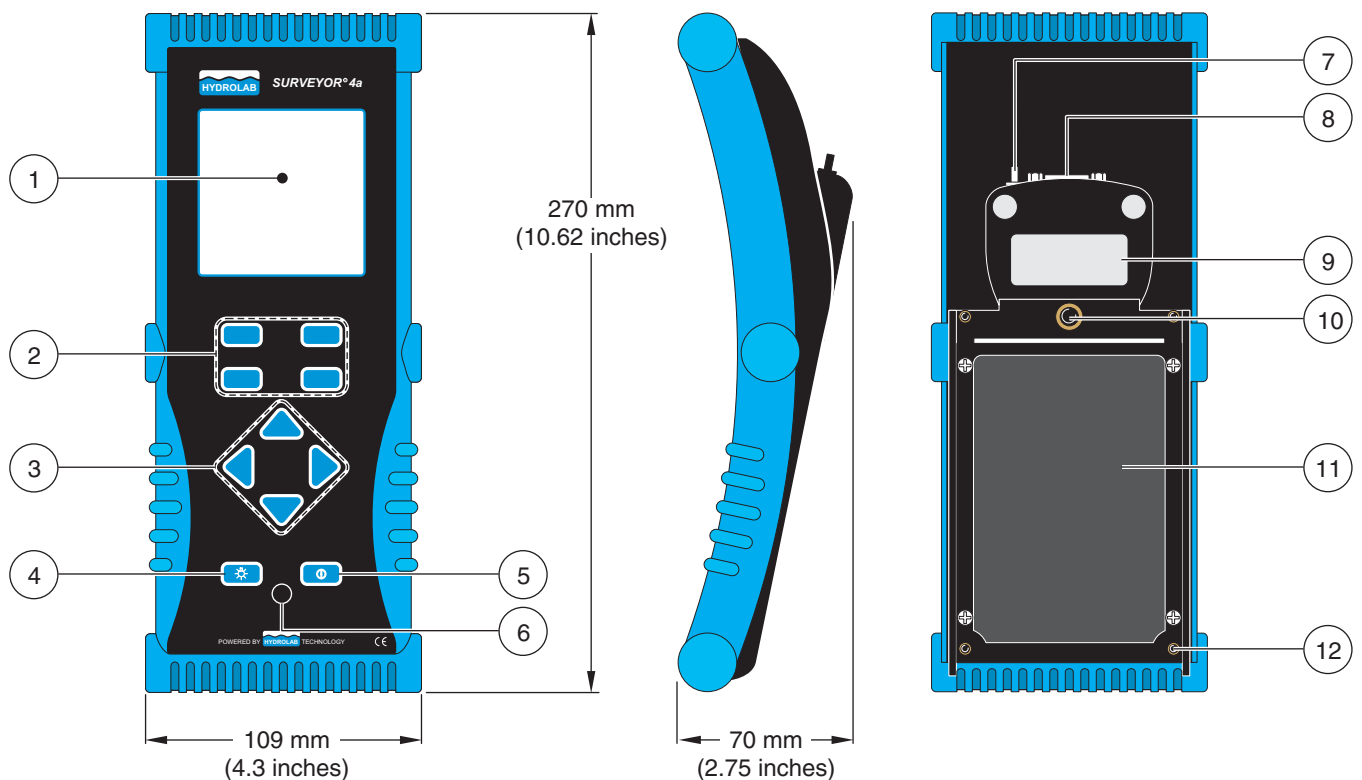
1.1 Unpacking the Instrument

Remove Surveyor 4a from its shipping carton and inspect it for any visible damage. Contact Hach Customer Service at 1-800-604-3493 if any items are missing or damaged.

1.2 Instrument Description

The front panel of the Surveyor 4a consists of 11 soft keys and a high-resolution screen. The back of the case contains the batteries and also has a 9-pin male connector for multiprobe or PC connection.

Figure 1 Front Panel

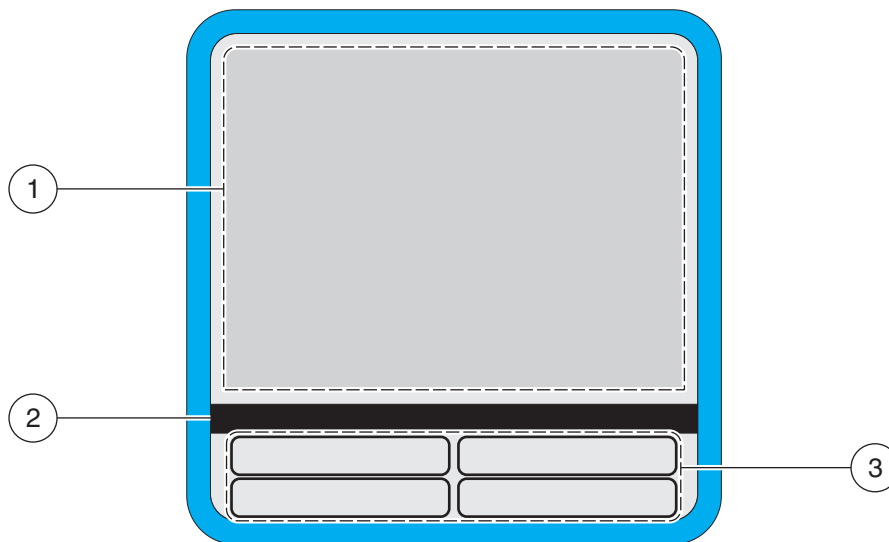


Item Number	Name	Description
1	Screen	The high-resolution, liquid crystal screen displays real-time reading, graphs, or submenus.
2	Function Keys	Takes the action indicated on one of the four rectangles at the bottom of the screen.
3	Cursor Keys	Moves the cursor up, down, right, and left in menus, submenus, and virtual keyboards. Hold down an arrow key to scroll the cursor on the screen in fast repeat mode.
4	Power	Turns the instrument on and off.
5	Backlight Key	Turns the backlight on and off. The back light allows use in low-light or dark conditions.
6	Hidden Key	Displays system information on the Surveyor 4a and on the multiprobe.

1.3 Screen Features

The screen is divided into three parts. The Real-time parameters, the History Line, and the function key options.

Figure 2 Screen Features



1. Real-time Parameters	3. Function Key Options
2. History Line	

1.3.1 Real-time Parameters

The real-time parameter lines show several parameters and the corresponding real-time readings, as they are received from the Sonde. The number of lines depends on the parameters selected to be displayed on the screen. The display automatically switches to a two-column format when the number of parameters exceeds twelve.

1.3.2 History Line

The dark grey line below the real-time parameter lines is the history line. This shows how the Surveyor 4a is connected. This line can display six basic messages. The history line messages are dependent on the types of cable connected to the Surveyor 4a and to the interface mode selected from the internal setup menu.

Table 1

Message	Description
NoConn	The Surveyor 4a is not connected to a Sonde, charger, or PC.
Series4Sonde	This is displayed if the Surveyor 4a is connected to a Sonde and configured for Series 4 Sondes.
Series3Sonde	This is displayed if the Surveyor 4a is connected to a Sonde and configured for Series 3 Sondes.
Charger	The Surveyor 4a charger cable is connected to the instrument and the Surveyor 4a is powered on.
PC	The Surveyor 4a PC adapter is connected to the instrument and the Surveyor 4a is powered on. The message will appear even before a physical connection is made.
Terminal	The Surveyor 4a is connected to a Sonde and configured for terminal emulation.

The history line also displays the path selected when moving through the menu and submenu structure.

1.3.3 Function Key Options

The function key options correspond to a front panel key, but they also represent Surveyor 4a software menus or submenus.

1.4 Security Levels

The security level determines the access privileges to the software submenus. Security Level-2 is the factory-set default level. If a security level is changed, the Surveyor 4a will remember the new security level the next time the instrument is powered on.

Important Note: To avoid erasing the multiprobe main software or any other related data, do not attempt to log on to Level-3 without assistance from Hach Company. For more information, call 1-800-604-3493.

Table 2 Security Levels

Security Level	Password	Allows Access To:
Level-0	Not Required (Surveyor 4a 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 4a)	Surveyor4 Files Status; Surveyor4 Files Review; Store; Sonde Files Status; Sonde File Download; Terminal File Download; Terminal Data Capture.
Level-2	User Definable (Disabled on new Surveyor 4a)	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.

Section 2 Surveyor 4a Setup

Press the **OFF/ON** key. The temporary welcome display is displayed, followed by the Main Surveyor 4a screen. When received directly from the factory, D/T is the Surveyor time and IBV is its internal battery voltage.

Complete the following basic setup in NoConn mode.

2.1 Selecting Interface Modes

The Surveyor 4a allows six different interface modes or connections which determine the basic message displayed on the instrument history line. To select the interface mode, no cables can be connected to the Surveyor 4a (NoConn Mode).

1. In NoConn Mode, select **SETUP/CAL** then select **SETUP**.
2. Highlight Sonde I/F:Mode and press **SELECT**.
3. Highlight the number that corresponds to the appropriate connection.
 - Select 0 if the Surveyor 4a will be connected to a Series 4 Sonde equipped with a RS232 hardware interface.
 - Select 1 if the Surveyor 4a will be connected to a Series 4 Sonde equipped with a RS422/RS485 hardware interface.
 - Select 2 if the Surveyor 4a will be connected to a Series 3 multiprobe (DataSonde 3 version 1.20 and higher, Recorder, Reporter, H20, or H20G).
 - Select 3 to interface with Series 3 multiprobes using Terminal mode.
4. Press the **DONE** key.
5. Make cable connections to the Surveyor 4a.
6. Power the Surveyor 4a on. The history line will reflect the interface mode. For all modes, except Terminal, the Surveyor 4a will try each baud rate available, starting with highest baud rate, until it established communications with the Sonde. For Terminal mode, the baud rates must be manually entered to match the multiprobe and the Surveyor 4a baud rates to allow communication. See XXXX for more information selecting baud rates. The history line will reflect the interface mode.

Note: When the Surveyor 4a connects to a Series 3 Sonde, the Surveyor 4a will reconfigure the following multiprobe settings: enables all the parameters; selects conductivity in the conductivity/resistivity column; selects salinity in the salinity/TDS column, enables conjunctivitis autoranging; enables turbidity autoranging (if the DataSonde 3 revision is ≥ 1.40 or the H20 revision is ≥ 2.00); selects %Sat in the %Sat/mg/L column (if the DataSonde 3 revision is ≥ 1.40 and < 1.60 , or H20 revision is ≥ 2.00 and < 2.10).

2.2 Setting the Time and Date

1. From the Main screen, select **SETUP/CAL>SETUP**.
2. Highlight Clock using the **DOWN** cursor key and press **SELECT**. The Date screen will be displayed.
3. Enter the new date (MMDDYY). Use the **RIGHT** and **LEFT** cursor keys to highlight the numbers at the center of the screen: 0123456789. When the correct number is highlight press **SELECT**. For example, for January 8, 2004 enter 010804.

4. Repeat step 3 until the entire date is selected. If a mistake is made, clear entries one by one using the **BACKSPACE** key.
5. When the new date is correctly entered, press the **DONE** key.
6. The Time screen will be displayed. Use the **RIGHT** and **LEFT** cursor keys to enter the new time (HHMMSS). Press **DONE** when complete. The Surveyor 4a will make a sharp beep noise and briefly the "Setup Successful! Press any key..." message will be displayed.
7. Press any key to return to the Setup submenu.

2.3 Changing the Date Format

The features specifies the date format that will be used by the Surveyor 4a software.

1. From the Main Screen select **SETUP/CAL>SETUP**.
2. Highlight Date:Format using the cursor keys and press **SELECT**.
3. Use the cursor keys and select the date format (0:MMDDYY, 1:DDMMYY, or 2:YYMMDD) and then press **SELECT**.

***Note:** The selection will affect all existing files and all files created or transferred, except captured or downloaded from Terminal mode.*

4. Press **DONE** when the correction selection is made.

2.4 Setting the Tabular Display Mode

The Tabular display mode is the default mode when the instrument is powered on. The data is displayed in lines or columns, depending on the size of the characters and the number of parameters present on the screen.

To add or delete parameter displayed on the screen:

1. From the Main Screen select **SETUP/CAL>SETUP**.
2. Highlight Display: Tabular using the down cursor key and press **SELECT**.
3. A screen with the list of parameters is displayed. The parameters currently on the Surveyor 4a are preceded by numbers. These number provide the order of appearance (from 1 to 24) on the real-time display lines. The parameter without numbers are not currently displayed on the Surveyor 4a screen.
4. Select a parameter to display using the **UP** and **DOWN** cursor keys and press **ADD**.

***Note:** To delete a displayed parameter, select the parameter and press Remove.*

5. When all the parameters to be displayed are selected, press **DONE**. Press **GO BACK** to return to the real-time screen (tabular display). The new parameter(s) should be added to the screen.

***Note:** Some of the parameters, such as temperature, can only be displayed in one unit. For example, if Temp: °C is added, Temp: °F cannot be displayed. If Temp: °F is added, Temp: °C will be automatically removed.*

2.5 Setting the Graph Display Mode

The second display mode is a graph. The Graph/Tab key toggles between the tabular and graph modes.

Due to the different configuration possibilities, one or more parameter may need to be added to the tabular display to allow the graph mode. See [section 2.4](#) for more information.

1. From the Main Screen, select **SETUP/CAL>SETUP**.
2. Highlight Display:Graph and press **SELECT**. A new screen will be displayed with three graph configuration choices, X-Axis, Y-Axis, and Orientation.

X-Axis Configuration

- a. Highlight X-Axis and press Select.
- b. Select the Date and Time or one of the parameters and press select.

2.6 Setting the Automatic Shutdown

The automatic shutdown is used to save battery life in case it is not turned off after an operation. This feature will turn the Surveyor 4a off if no key is pressed in the programmed amount of time following the last key pressed. Once the Surveyor 4a shuts down, power it back up using the **OFF/ON** key.

1. From the Main Screen, select **SETUP/CAL>SETUP**.
2. Highlight Timeout:Shutdown using the cursor keys and press **SELECT**.
3. A Timeout:Shutdown screen is displayed.
4. Enter the shutdown timeout. Select 0 (zero) to disable or select the appropriate amount of time (1–255 minutes) for the specific operation using the **RIGHT** and **LEFT** cursor keys. Press **SELECT** after each number.

*Note: If a mistake is made, clear entries one by one using the **BACKSPACE** key.*

5. When all the numbers are entered, press the **DONE** key. A “Setup:Successful! Press any key” message will be displayed.

2.7 Setting the Screen Saver Option

This is a power saving feature that puts the Surveyor 4a screen to sleep if no key is pressed in a programmed amount of time following the last key pressed. If the screen shuts down, press any key once and the screen will reappear with the last screen displayed.

If the screen save option is active while using the Surveyor 4a, up to 80% more battery life can be saved.

1. From the Main Screen, select **SETUP/CAL>SETUP**.
2. Highlight Timeout:Display using the cursor keys and press **SELECT**.
3. The Timeout:Display screen is displayed.

4. Enter when the screen save mode will become active. Select 0 (zero) to disable the screen saver mode or select the appropriate time (10 to 255 seconds) for the specific operation using the **RIGHT** and **LEFT** cursor keys. Press **SELECT** after each number.

*Note: If a mistake is made, clear entries one by one using the **BACKSPACE** key.*

5. When all the numbers are entered, press the **DONE** key. A "Setup:Successful! Press any key" message will be displayed.

2.8 Setting the Backlight Feature

The backlight feature turns off the backlight after a certain duration of time. This feature conserves power in case the Surveyor 4a is not manually powered off. If the backlight auto-shutoff feature is activated while using the Surveyor 4a, up to 40% more battery life can be saved than if the option was disabled.

1. From the Main Screen, select **SETUP/CAL>SETUP**.
1. Highlight Timeout:Backlight using the cursor keys and press **SELECT**.
2. The Timeout:Backlight screen will be displayed.
3. Choose the shutdown interval, in seconds (1–255) using the cursor keys, and then press Select. Select 0 (zero) to disable this feature.
4. Press Done. A "Setup Successful!" message will appear, press any key to continue.

2.9 Setting the Baud Rate for the PC

1. From the Main Screen, select **SETUP/CAL>SETUP**.
2. Highlight Baudrate:PC using the cursor keys and press **SELECT**.
3. The Baudrate:PC screen will be displayed.
4. Use the cursor keys and the **SELECT** key to enter the baud rate that the computer uses to communicate with the instrument. The baud rate is dependent on the communications program that is used.
5. Press the **DONE** key when complete.

2.10 Setting the Baud Rate for the Surveyor 4a

1. From the Main Screen, select **SETUP/CAL>SETUP**.
2. Highlight Baudrate:Terminal using the cursor keys and press **SELECT**.
3. Use the cursor keys and the **SELECT** key to set the Surveyor 4a baud rate (300, 1200, 2400, 4800, or 9600).
4. Press the **DONE** key when complete.

2.11 Changing the Password

The password can be changed to limit access to certain Surveyor 4a functions. The current password is required to change the password. From the factory, the default security is disabled for levels 1 and 2 and set to "HYDROLAB" for level 3.

This option requires the Level-3 security password.

1. From the Main Screen, select **SETUP/CAL>SETUP**.
2. Highlight Password:Change using the cursor keys and press **SELECT**.
3. Enter the Level-3 password using the cursor keys and the **SELECT** key, and then press **DONE**.
4. Use the cursor key to select the security level (Level-1, Level-2, and Level-3).
5. Use the cursor keys and the **SELECT** key to enter the new password.
6. Press **DONE** when complete.

2.12 Adding New Options

This adds new options, such as a barometer or GPS, to the Surveyor 4a. This option requires the Level-3 security password.

1. From the Main Screen, select **SETUP/CAL>SETUP**.
2. Highlight Factory:Options using the cursor keys and press **SELECT**.
3. Enter the Level-3 password and press **DONE**.
4. Highlight Barometer/GPS and press **Select**.
5. Enter which options to install (0=None, 1=BP only, 2=GPS only, or 3=BP and GPS).

Note: The software options need to match the installed hardware (if a GPS card is not installed, do not install GPS). Failure to do so can provide misleading data.

2.13 Selecting the Radix within a Numeric Value

The features allows the selection of radix (a decimal point or comma) within a numeric value. It also allows the selection of the corresponding delimiter (what will separate the values within a file during spreadsheet-importable file transfer). For example, decimal point (24.2) or a comma (24,2).

1. From the Main Screen, select **SETUP/CAL>SETUP**.
2. Highlight Radix:Delimiter using the cursor keys and press **SELECT**.
3. The Radix:Delimiter screen will be displayed.
4. Select 0, 1, or 2 for the type of radix using the cursor keys, and then press **SELECT**.
 - 0—for decimal point radix and a comma delimiter (0: '.' and ',')
 - 1—for decimal point radix and a tab delimiter (1: '.' and tab)
 - 2—for comma radix and a tab delimiter (2: ',' and tab)
5. Press **DONE** when complete.

Section 3 Sonde Setup

The Surveyor 4a can setup the Sonde (Series3 or Series4, only). The items displayed in the Sonde Setup submenu depends on the Sonde connected to the Surveyor 4a. Some of the choices and options are not available on some Series 3 Sondes. See the Series 3 Operating Manual for more information on setup.

Security Level-2 is required to change Sonde Setup features.

1. Connect the Surveyor 4a to a Sonde.
2. Press the **OFF/ON** button.
3. From the Main screen, select **SETUP/CAL>SETUP>SONDE**. The Sonde Setup submenu will be displayed.
4. Highlight the option to be configured. Sections 3.1—3.9 describes the Sonde Setup submenu features.

3.1 Selecting Parameters

This feature allows the setup of parameter setup options for the Sonde. The Surveyor 4a will display the parameters included on the Sonde.

3.2 Turning the Circulator On/Off

Note: When using a DataSonde 3 or Recorder, this option allows the “stirrer” to be turned on of off.

1. Highlight Circltr:ON/Off and press **SELECT**.
2. Choose to turn the circulator on or off using the cursor keys and the **SELECT** key. Select 0 (zero) to disable the circulator or select 1 to enable the circulator.
3. Press **DONE** when complete.

3.3 Turning the Audio On/Off

Note: When using a DataSonde 3 or Recorder, this option allows the “Buzzer” to be turned on of off.

1. Highlight Audio:On/Off and press **SELECT**.
2. Choose to turn the audio on or off using the cursor keys and the **SELECT** key. Select 0 (zero) to disable the audio or select 1 to enable the audio.
3. Press **DONE** when complete.

3.4 Assigning the SDI-12 Address

1. Highlight SDI:Address and press **SELECT**.
2. Enter the SDI address using the cursor keys and the **SELECT** key. The SDI address status is displayed on the bottom right-hand corner of the screen.
3. Press **DONE** when complete.

3.5 Setting the SDI Delay

1. Highlight SDI:Delay and press **SELECT**.
2. Enter the delay of the SDI address (5–994 seconds) using the cursor keys and the **SELECT** key.
3. Press **DONE** when complete.

3.6 Assigning a Site ID

This feature will assign a description of the site where the Sonde is located.. The Site ID uses a maximum of 15 letters, numbers, and blanks.

1. Highlight Site ID and press **SELECT**.
2. Enter the new Site ID using the cursor keys and the **SELECT** key. To add space, highlight <<<Space>>> and press **SELECT**. To delete an error, press the **BACKSPACE** key.
3. Press **DONE** when complete.

3.7 Assigning the MODBUS Address

1. Highlight MODBUS:Address and press **SELECT**.
2. Enter the new Modbus address (1–247) using the cursor keys and then the **SELECT** key.
3. Press **DONE** when complete.

3.8 Setting the Sonde Time and Date

Note: When using a DataSonde 3 or Recorder, this option is displayed as “D/T:MDY/HMS”.

1. Highlight Date-Tim:MDY/HMS and press **SELECT**.
2. Set the date (month, day, year) and time (hours, minutes, seconds) for the Sonde using the cursor keys and the **SELECT** key.
3. Press **DONE** when complete.

3.9 Turning the AutoLog On/Off

1. Highlight Autolog:On/Off and press **SELECT**.
2. Choose to turn the circulator on or off using the cursor keys and the **SELECT** key. Select 0 (zero) to disable the autolog or select 1 to enable the autolog.
3. Press **DONE** when complete.

Section 4 Logging and Data Transfer

4.1 Introduction

The Surveyor 4a memory logging system comes in several options. The instrument logging capacity depends 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 reading.

4.2 Clipboard Memory

If the Surveyor 4a has Clipboard memory, up to 12 scans (with a maximum of 25 parameter readings per scan) by using the Store function. This feature captures lines of data displayed at the time the Store key is pressed.

4.2.1 Storing Clipboard Memory

1. In NoConn mode, select Setup/Cal>Setup>Tabular:Display and press Select.
2. Select the parameters that will be saved to the Surveyor 4a Clipboard memory using the Add or Remove key.
3. Press the DONE key and then the GOBACK key three times.
4. Press the Store key. One scan has been saved to the Surveyor 4a memory.
5. If a "Clipboard is full!" messages is displayed, refer to

4.2.2 Reviewing Clipboard Scans

1. From the Files>Clipboard (for NoConn, PC, or Terminal modes) screen or the Files>Surveyor4a>Clipboard screen (for Series3Sonde or Series4Sonde modes), press SELECT to display a the scan saved to the Clipboard memory when the Store key was pressed.
2. Depending on the number of scans the Clipboard contains, press the DOWN key and move to the other files to review the information.
3. Press the DONE key when finished viewing the data.

4.2.3 Transmitting Scans

1. Connect the instrument to a computer using the Surveyor 4a to PC adapter. Power the Surveyor 4a.
2. Press the Files key.
3. Move the cursor to Transmit and press Select.
4. Select one of the three transfer choices: ASCII: Text, XMODEM: Text, or XMODEM: Binary.
 - ASCII: Text will transfer the stored scans as text, using the ASCII communications protocol.
 - XMODEM: Text will transfer scans as a spreadsheet-importable text files, using XMODEM communications protocol.

- XMODEM: Binary is for factory diagnostic purposes and should not be used by the operator. This option requires Security Level 3.

Note: Refer to [section 2.13 on page 9](#) to correctly configure the spreadsheet-importable format.

Before starting the transmit process, refer to the communications program specific commands or to ProComm Plus for DOS basic commands or Hyperterminal basic command in the Quick Reference chapter.

5. Launch the communication program on the PC. Make sure the correct baud rate is selected for the computer and that the proper transfer protocol is selected in the communications program setup menus.
6. From the PC, select the option to receive the files in the communications program. For example, press PgDn for ProComm Plus for DOS. Name the file and press ENTER. Then press any key.
7. The last two lines (with zeros) on the Surveyor 4a screen should start changing to show that the transfer is taking place. Otherwise, check the cables, setup, and transfer procedures. Press ABort to terminate the transfer.
8. When the transfer is complete, go to the computer directory where the files was saved. Open the files to view the scan(s).

Note: Information from the Series 3 or 4 multiprobes cannot be downloaded since the Surveyor 4a Clipboard memory does not have the capacity to receive files. Call Technical Support to inquire about upgrades to the Surveyor 4a.

Note: If the Surveyor 4a is connected to a multiprobe with logging, you can also go yo Sonde instead of Surveyor 4a from the Files submenu to create, delete, or look at the status of the multiprobe files. To download and file, a Surveyor 4a with memory must be sued. Refer to XXXXX

4.2.4 Deleting Scans

To delete scans stored in the instrument clipboard, follow the steps below.

1. Press the Files key, or the Files key and then Surveryor4a key (for the Series4Sonde or Series4Sonde connections), move the cursor to Delete and press SELECT.
2. Make sure you want to delete the selected scans. There is not an undo function. 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.

4.3 Surveyor 4a File Types (with Memory)

The Surveyor 4a can be set up to store, create, delete, capture, review, annotate, download, transmit, wipe, and view the status of files, and turn the Autolog feature on or off.

Surveyor File Types

- Captured Text: this files is a text file that was created, then data was added manually by pressing the STORE key in NoConn, Series3Sonde, or Series4Sonde mode. Once transferred to a PC, the captured text can be opened in a word processing program.
- Manual File: this files was created using a Series 3 multiprobe in Series3Sonde interface mode. Once transferred to a PC, a manual file can be opened in a word processing or spreadsheet program.

- Time-triggered File: this files is logging events that were created, then added data based on time intervals. Once transferred to a PC, the time-triggered files can be opened in a word processing or spreadsheet program.
 - AutoLog File: this files an automatic back-up logging event that was created/activated. Once transferred to a PC, an auto-log files can be opened in a word processing or spreadsheet program.
 - Download Text: this file is a text file that was transferred/downloaded to the Surveyor 4a using a Series 3 multiprobe in terminal interface mode. Once transferred to a PC, a downloaded text file can be opened in a word processing program.
 - Downloaded File: this files is a multiprobe files that was transferred/downloaded to the Surveyor 4a using a Series 3 or Series 4 muliprobe in Series3Sonde or Series4Sonde interface mode. Once transferred to a PC, a downloaded file can be opened in a word processing or spreadsheet program.
1. From the top level screen, press Files.
 2. Press the Surveyor4a key (skip this step if PC or Terminal interface modes are active).
 3. Move the cursor to select annotate, create, status, review, wipe, delete, or autolog and press SELECT.

Note: In PC mode, Transmit (to transfer files from the Surveyor 4a to a PC) is added to the menu. In terminal mode, Download (to transfer files from the Series 3 multiprobe to the Surveyor 4a) and Capture (to capture ASCII data from a Series 3 multiprobe) are added to the menu. Capture is also a Create submenu item in NoComm and PC modes.

4.3.1 Storing Data

To be able to store data to a file, a files needs to be created in the Surveyor 4a memory, otherwise a "No Log Files available!" message will be displayed. To create a files, refer to [section 4.3.2.1 on page 19](#).

1. Go to the Series4Sonde screen and press the STORE key.
2. Either select Manual File (if more than one is available) and press select, or press SElect. Note that the Surveyor 4a will, by default, select the last manual file where data was stored. The data on the screen is stored to the selected file.
3. Repeat to store more data to the select file or another manual file, if available. The # bytes field will changes as data is added to the file.

4.3.2 Creating a File

A file can be created within the Surveyor 4a. Up to 24 files can be saved the Surveyor 4a memory (23 manual or time-triggered files and 1 Autolog file). If the directory is full, following the directions in XXX

4.3.2.1 Manual File Creation

1. From the Series4Sonde>Files>Surveyor4 screen, move the cursor to Create and press the SELECT key.

2. Select Manual or Time-Trig. If Manual is selected, the Surveyor 4a logging software will create a files manually to store scans of data. If Time-Trig is selected, a files will automatically start and stop acquiring data as specified by the user.
3. Use the cursor keys and the Select key to enter the file name. Press the Done key when finished entering the file name.
4. If Time-Trig is selected,
 - a. Enter the file starting date and press DONE.
 - b. Enter the Starting time and press DONE.
 - c. Enter the Stop date and press DONE.
 - d. Enter the Stop time and press DONE. If you enter an incorrect date or time, a "Start must be before Stop!" or "Invalid or incomplete text" message will appear. Press any key and go back to check the time and date and enter the acceptable value.
 - e. Enter the time (in hours, minutes, and seconds) for the interval between each parameter reading. The interval must be 30 seconds or more. If an interval below 30 seconds is entered, the "Entry is outside acceptable limits!" will be displayed at the bottom of the screen. Press any key and enter an acceptable interval. Press the DONE key when complete.
 - f. Enter the multiprobe warm-up time. The warm-up time is the time it takes the multiprobe sensors to be ready to record accurate data. Warm-up time will vary according to the sensors being used and the field conditions. The value must be 30 seconds or more. When complete, press the DONE key.
5. A screen of parameters appears with the default selection that the matches the Surveyor 4a tabular display. Parameters can be added and removed. When the new display is configured, press DONE, and the message file "Files Created!" will briefly appear on the screen. Press any key to return to the Files>Create window. Note that the additions or removals from the parameter menu do not affect the tabular display.

If the Surveyor 4a files directory has reached full capacity (24 files and 1 for AutoLog), a "Directory is FULL!" screen will appear. Press any key.

4.3.3 Creating a Capture File

If the Surveyor 4a is connected to a Series 3 Sonde and Terminal interface mode is being used, file creation has an additional submenu item, called Capture. This option captures ASCII data from a Series 3 Sonde, much like PC terminal emulators. Capture is available in NoConn and PC modes, however, data can only be sent to the capture file in Terminal mode.

1. In Terminal mode, select Files.
2. Select Create and press Select.
3. Select Capture and press Select.
4. Enter the file name of the capture file. Press DONE when complete.

4.3.4 Checking the File Status

1. From the Files>Surveyor 4a menu, highlight Status and press Select. A screen appears that provides information about the number of files present in the Surveyor 4a directory, the

maximum number of files that can be stored in the instrument, amount of formatted memory installed on the Surveyor 4a, the memory currently available, and number of days available with the present amount of memory left, internal battery capacity (IBC) in percent and in days left before the Surveyor 4a power runs out, and the external battery capacity (XBC).

Note: The formatted memory capacity is less than the raw memory capacity. To determine raw memory, press the hidden Hydrolab key.

2. Press any key to return to the Surveyor 4a Files submenu and move to the next option.

To check individual file status, highlight Delete and press SELECT. All files will appear listed with the file type and the corresponding size. Press the GOBACK key to prevent deleting any file.

4.3.5 Reviewing a File

This function shows the contents of any manual, time-triggered, or AutoLog file. This function can also be used to check the status of these file types.

1. From the Files>Surveyor 4a menu, in Series4Sonde interface mode, press the Review key.
2. Choose the file to review and press the Select key.
3. Select how to review the contents of the file, either from top (Beginning) or from a specific date and time.
 - a. If Beginning is selected, the information contained in the file is displayed in tabular format. Press the DOWN arrow key to go to the previous scans.
 - b. If Date/Time is selected, enter the date where you want to review the data and press DONE. The default date is the file setup date.
 - c. Enter the time where you want to start the review and press DONE. The default time is the file setup time.
 - d. Press the UP or DOWN arrow keys to move through the file.
4. To return to the Beginning/Date/Time submenu, press GOBACK. To go back to the Review menu, press DONE.

4.3.6 Annotating a File

On files have been created, comments can be added to the files. Annotate will only allow comments to be added to manual, time-triggered, or AutoLog files.

1. From the Files from the Main Menu, in Series4Sonde interface mode, press Annotate.
2. Choose the file to annotate and press SELECT.
3. Enter any comments (up to 80 characters) and press the DONE key when complete.

4.3.7 Deleting Files

Deleting files will make more room for new files and erase unwanted stored files in the instrument memory.

1. Select Files from the Main Menu.
2. Highlight Delete and press SELECT.

3. Highlight the file to be deleted and press SELECT.
4. Select 1: Yes to delete the file. A message screen will appear showing the file has been deleted.

4.3.8 Erasing Manual-triggered Files

This function erases the contents of any manual-triggered files saved in the Surveyor 4a memory. It only keeps the file name and the parameter settings, and resets the date to the day when the contents were erased from the file. This function quickly deletes information in the manual files but leaves an empty file template for future operations. This function only applies to manual files.

1. Select Files from the Main Menu.
2. Highlight Wipe and press SELECT.
3. Highlight the file you want to erase and press SELECT.

If AutoLog is enabled, the file description 0:=> AUTOLOG <= appears on top of the screen. If AutoLog is disabled, the file description will change to =>Disabled File<=. If the AutoLog feature is resumed, the AutoLog file initially created is enabled, and all new data is added to the same 0:=> AUTOLOG <= file.

Note: To delete the AutoLog file from the Surveyor 4a memory, disable the AutoLog file before removing it using the Delete option. If an enabled AutoLog file is deleted, the Surveyor 4a will delete it and recreate a new one.

Note: Make sure the multiprobe is connected to the Surveyor 4a before using the AutoLog feature.

4.3.9 Transmitting a File for the Surveyor 4a to a Computer

This transmission configuration involves connecting the Surveyor 4a to the computer with the Surveyor 4a to PC adapter cable. Files should be saved in the memory, either created from logging with a Sonde, captured when connected to a Series 3 Sonde, or transferred (downloaded) from a Sonde.

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

Note: If transferring files downloaded from a Series 3 Sonde into a Series 4 Sonde, and temperature as a parameter was selected, both °C and °F will be included in the file. If SpCond:mS/cm was selected, SpCond:µS/cm, Res, and TDS are included in the file. If Depth was selected, both Depth:Meters and Depth:Feet will be included in the file. If DO%Sat was selected, both DO:%Sat and BP:mmHg will be included in the file. After the transfer process to the PC is complete, open the file within the PC and erase the unnecessary parameters and readings. Note that only the first 80 columns of the file transfers to the computer.

1. Launch the communications program and make sure the baud rate for the computer and the proper transfer protocol is selected in the communications program setup menus.

Note: The delimiter and radix will influence the way the file is transferred.

2. Select Files from the Main Screen.
3. Highlight Transmit and press SELECT.
4. Highlight the file to be transmitted and press SELECT.
5. Highlight Printer-Ready, SS-Importable, or XMODEM:Binary and press SELECT.

- Print-Ready will send the file to a printer or create a text file.
- SS-Importable will create a spreadsheet-importable file.
- XMODEM:Binary if for factory diagnostic purposes only.

If Printer-Ready is select:

- a. Choose the type of statistics which will append to the print-ready output. Select NoStats, Daily Stats, Total Stats, or Both Stats and press SELECT.
 - NoStats—
 - Daily Stats—Information on about the files statistics for each day will be sent to the printer and/or capture file. 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 the day's data will be displayed.
 - Total Stats—Information is similar to Daily Status, except Total Stats provides the overall statistics over the entire logging run.
 - Both Stats—Daily and overall statistics are calculated.
- b. Turn the printer on or open a capture file. Then press any key.
- c. A transfer process screen will appear on the Surveyor 4a screen to show the file transfer is taking place.
- d. After the transfer is complete, a "Deactive printer and/or close capture file" message will appear.
- e. Turn the printer off or close the capture file.

Note: At the bottom of the file, a "Recovery finished line" will be displayed.

If SS-Importable Transmission is selected:

- a. After selecting SS-Importable, a "To start XMODEM transfer...Press any key..." message will be displayed. Press any key to continue.
- b. Follow the communication software prompts. Press ESC on the computer keyboard or the Abort key form the Surveyor 4a to cancel the file transfer.
- c. When the file transfer is complete, a "Transfer completed!" message will be displayed. Press any key to continue.
- d. To view the transmitted file, go to the computer directory where the file was saved and open the file.

4.3.9.2 Captured and Downloaded Text Transmission

Note: Prior to starting the transmit process, please refer to your communications program specific commands.

1. Select Files from the Main Menu.
2. Highlight Transmit and press SELECT.
3. Highlight the captured text file and press SELECT.
4. Select ASCII: Text, XMODEM: Text, or XMODEM: Binary.

- ASCII: Text will transfer the stored files as straight text files.
 - XMODEM: Text will also transfer files as text files, using the XMODEM communications protocol.
 - XMODEM: Binary is for factory diagnostics only.
5. Launch the communications program and make sure the baud rate for the computer and the proper transfer protocol is selected in the communications program setup menus.
 6. Select the appropriate downloading process sequence and press any key on the Surveyor 4a.
 7. When finished, press any key on the Surveyor 4a.

4.4 The Multiprobe Files Submenu

4.4.1 Creating a File

Note: If creating files with a Series 3 Sonde, and temperature as a parameter was selected, both °C and °F will be included in the file. If SpCond:mS/cm was selected, SpCond:µS/cm, Res, and TDS are included in the file. If Depth was selected, both Depth:Meters and Depth:Feet will be included in the file. If DO%Sat was selected, both DO:%Sat and BP:mmHg will be included in the file. After the transfer process to the PC is complete, open the file within the PC and erase the unnecessary parameters and readings. Note that only the first 80 columns of the file transfers to the computer.

1. In Series3Sonde or Series4Sonde mode, press Files and press Sonde. In Series3Sonde mode, the Surveyor 4a will scan for the Sonde.
2. Highlight Create and press SELECT.
3. Press SELECT again.
4. 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), a circulator (or stirrer), and a choice of the parameters to be recorded.

Section 5 Maintenance & Calibration

5.1 Cleaning the Instrument

Clean the case, screen, and other components (except connectors and plugs) with a slightly wet cloth or cotton swab. Use soap to remove grease spots.

5.2 Recharging the Internal Battery

DANGER

Never connect the Surveyor 4a to a power source which exceeds 15 volts or fatal electrical shock may occur. To avoid shock hazards, do not use AC (110 and 220 VAC 12VDC power adapters) to power the Sonde. Use battery power when deploying a Sonde outdoors. If an AC power is used, a Ground Fault Interrupt (GFI) device must be used. GFI installation must be done by a licensed electrician.

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

We recommend charging the Surveyor 4a when the instrument internal battery voltage (IBV) reaches 6.5 volts.

The recharge time depends on the percent left (IB%) in the battery. Charging is complete in three and a half hours.

When the Surveyor 4a is first received, we recommend that a complete discharge cycle is performed and then recharge the Surveyor 4a.

1. Connect the Surveyor 4a charger cable to the Surveyor 4a. Attach the 110 or 220 power adapter to the other end of the charger cable. For the 220 power adapter, connect the country's corresponding power cord to the IEC 320 connector.
2. Turn the Surveyor 4a on.
3. A low external power supply screen will be displayed if the Surveyor 4a is connected to an external power source that is providing insufficient voltage or poor connections where made. Recheck all connections and try again. Insert the loose end of the power adapter to the country's corresponding power cord into the wall outlet. Press any key on the Surveyor 4a to continue.
4. After the welcome screen, the following screen will be displayed. The Estimated Time to Charge (ETTC) and estimated current charge level of the internal battery back in percent will be displayed (IB%). The ETTC value will decrease as the full charge approaches. The IB% value will change until it reaches full recharge capacity.

Note: IB% is an estimate. Do not disconnect the Surveyor 4a from charging until prompted. Early disconnect can severely reduce the operating time.

5. The battery will automatically start to recharge. Press the Suspend key to pause the recharge process. Press Resume to restart the recharge process. During the recharge process, some of the original data will reset. Press the All Stats key to provide more detailed information on the recharge process.

Note: When the All Stats key is selected, it will be replaced with the Est Only key, which brings back the first charge mode menu.

Table 3 All Stats Information

Display	Description
Δt	The elapsed time from the beginning of the charging event. Charging stops when Δt exceeds approximately three and a half hours.
V _{peak}	The maximum voltage at any time during the charging event.
$-\Delta V$	The negative change of voltage (V _{peak} minus current voltage reading). Charging stops when $-\Delta V$ exceeds 60 mV.
ΔTCO	The change in temperature from the beginning of the charging event to the current time. Charging stops when ΔTCO exceeds 15 °C.
Init	Initial readings when the charge event was started.
Current	Current reading.
Parameters	Time, temperature, voltage (Volts), and battery charge capacity (%)

6. The Surveyor 4a will display “Charging Complete! Disconnect Charger for Normal Operation. Press any key...” when the charge event is complete.

Note: Charging is not complete when $ETTC=0$ or $IB\%=100$. Charging is complete when Δt equals or exceeds three and a half hours, $-\Delta V$ equals or exceeds 60 mV, or ΔTCO equals or exceeds 15 °C.

7. When IBP is fully recharged, disconnect the Surveyor 4a charge cable. The Surveyor 4a screen will display the NoConn message.

5.3 Battery Replacement

5.3.1 Internal Battery Replacement

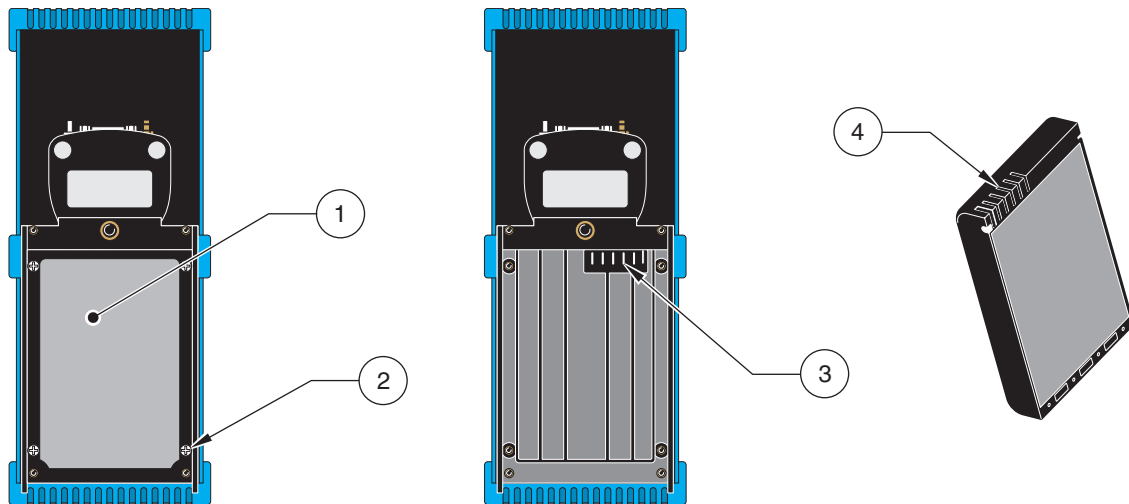
CAUTION

To prevent damage to internal components, avoid placing the battery next to a water source.

Replace the batteries on a clean, dry working surface.

1. Disconnect any cable connections to the Surveyor 4a.
2. Turn the Surveyor 4a upside down on the working surface.
3. Unscrew the four retaining screws with a Phillips screwdriver. Do not pull the screws completely out.
4. Lift and remove the back panel from the bottom of the Surveyor 4a.
5. Remove the old batteries from the compartment.
6. Insert the new battery, aligning the notches on the battery with the notches on the Surveyor 4a case.
7. Lightly coat the o-ring around the battery compartment with silicone grease. Do not use any other kind of grease.
8. Place the back panel over the battery compartment and screw the retaining screws. Do not overtighten the screws.

Figure 3 Removal and Installation of Battery



1. Battery Compartment/Back Panel	3. Battery Connector
2. Phillips-head screws (4) captive	4. Surveyor 4a Battery Terminal

5.3.2 Lithium Battery Replacement

CAUTION

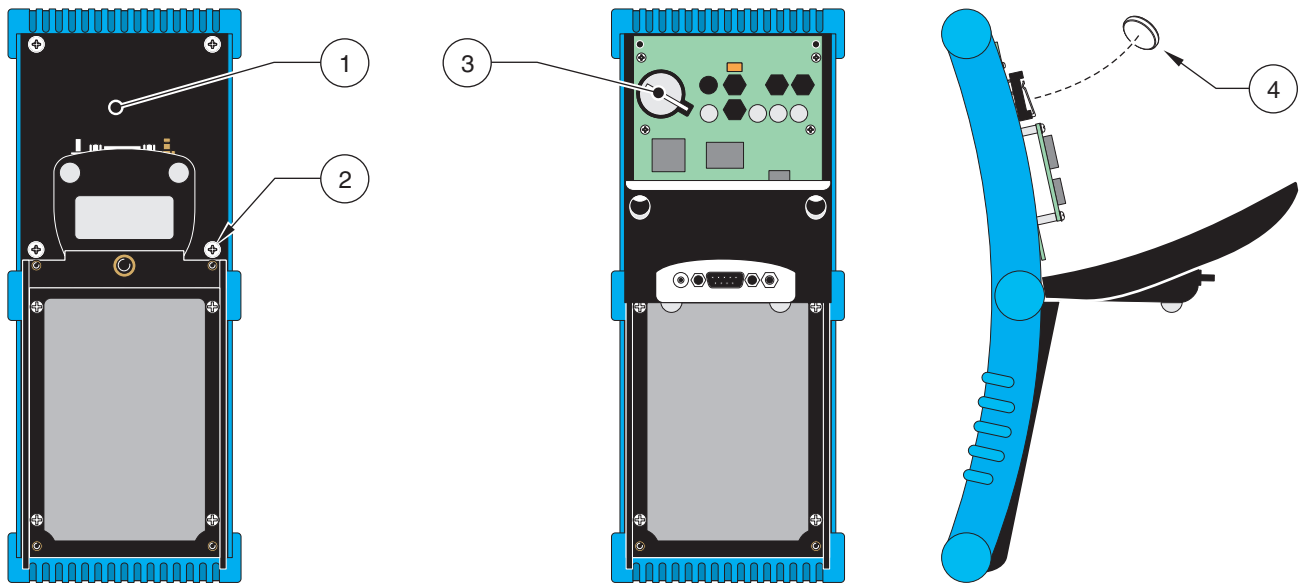
To prevent damage to the internal components, make sure the instrument is clean, dry and all cables are disconnected. Open the Surveyor 4a away from a water source.

The Surveyor 4a 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 the two-year period. This will prevent inaccurate readings of the internal clock and time-triggered logging.

To avoid damage to the internal components when opening the Surveyor 4a, make sure the instrument is clean and dry and that all cables are disconnected from the unit.

1. Turn the Surveyor 4a face down, so the front panel faces the work surface.
2. Unscrew the four retaining screws securing the top cover of the back panel with a Phillips screwdriver.
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).
4. Place one hand over the top cover and the bottom of the PCB. Lift the Surveyor 4a to a vertical position over the work surface, lithium battery facing down.
5. Place your thumb under the battery clip. Pull the clip away from the battery and let the battery slide out of the clip.
6. Insert the new battery. Observe polarity. Match the "+" on the battery with the "+" on the battery clip.
7. Replace the top cover over the PCB, insert and tighten the four retaining screws.
8. Reset the time and date after replacing the lithium battery. Press Setup/Cal, and Setup, then Clock.

Figure 4 Removing the Lithium Battery



1. Top Cover/Back Panel	3. Holder, Lithium Battery
2. Phillips-head screws (4) captive	4. Lithium Battery

5.4 Calibration

DANGER

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 caps, sensors, or other removable parts to disengage with force sufficient to cause serious injury.

Surveyor 4a calibration is not necessary, unless there is an option that requires calibration such as the internal barometer.

The Surveyor 4a can calibrate a multiprobe just like with a computer.

Proper maintenance of all sensors should proceed calibration. Refer to the Sonde user guide for detailed sensor maintenance procedures.

Security Level-2 is required for calibration.

1. Set the I/F mode to Series 3.
2. Press the Setup/Cal key.
3. Press the Calibrate key.
4. Press the Sonde key. A pop-up screen will displayed.
5. Highlight the parameter to be calibrated and press Select.
6. Follow the Surveyor 4a prompts using the appropriate calibration sections from the Sonde manual.

Section 1 Troubleshooting

1.1 Power Cables and Connections

Verify that the Surveyor 4a and the Sonde are properly connected.

Very that the Surveyor 4a and the Sonde are properly connected to the wall power outlet or external battery if used.

Verify that the input voltage to the Sonde is between 6.5 and 15 volts by adding IBV or XBV to the screen.

If the Surveyor 4a is drawing its power from its internal battery (IBP), verified the IBV (voltage) reading on the display and verify that the battery was properly installed. Check the battery polarity and voltage.

If the Sonde is equipped with an internal battery verify the IBV reading and verify that the battery was properly installed. Check the battery polarity and voltage.

Table 1

Symptom	Possible Solution
The Surveyor 4a will not power on.	Charge the battery
The Surveyor 4a battery expires quickly.	Check the backlight time out interval.
	Check to see if the GPS option was set to be constantly on.
	Check the screen shutdown or timeout interval.

1.2 Internal Components

To avoid damage to the internal components when opening the Surveyor 4a, make sure that the instrument is clean and dray and that all cables have been disconnected.

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

1.3 External Components

Table 2

Symptom	Possible Solution
The Surveyor 4a stirrer or circulator does not operate correctly.	The Sonde stirrer or circulator needs to be serviced. Refer to the maintenance chapter in the Sonde User or Operating Manual.

1.4 Communications

Symptom	Possible Solution
For Surveyor 4a software V1.10 and lower, the Surveyor 4a 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 4a download starts to initiate the Series 3 Sonde file download.	To recover from lock-up, disconnect the underwater cable from either the Series 3 Sonde or the Surveyor 4a, then press Abort or wait for the transfer to time-out.
Real-time readings from the Sonde are not displayed on the screen, or symbols instead of readings are displayed after connecting the Sonde to the Surveyor 4a.	Check the history line to determine how the Surveyor 4a is connected (NoConn, Series4Sonde, Series3Sonde, Charger, PC, or Terminal). Depending on the operation to perform, choose one of the connection types.
	Check cables and connections. Check baud rate settings. Important Note: If you are using 100 meter or longer cable and decide to switch to 19200, you may lose communications with the instrument. We recommend connecting the Sonde and Surveyor 4a with a shorter cable before switching the baud rate.

1.5 Surveyor 4a Software Symbols

The software symbols used for the Sonde parameters will also appear on the Surveyor 4a display. Note that “N/A” will be displayed as “N” on the Surveyor 4a screen.

Table 3 Surveyor 4a Software Symbols

Symbol	Description	Solution
(Blank)	Indicated that the reading is within expected range and does not present any anomalies.	No service required
#	Indicated that the reading cannot be taken for the parameter, it is out of range (above or below the Sonde measurement capability). For instance, if the Surveyor 4a battery voltage is out of range, the instrument will display # signs on the screen in place of the reading.	—
X	Indicated the Surveyor 4a is interrogating the Sonde for information, or that the parameter will keep a fixed value and will not update	—
-----	Indicates that the Surveyor 4a is interrogating the multiprobe for information, or that the parameter is not available or off-line (the reading will not update).	—
*	Reminder to set the time after changing the clock battery or parameter has never been calibrated after a reset.	—
&	After D/T, it indicates that the Surveyor 4a clock is not functioning.	Replace the lithium battery.
	After IB% Svr4a:%Left, it indicates that Surveyor 4a battery was removed.	Contact Technical Support.

Table 3 Surveyor 4a Software Symbols (continued)

Symbol	Description	Solution
!	For version before 1.10 only. when the Surveyor 4a is connected to an external power source, it indicated that the Surveyor 4a internal battery is expired.	Recharge the battery.
^	After D/T, it indicates that the Surveyor 4a clock battery is low.	Replace the battery.
	For versions before 1.10, after IB% Svr4a:%Left, it indicates that the Surveyor 4a battery was replaced or that the Surveyor 4a cannot detect the estimated battery status.	Perform a new discharge and recharge cycle.

1.6 Error Messages

Table 7 provides a quick reference for general error messages that may appear on the screen when working with the Sonde.

Table 4 Surveyor 4a Software Symbols

Message	Menu Tree ¹	Problem	Solution
NoConn	(History Line)	The instrument is not connected to any peripherals.	Check the Surveyor 4a and peripheral connections.
Graph parameter N/A	Graph/Tab	Appears any time the graph mode is switched when graph parameters have been removed from the tabular display.	Add more parameters to the tabular display.
Invalid or incomplete text!	Date & Time (or:) Files	Too few characters entered or invalid entry.	Use the BACKSPACE key and correct the entry.
No suitable X-axis Parameter! (or:) No suitable T-axis Parameter!	Display:Graph	No tabular display parameter is suitable for this axis.	Add more parameters to the tabular display.
Directory is FULL! Press any key...	Files	The files directory is full.	Delete one or more files.
Entry is outside of acceptable limits!	Display:Graph (or:) Files	An invalid number was entered or an unacceptable value.	Enter a correct figure.
No memory installed!	Reset:Files	The Surveyor 4a is not equipped with any logging memory.	Contact Technical Support.
External power is less than 11.4V, Check connections!	(History line) (Charger mode)	The instrument is connected to an external power source providing insufficient voltage.	Check the instrument and peripheral connections.
*Start must be before Stop!	Files	An incorrect start/stop time/datre was entered.	Enter the correct values.

1. Menu tree refers to the general menu where the error message can be found, not the specific place or places where it is displayed.

