

Congratulations !

You have purchased the latest in Handheld Conductivity-Salinity-Temperature instrumentation. We trust that your new **WP-84** will give you many years of reliable service.

The **WP-84** is a breeze to operate. This manual has been designed to help you get started, and also contains some handy application tips. If at any stage you require assistance, please contact either your local TPS representative or the TPS factory in Brisbane.

The manual is divided into the following sections:

1. Table of Contents

Each major section of the handbook is clearly listed. Sub-sections have also been included to enable you to find the information you need at a glance.

2. Introduction

The introduction has a diagram and explanation of the display and controls of the **WP-84**. It also contains a full listing of all of the items that you should have received with your **WP-84**. Please take the time to read this section, as it explains some of items that are mentioned in subsequent sections.

3. Main Section

The main section of the handbook provides complete details of the **WP-84**, including operating modes, calibration, troubleshooting, specifications, and warranty terms.

4. Appendices

Appendices containing background information and application notes are provided at the back of this manual.

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Model WP-84
Conductivity-Salinity-
Temp. Meter

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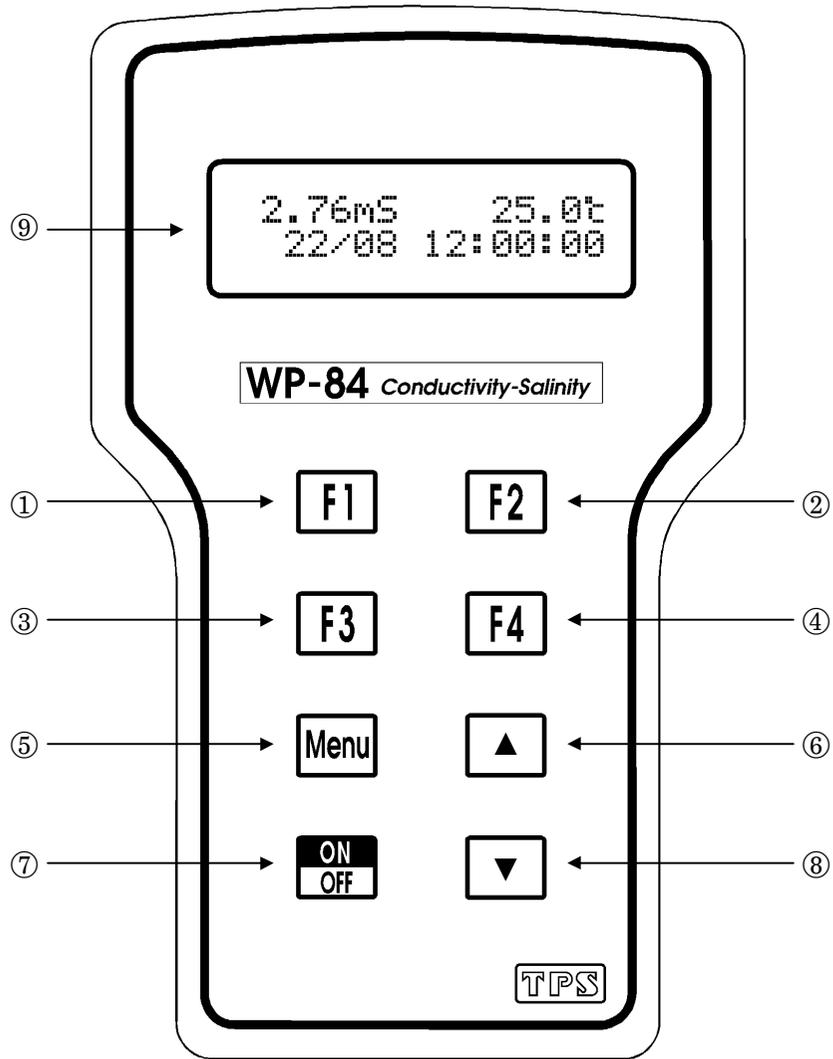
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1. Introduction

1.1 WP-84 Display and Controls



- ①  Press to record readings into memory. See section 8.1.
- ②  Press to show or hide the date and time. See section 12.2.

Also used to select k=0.1 or k=10 sensor, when standard k=1 sensor is not being used.
- ③  Press to start or stop automatic logging. See section 9.

Alternatively, press to transmit current reading plus date and time to the RS232 port (optional) See section 10.2.
- ④  Only used within the menu system on the **WP-84**.
- ⑤  Press to access the user-friendly menu system which makes the **WP-84** a breeze to operate.
- ⑥  and ⑧  The  and  keys are used when calibrating temperature readout (section 6), setting the clock (section 12.1), or setting the automatic logging period (section 9), and displaying GLP information (section 7).

The  key is also used to initialise the **WP-84** at turn-on. See section 14.
- ⑦  Switches the **WP-84** on and off.
- ⑨ **Display**
32 character alpha-numeric display with user-friendly menu and prompting system. Shows Conductivity/Salinity and Temperature simultaneously. Date and time can also be displayed.

1.2 Unpacking Information

Before using your new **WP-84**, please check that the following accessories have been included:

	Part No
1. WP-84 Conductivity-Salinity-Temperature Instrument	122159
2. k=1/ATC/Temperature Sensor, 1m cable	122201
3. 2.76mS/cm Conductivity Standard, 200mL	122306
4. 2 ppK Salinity Standard, 200mL	122307
5. Battery charger	130037
6. WP-84 Handbook	130050

Options that may have been ordered with your **WP-84**:

1. k=10/ATC/Temperature Sensor, 5m cable	122220
2. k=0.1/ATC/Temperature Sensor, 1m cable	122229
3. RS232 Serial Interface Option (includes cable)	130039
4. Hard Carry Case	130059
5. Battery charger lead for 12V cigarette lighter socket	130046
6. Solar Panel	130012
7. RS232 Printer	130031

Other spares:

1. 6V NiCad Battery	130038
2. RS232 Interface Cable	130041

1.3 Specifications

Conductivity

Ranges : 5 ranges, with automatic range selection.
 k=0.1 Sensor..... 2.000 μ S/cm to 20.00 mS/cm
 k=1.0 Sensor..... 20.00 μ S/cm to 200.0 mS/cm
 k=10 Sensor..... 200.0 μ S/cm to 2000 mS/cm

Resolution : 0.05% of selected range

Accuracy : \pm 0.2% of full scale of selected range

Salinity

Ranges : 5 ranges, with automatic range selection and linearising software.
 k=0.1 Sensor..... 1.000 ppM to 10.00 ppK
 k=1.0 Sensor..... 10.00 ppM to 100.0 ppK
 k=10 Sensor..... 100.0 ppM to 1000 ppK

Resolution : 0.1% of selected range

Accuracy : \pm 0.3% of full scale of selected range

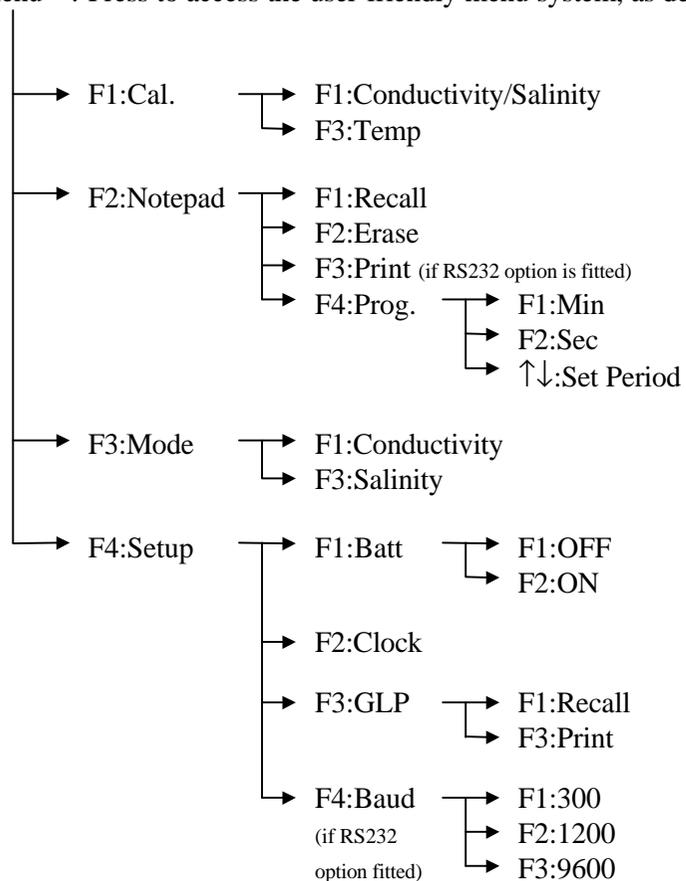
2. WP-84 Menu Structure

A detailed breakdown of the menu system of the **WP-84** is shown below. This diagram provides a quick reference for the menu functions available for the **WP-84**.

Press the function keys in normal display mode, to perform the following tasks:

- F1 : Press to record current data plus date and time into memory.
- F2 : Press to show or hide date and time.
- F3 : Press to start and stop automatic logging.
If logging period is set to zero, press to transmit current reading plus date and time to the RS232 port.

Menu : Press to access the user-friendly menu system, as detailed below.



3. Operating Modes

The **WP-84** has two operating modes : Conductivity and Salinity.

To select a mode, access the mode menu by pressing **[Menu]**, then **F3:Mode**.

1. F1:Conductivity

Displays Conductivity and Temperature readings simultaneously. Press **[F2]** to show or hide the date and time.

eg: **2.76mS 25.0°C**
31/12 12:00:00

Temperature is displayed as an overrange reading if the temperature probe is unplugged or faulty, or if the temperature reading is out of range.

eg: **2.76mS OVR°C**
31/12 12:00:00

2. F2:Salinity

Displays Salinity and Temperature readings simultaneously. Press **[F2]** to show or hide the date and time.

eg: **36.0ppK 25.0°C**
31/12 12:00:00

Temperature is displayed as an overrange reading if the temperature probe is unplugged or faulty, or if the temperature reading is out of range.

eg: **36.0ppK OVR°C**
31/12 12:00:00

3. Notes

- 1) The decimal point is replaced by a * if a Conductivity, Salinity or Temperature calibration has failed (sections 4.1, 5.1 and 6), or if the unit is initialised (section 14).

4. Conductivity Calibration

4.1 Calibration Procedure

1. Plug the Conductivity sensor into the **Sensor** socket.
If a k=0.1 or k=10 sensor is being used, ensure that the **WP-84** is set to the correct k factor before using the instrument (see section 13).
2. Switch the meter on. 
3. Select Conductivity Mode.  → **F3:Mode** → **F1:Conductivity**
4. Rinse the Conductivity electrode in distilled water. Shake off as much water as possible. Blot the outside of the electrode dry. **DO NOT BLOT THE ELECTRODE WIRES.**
5. **Zero Calibration**
Let the electrode dry in air.
Select Conductivity Calibration.  → **F1:Cal.** → **F1:Conductivity**
6. When the reading has stabilised at or near zero, press the  key to calibrate.
The * will not be removed after a zero calibration.
7. **Standard Calibration**
Allowable Conductivity standards are 150µS/cm, 1413µS/cm, 2.76mS/cm, 12.88mS/cm and 58.0mS/cm, and should be selected according to your range of interest.

If the **WP-84** does not recognise the standard, it will display the message, “**NOT STD**” during calibration. Calibration will fail if this message is displayed.

Place the electrode into a sample of Conductivity standard, so that it is immersed at least to the vent hole in the white plastic cover. The white plastic cover MUST be in place for correct readings.

DO NOT place the electrode directly into the bottle of standard. Discard the used sample of standard after use. It is advisable to use a narrow sample vessel to minimise the use of standard solution.

8. Select Conductivity Calibration.  → **F1:Cal.** → **F1:Conductivity**
9. When the reading has stabilised, press the  key to calibrate.
The * will now be replaced by a decimal point, if calibration was successful.
10. The **WP-84** is now calibrated for Conductivity and is ready for use in this mode.

4.2 Calibration Notes

1. A Zero calibration should be performed at least monthly. In low conductivity applications (where a zero error is particularly significant) a zero calibration may have to be done weekly.
2. A Standard calibration should be performed at least weekly. Of course, more frequent calibration will result in greater confidence in results.
3. Conductivity and Salinity calibration data is stored separately in memory. Ensure that the **WP-84** has been correctly calibrated for the mode in which it will be used. The **WP-84** does not require recalibration when alternating between Conductivity and Salinity modes, providing the instrument has been correctly calibrated for both.
4. All calibration information is retained in memory when the **WP-84** is switched off, even when the battery is removed. This information can be recalled or printed later using the GLP function (see section 7).
5. The **WP-84** displays the value of the standard to which it will attempt to calibrate. Ensure that the standard value displayed corresponds to the standard that you are using.
6. If the **WP-84** does not recognise the standard, it will display the message, “**NOT STD**” during calibration. Calibration will fail if this message is displayed.

4.3 Calibration Messages

1. If a Zero calibration has been successfully performed, the **WP-84** will display the following message, and the zero value of the electrode.
eg: **Calibrate OK**
Zero= 0.00uS
2. If a Standard calibration has been successfully performed, the **WP-84** will display the following message, and the k factor of the electrode.
eg: **Calibrate OK**
k= 1.0
3. If a Standard calibration has failed, the **WP-84** will display the following message, and the failed k factor of the electrode.
eg: **Calibrate Fail**
k= 1.5

5. Salinity Calibration

5.1 Calibration Procedure

1. Plug the Conductivity sensor into the **Conductivity/Salinity** socket.
If a k=0.1 or k=10 sensor is being used, ensure that the **WP-84** is set to the correct k factor before using the instrument (see section 13).
2. Switch the meter on. 
3. Select Salinity Mode.  → **F3:Mode** → **F3:Salinity**
4. Rinse the Conductivity electrode in distilled water. Shake off as much water as possible. Blot the outside of the electrode dry. **DO NOT BLOT THE ELECTRODE WIRES.**

5. Zero Calibration

Let the electrode dry in air.

Select Salinity Calibration.  → **F1:Cal.** → **F1:Salinity**

6. When the reading has stabilised at or near zero, press the  key to calibrate.
The * will not be removed after a zero calibration.

7. Standard Calibration

Allowable Salinity standards are 69.5ppM, 2.00ppK, 8.00ppK, and 36.0ppK, and should be selected according to your range of interest.

If the **WP-84** does not recognise the standard, it will display the message, “**NOT STD**” during calibration. Calibration will fail if this message is displayed.

Place the electrode into a sample of Salinity standard, so that it is immersed at least to the vent hole in the white plastic cover. The white plastic cover MUST be in place for correct readings.

DO NOT place the electrode directly into the bottle of standard. Discard the used sample of standard after use. It is advisable to use a narrow sample vessel to minimise the use of standard solution.

8. Select Salinity Calibration.  → **F1:Cal.** → **F1:Salinity**
9. When the reading has stabilised, press the  key to calibrate.
The * will now be replaced by a decimal point, if calibration was successful.
10. The **WP-84** is now calibrated for Salinity and is ready for use in this mode.

5.2 Calibration Notes

1. A Zero calibration should be performed at least monthly. In low salinity applications (where a zero error is particularly significant) a zero calibration may have to be done weekly.
2. A Standard calibration should be performed at least weekly. Of course, more frequent calibration will result in greater confidence in results.
3. Salinity and Conductivity calibration data is stored separately in memory. Ensure that the **WP-84** has been correctly calibrated for the mode in which it will be used. The **WP-84** does not require recalibration when alternating between Salinity and Conductivity modes, providing the instrument has been correctly calibrated for both.
4. All calibration information is retained in memory when the **WP-84** is switched off, even when the battery is removed. This information can be recalled or printed later using the GLP function (see section 7).
5. The **WP-84** displays the value of the standard to which it will attempt to calibrate. Ensure that the standard value displayed corresponds to the standard that you are using.
6. If the **WP-84** does not recognise the standard, it will display the message, “**NOT STD**” during calibration. Calibration will fail if this message is displayed.

5.3 Calibration Messages

1. If a Zero calibration has been successfully performed, the **WP-84** will display the following message, and the zero value of the electrode.
eg: **Calibrate OK**
Zero= 0.00ppM
2. If a Standard calibration has been successfully performed, the **WP-84** will display the following message, and the k factor of the electrode.
eg: **Calibrate OK**
k= 1.0
3. If a Standard calibration has failed, the **WP-84** will display the following message, and the failed k factor of the electrode.
eg: **Calibrate Fail**
k= 1.5

6. Temperature Calibration

6.1 Calibration Procedure

1. Plug the Conductivity/Temperature sensor into the **Sensor** socket.
2. Switch the meter on. 
3. Place the sensor into a beaker of room temperature water, alongside a good quality mercury thermometer. Stir the sensor and the thermometer gently to ensure an even temperature throughout the beaker.
4. Select Temperature Calibration.  → **F1:Cal.** → **F3:Temp**
5. The reading from the probe is now displayed on the right of the display, and the value you are going to set is shown on the left.
eg: → **25.0** ← **20*0°c**
↑↓:Set **F1:Cal.**
6. When the reading on the right has stabilised, press the  and  keys until the reading on the left shows the same temperature as the mercury thermometer.
7. Press the  key to calibrate the temperature readout.
The * will now be replaced by a decimal point, if calibration was successful.
Alternatively, press the  key to abort temperature calibration.

6.2 Calibration Notes

1. Temperature calibration information is retained in memory when the **WP-84** is switched off, even when the battery is removed. This information can be recalled or printed later using the GLP function (see section 7).
2. Temperature does not need to be recalibrated unless the sensor is replaced or the meter is initialised.

6.3 Calibration Messages

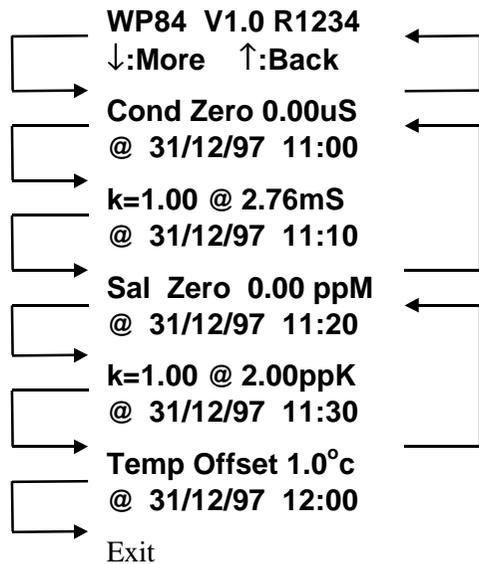
1. If a temperature calibration has been successfully performed, the **WP-84** will display the following message and the offset value of the probe.
eg: **Calibrate OK**
Offset= 1.0°c
2. If a temperature calibration has failed, the **WP-84** will display the following message, and the failed offset value of the probe.
eg: **Calibrate Fail**
Offset= 10.5°c

7. Good Laboratory Practices (GLP)

The **WP-84** keeps a record of the date and time of the last Conductivity, Salinity and Temperature calibrations as part of GLP guidelines. The zero and span values for Conductivity and Salinity are stored separately.

7.1 To recall GLP information on the display

1. Switch the meter on. 
2. Select the GLP menu.  → **F4:Setup** → **F3:GLP**
3. Select recall. **F1:Recall**
4. The instrument model, firmware version number, and instrument serial number are displayed, along with a prompt describing how to scroll through the GLP information.
eg: **WP84 V1.0 R1234**
↓:More ↑:Back
5. Press the  key to sequentially scroll through the GLP information for all parameters. Press the  key to scroll back to previous data. The sequence of information displayed is shown below. Press  to abort at any time.



7.2 Failed Calibration

If calibration has failed, the GLP function will reset the date and time to zero. The **WP-84** still shows the results of the last successful calibration.

eg: **Cond Zero 0.00uS k=1.00**
@ 00/00/00 00:00 @ 00/00/00 00:00

Sal Zero 0.00ppM k=1.00 Temp Offset 1.0°C
@ 00/00/00 00:00 @ 00/00/00 00:00 @ 00/00/00 00:00

Note that these calibration values are still used if further measurements are taken without recalibrating.

7.3 Printing GLP Information to the RS232 Port

The GLP information stored in the instrument's memory can be sent to a printer or PC via the RS232 port. This function is available only when the optional RS232 port is fitted.

1. Switch the meter on. 
2. Ensure that the **WP84** RS232 cable is connected to the instrument and to the printer or PC.
3. Send the GLP information to the RS232 port:
 → **F4:Setup** → **F3:GLP** → **F3:Print**
4. The GLP information is sent to the RS232 port in formatted ASCII text.

eg: WP84 V1.0 R1234 @ 31/12/97 12:00
 Conductivity Zero= 0.00uS @ 31/12/97 11:15
 Conductivity k= 1.00 @ 2.76mS @ 31/12/97 11:20
 Salinity Zero= 0.00ppM @ 31/12/97 11:30
 Salinity k= 1.00 @ 36.0ppK @ 31/12/97 11:35
 Temperature Offset= 1.0oC @ 31/12/97 11:00
 ENDS

7.4 Instrument Serial Number

In case the serial number that is fitted to the rear of the **WP-84** is removed or becomes illegible, it is also available on the **WP-84** display.

- The serial number is displayed at turn-on,
eg: **WP-84 V1.0 R1234**
Cond. Sal. Temp.
where **R1234** is the serial number.
- The serial number is display when recalling the GLP information (section 7.1).
- The serial number is included on the printout of GLP information (section 7.3).

7.5 Additional GLP Features

Another GLP requirement is to record the date and time of every reading. The **WP-84** does this for you when readings are recorded either with the Notepad function (section 8) or the Automatic Logging function (section 9).

8. Notepad Function

8.1 Recording Readings into the Notepad

To record readings into the Notepad memory:

1. Press **F1** in normal display mode. The display should now look like this:
eg: **2.76mS 25.0°C** or **2.00ppK 25.0oc**
F1: 1 12:00:00 **F1: 1 12:00:00**
2. If you now press **F1**, the Conductivity/Salinity, Temperature, Date and Time will be recorded into the notepad, and labeled as reading number 1.
3. Repeat steps 1 & 2 as often as required. The maximum number of readings that can be stored in the Notepad is 150.

8.2 Recalling Records from the Notepad

To recall records from the Notepad onto the **WP-84** display:

1. Select the Notepad menu **Menu** → **F2:Notepad**
2. Select Recall from the menu **F1:Recall**
3. Record number 1 is now displayed,
eg: **2.76mS 25.0°C**
1 F2:Clock
4. Press **F2** to alternatively display the date and time or the data for this record.
Press **▲** to move forward through the records.
Press **▼** to move backward through the records.
Press and hold the **▲** or **▼** keys to roll rapidly through the readings.

8.3 Erasing Records from the Notepad

To erase all records from the Notepad:

1. Select the Notepad menu **Menu** → **F2:Notepad**
2. Select Erase from the menu **F2:Erase**
3. The **WP-84** now asks if you are sure that you wish to erase all records.
Erase, You Sure?
F1:Yes F2:No
4. Press **F1** to erase all records from the Notepad
Press **F2** to quit without erasing the records from the Notepad.

8.4 Printing Records from the Notepad to the RS232 Port

This function is only available when the optional RS232 port is fitted.

1. Connect one end of the RS232 cable to the **Charger/RS232** socket of the **WP-84**. The charger, optional solar panel, or optional car battery lead can be connected into the spare socket on the cable for long term use, if required.
2. Connect the other end of the RS232 cable to an RS232 Printer, or to COM1 or COM2 of a PC.
3. Ensure that the baud rate for the printer or PC and the **WP-84** are the same. If necessary, alter the baud rate of the **WP-84** (see section 10.1). The **WP-84** uses XON/XOFF protocol. Ensure that the printer is set accordingly.
4. Select the Notepad menu. Menu → **F2:Notepad**
5. Select Print from the menu. **F3:Print**
Printing starts as soon as F3 is pressed. The display shows the word “**Printing**” until printing is completed.

9. Automatic Datalogging

The **WP-84** can automatically log records into the Notepad. First the logging period must be programmed, then automatic logging can be started and stopped as required.

1. Select the Program menu Menu → **F2:Notepad** → **F4:Prog.**
2. The display should now look like this:
eg: →00← **F1:Min F2:Sec**
 ↑↓:**Set Period**
3. Use the ▲ and ▼ keys to set the period at which the **WP-84** will automatically log records.
4. When the logging period has been correctly set, select whether this period is in minutes or seconds.
Press F1 to save the period as minutes.
press F2 to save the period as seconds.
eg: If the period was set to **05**, followed by F2, then the **WP-84** will automatically log a record every 5 seconds.
5. If the optional RS232 port is fitted, the **WP-84** will ask if the records are to be logged into the Notepad, or sent directly to the RS232 port.
Press F1 to log records into the Notepad (maximum of 150 readings).
Press F3 to send records directly to the RS232 port.
6. The automatic logging function is now programmed, and can be started and stopped as required.
7. To start automatic logging, press F3 in normal display mode.
If the **WP-84** is logging into the Notepad, the display will look like this:
eg: **2.76mS 25.0°C**
 Log# 1 12:00:00
The log number will increment and the **WP-84** will beep each time a reading is recorded.
If the **WP-84** is sending records directly to the RS232 port, the display will look like this:
eg: **2.76mS 25.0°C**
 Sending 12:00:00
The **WP-84** will beep each time a record is sent to the RS232 port.
8. Press F3 to stop automatic logging.
9. **Note:** The clock must be set before the **WP-84** will allow automatic logging to start. The message "**Clock Not Set**" is displayed if the clock is not set.

10. RS232 Port

This section is applicable if the optional RS232 port is fitted.

10.1 Setting the Baud Rate

1. Select the RS232 Set-up menu Menu → **F4:Setup** → **F4:Baud**
2. The available baud rates are listed on the display.
ie: **F1:300** **F2:1200**
 → **F3:9600**

The arrow shows the current selection.

3. Press F1 to select 300 baud
Press F2 to select 1200 baud
Press F3 to select 9600 baud.
Press Menu to quit and retain the current setting.

10.2 Sending Readings to the RS232 Port

Press F3 to instantly send readings to the RS232 port whenever the **WP-84** is in normal display mode. This function is disabled if the automatic logging period is set to greater than zero (see section 9).

Records can be sent directly to the RS232 port rather than stored in memory during automatic datalogging. See section 9 for details.

10.3 RS232 Configuration

The **WP-84** RS232 configuration is 8 bits, No Parity, 1 Stop Bit, XON/XOFF Protocol.

10.4 Communication and Statistical Software

Communication between the **WP-84** and a PC can be handled with any RS232 communication software. The diskette supplied by TPS contains a BASIC program for this purpose. The diskette also contains set-up files for use with Terminal (supplied with Windows[®] 3.1 & 3.11) and for HyperTerminal (supplied with Windows[®] 95).

Once the data is saved to disk, the next problem is how to use it. The data is formatted columns that can be imported by programs such as Microsoft[®] Excel[®] and Lotus 123[®]. The diskette supplied by TPS when the RS232 option is fitted contains a sample file for Excel[®] 5.0 that is set up to import **WP-84** data files.

Information on how to use the software is provided in the README files on the diskette.

10.5 Commands

The following commands can be sent from a PC to the **WP-84**. Note that <cr> denotes carriage return and <lf> denotes a line feed.

Action	Command	Notes
Request current data	?D<cr>	Returns the current Conductivity/Salinity, Temperature, date and time from the WP-84 . The log number returned is set to Zero.
Request logged data	?R<cr>	Returns all logged records from the WP-84 memory. The data ends with the message ENDS <cr>
Erase logged data	?E<cr>	Erases all logged records from the WP-84 memory. Returns the message ERASED <cr> to confirm that the records have been erased.
Request status information	?S<cr>	Returns the model name, firmware version number, instrument serial number and number of logged readings in memory, eg: WP84♦♦V1.0♦R1234♦9999 <cr>, where ♦ are spaces. Note that the number of logged readings is right-justified.
Request GLP information	?G<cr>	Returns all calibration GLP information, plus the instrument model and current date (see section 10.6 for data format and handshaking).

10.6 Data Format

- A.** Data is returned to the RS232 port by the **WP-84** in the following format when requested by a PC with the ?D or ?R commands (section 10.5):

LLLL•DDDDDDUUU•TTTTTToCm•dd/mm/yy•hh:mm:ss<cr>

- or B.** Data is sent to the RS232 port by the **WP-84** in the following format when it is sent by the **WP-84** using the Print function (section 8.4) or the Instant Send function (section 10.2):

LLLL•DDDDDDUUU•TTTTTToCm•dd/mm/yy•hh:mm:ss<cr><lf>

- where:** **LLLL** is the Log Number. Maximum 4 characters, right justified. A Zero is sent for instant readings (section 10.2).

♦ is one space.

DDDDDD is the Conductivity or Salinity Data. Maximum 6 characters, right justified.

UUU is the unit description, either “uS♦”, “mS♦”, “ppM” or “ppK” (where ♦ is 1 space).

♦ is one space.

TTTTTT is the Temperature Data. Maximum 6 characters, right justified.

oCm is the Temperature unit description. The **WP-84** sends “oC♦” for temperature data (where ♦ is one space).

♦ is one space.

dd/mm/yy is the date, month and year data.

♦ is one space.

hh:mm:ss is the hours, minutes and seconds data.

- C.** GLP information is returned as 6 lines terminated by a carriage return. The computer must respond with a character after receiving each line.

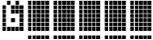
eg: WP84 V1.0 R1234 @ 31/12/97 12:00
 Conductivity Zero= 0.00uS @ 31/12/97 11:15
 Conductivity k= 1.00 @ 2.76mS @ 31/12/97 11:20
 Salinity Zero= 0.00ppM @ 31/12/97 11:30
 Salinity k= 1.00 @ 36.0ppK @ 31/12/97 11:35
 Temperature Offset= 1.0oC @ 21/12/97 11:00
 ENDS

11. Battery Saver Function

The **WP-84** is equipped with a battery saver function. If no button has been pressed for five minutes, the unit beeps and flashes the display for 20 seconds, and then shuts off. This function can be switched off for continuous use.

To enable or disable the battery saver function:

1. Switch the meter on. 
2. Select Battery Saver Set-up  → **F4:Setup** → **F1:Batt**
3. The battery saver menu is now displayed.

eg: **Batt Saver** **F1:OFF**
 **100%** → **F2:ON**

The arrow indicates the current selection.

The bar graph and percentage indicate the approximate level of charge in the battery.

4. Press **F1** to disable the battery saver function for continuous use.
Press **F2** to enable the battery saver function. The meter will switch itself off if no key has been pressed for five minutes.
Press  to quit the battery saver menu and retain the current setting.
5. **NOTE:** For troubleshooting purposes, the battery volts can also be displayed in the battery saver menu. Press **F3** to display battery volts.

The  symbol flashes when the battery volts drops below 5.60 volts.
At 5.00 volts the meter turns itself off.

12. Clock Function

12.1 Setting the Clock

1. Select the Clock Set-up menu **Menu** → **F4:Setup** → **F2:Clock**
2. The display now shows the current date and time. The cursor starts at the day.
eg: **31/12/96** **12:00**
F1:← **F2:→** **↑↓:Set**
3. Press the **▲** and **▼** keys until the day is correct.
4. Press **F2** to move to the month. Press the **▲** and **▼** keys until the month is correct.
5. Press **F2** to move to the year. Press the **▲** and **▼** keys until the year is correct.
6. Press **F2** to move to the hour. Press the **▲** and **▼** keys until the hour is correct.
7. Press **F2** to move the cursor to the minutes. Press the **▲** and **▼** keys until the minutes are correct.
8. Check that the date and time are correct.
Press **F2** to save the settings.
If any changes are needed, press the **F1** key to move left to the desired position.
Press **Menu** to quit without resetting the clock.

Notes

1. The **WP-84** does not test for a valid day of the month when setting the clock (eg: attempting to enter 31/02/96 is not corrected).
2. The **WP-84** does test for leap years.

12.2 Displaying or Hiding the Clock

The date and time are normally displayed along with the Conductivity/Salinity and Temperature readings. Press **F2** in normal display mode to alternatively display or hide the clock.

13. Selecting k=0.1 or k=10 Sensors

The **WP-84** automatically recognises a k=1.0 sensor. The **WP-84 does not** automatically recognise k=0.1 or k=10 sensors. When a k=0.1 or k=10 sensor is used, the **WP-84** must be set to the correct k factor before use. The following procedure describes how to select a k=0.1 or k=10 sensor.

1. Switch the meter **OFF** with the  key.
2. Connect the k=0.1 or k=10 sensor.
3. Press and HOLD the  key while switching the meter back on.
4. The k factor selection menu is now displayed (only if the k=0.1 or k=10 sensor is connected).

eg: **Select** → :**k=0.1**
k Factor :**k=10**

The arrow indicates the current selection.

5. Press  to select a k=0.1 sensor.
Press  to select a k=10 sensor.
Press  to quit buffer selection and retain the current setting.

6. Notes

- 1) The manual k factor selection is kept in memory when the meter is switched off, even if the battery is removed.
- 2) The manual k factor selection is reset to k=10 during initialisation.
- 3) The **WP-84** will always automatically recognise a k=1.0 sensor, regardless of the manual k factor selection.
- 4) Calibration settings for k=0.1, k=1.0 and k=10 sensors are **NOT** stored separately. The **WP-84** requires recalibration when a new k factor sensor is connected.

14. Initialising the WP-84

If the calibration settings of the **WP-84** exceed the allowable limits, the unit may need to be initialised to factory default values. This action may be required if the electrode is replaced.

To initialise the **WP-84**:

1. Switch the **WP-84** off, by pressing the  key.
2. Press and hold the  key while switching the **WP-84** back on with the  key.
3. The following messages should be displayed:
Initialized then: **WP84s V1.0 R1234**
MUST ReCalibrate **Cond. Sal. Temp.**
(The “s” after **WP-84** is shown when the RS232 serial port option is fitted)
4. The meter then displays Conductivity and Temperature. Note that the decimal points have been replaced with a *, to indicate that the unit requires recalibration.

Note: When the **WP-84** is initialised, the manual k factor selection is re-set to k=10. See section 13 if you wish to select a k=0.1 sensor.

15. Instrument firmware version number.

If you need to phone or fax TPS for any further technical assistance, the version number of your **WP-84** firmware may of benefit to us. The version number is displayed by the **WP-84** at turn-on.

16. Troubleshooting**16.1 General Errors**

Error Message	Possible Causes	Remedy
Factory Cal. Failed See Handbook	The EEPROM chip which contains the factory calibration information has failed.	The unit must be returned to TPS for service. <ul style="list-style-type: none"> • Conductivity and Salinity readings will be accurate. only if used in same range in which it was calibrated. • Temperature readings may be up to 10% incorrect.
Memory Failed Calibration Lost Initialised MUST ReCalibrate	User calibration settings have been lost or corrupted.	Re-calibrate the instrument. A full 2-point calibration will be required for Conductivity and Salinity (see sections 4.1 & 5.1) and a 1 point calibration for temperature (see section 6).
Flashing  symbol.	Battery is below 5.60 volts.	Recharge the battery. Note that the unit will switch itself off when the battery falls below 5.00 volts.
Meter displays the word OFF , and switches off.	Battery is below 5.00 volts.	Recharge the battery. If this fails, check the charger. If charger OK, replace the battery.
Meter will not turn on.	1. Battery is exhausted. 2. Faulty Instrument	Recharge the battery. If this fails, check the charger. If charger OK, replace the battery. Return to factory for repair.
Battery does not charge up when charger is connected.	1. Faulty battery charger or faulty battery. 2. Faulty instrument.	1. Connect the charger and switch the power on. Display the battery volts in the battery saver menu (see section 11). If the battery volts are increasing then the charger is OK. If the battery volts do not increase, then the charger is faulty. Replace the charger or the battery, as required. 2. Return to factory for repair.

16.2 Conductivity and Salinity Troubleshooting

Symptom	Possible Causes	Remedy
Unit fails to calibrate, even with new electrode.	Calibration settings outside of allowable limits due to previous failed calibration.	Initialise the unit. See section 14.
Unit attempts Span calibration instead of Zero calibration.	Electrode has Zero error.	Thoroughly rinse electrode in distilled water and allow to completely dry in air before attempting zero calibration. If instrument does not calibrate at Zero with electrode disconnected, then the instrument is faulty.
Standard calibration fails, and k factor is greater than 0.133, 1.33 or 13.3, (depending on k factor of sensor).	<ol style="list-style-type: none"> 1. Electrode is not immersed deeply enough. 2. Electrode may have a build-up of dirt or oily material on electrode wires. 3. Platinum-black coating has worn off. 4. Standard solution is inaccurate. 5. Electrode is faulty. 6. Faulty instrument. 7. k-factor incorrectly set if using k=0.1 or k=10 sensor. 	<p>Immerse electrode at least to the vent hole in the white plastic cover.</p> <p>Clean electrode, as per the instructions detailed in section 18.1.</p> <p>Electrode requires replatinisation. Return to the factory, or see details in section 18.2.</p> <p>Replace standard solution.</p> <p>Return electrode to factory for repair or replacement.</p> <p>Return to factory for repair.</p> <p>Set the correct k-factor, as per section 13.</p>

Continued next page...

Conductivity and Salinity Troubleshooting, continued...

Standard calibration fails, and k factor is less than 0.075, 0.75 or 7.5, (depending on k factor of sensor).	<ol style="list-style-type: none"> 1. White protective cover is not fitted or upside down. 2. Standard solution is inaccurate. 3. Electrode may have a build-up of conductive material, such as salt. 4. Electrode is faulty. 5. Faulty instrument. 6. k-factor incorrectly set if using k=0.1 or k=10 sensor. 	<p>The white protective cover MUST be fitted for correct readings. The vent hole must be towards the cable end of the electrode.</p> <p>Replace standard solution.</p> <p>Clean electrode, as per the instructions detailed in section 18.1.</p> <p>Return electrode to factory for repair or replacement.</p> <p>Return to factory for repair.</p> <p>Set the correct k-factor, as per section 13.</p>
Inaccurate readings, even when calibration is successful.	<ol style="list-style-type: none"> 1. Electrode may have a build-up of dirt or oily material on electrode wires. 2. Platinum-black coating has worn off. 	<p>Clean electrode, as per the instructions detailed in section 18.1.</p> <p>Electrode requires replatinisation. Return to the factory, or see details in section 18.2.</p>
Readings drift.	<ol style="list-style-type: none"> 1. Electrode may have a build-up of dirt or oily material on electrode wires. 	<p>Clean electrode, as per the instructions detailed in section 18.1.</p>
Readings are low or near zero.	<ol style="list-style-type: none"> 1. Electrode may have a build-up of dirt or oily material on electrode wires. 2. Electrode is not immersed deeply enough. 3. Electrode is faulty. 4. Faulty instrument. 5. k-factor incorrectly set if using k=0.1 or k=10 sensor. 	<p>Clean electrode, as per the instructions detailed in section 18.1.</p> <p>Immerse electrode at least to the vent hole in the white plastic cover.</p> <p>Return electrode to factory for repair or replacement.</p> <p>Return to factory for repair.</p> <p>Set the correct k-factor, as per section 13.</p>

16.3 Temperature Troubleshooting

Symptom	Possible Causes	Remedy
Displays "OVR°C" when electrode is plugged in.	1. Faulty electrode. 2. Faulty instrument.	Fit new electrode, part number 122201. Return to factory for repair.
Temperature inaccurate and cannot be calibrated.	1. Faulty connector. 2. Faulty electrode. 3. Faulty instrument.	Check the connector and replace if necessary. Fit new electrode, part number 122201. Return to factory for repair.

17. Warranty

TPS Pty. Ltd. guarantees all instruments and electrodes to be free from defects in material and workmanship when subjected to normal use and service. This guarantee is expressly limited to the servicing and/or adjustment of an instrument returned to the Factory, or Authorised Service Station, freight prepaid, within twelve (12) months from the date of delivery, and to the repairing, replacing, or adjusting of parts which upon inspection are found to be defective. Warranty period on electrodes is three (3) months.

There are no express or implied warranties which extend beyond the face hereof, and TPS Pty. Ltd. is not liable for any incidental or consequential damages arising from the use or misuse of this equipment, or from interpretation of information derived from the equipment.

Shipping damage is not covered by this warranty.

PLEASE NOTE:

A guarantee card is packed with the instrument or electrode. This card must be completed at the time of purchase and the registration section returned to TPS Pty. Ltd. within 7 days. No claims will be recognised without the original guarantee card or other proof of purchase. This warranty becomes invalid if modifications or repairs are attempted by unauthorised persons, or the serial number is missing.

PROCEDURE FOR SERVICE

If you feel that this equipment is in need of repair, please re-read the manual. Sometimes, instruments are received for "repair" in perfect working order. This can occur where batteries simply require replacement or re-charging, or where the electrode simply requires cleaning or replacement.

TPS Pty. Ltd. has a fine reputation for prompt and efficient service. In just a few days, our factory service engineers and technicians will examine and repair your equipment to your full satisfaction.

To obtain this service, please follow this procedure:

Return the instrument AND ALL SENSORS to TPS freight pre-paid and insured in its original packing or suitable equivalent. INSIST on a proof of delivery receipt from the carrier for your protection in the case of shipping claims for transit loss or damage. It is your responsibility as the sender to ensure that TPS receives the unit.

Please check that the following is enclosed with your equipment:

- **Your Name and daytime phone number.**
- **Your company name, ORDER number, and return street address.**
- **A description of the fault. (Please be SPECIFIC.)**
(Note: "Please Repair" does NOT describe a fault.)
- **either \$13.50 for return freight for units under warranty,
or \$24 to cover inspection costs and return freight.**
(These amounts are not applicable to full-account customers.)

Your equipment will be repaired and returned to you by air express where possible.

For out-of-warranty units, a repair cost will be calculated from parts and labor costs. If payment is not received for the additional charges within 30 days, or if you decline to have the equipment repaired, the complete unit will be returned to you freight paid, not repaired. For full-account customers, the repair charges will be debited to your account.

- **Always describe the fault in writing.**
- **Always return the sensors with the meter.**

18. Appendices

18.1 Care, Cleaning and Maintenance of Conductivity Electrodes

18.1.1 Care of Conductivity electrodes

The conductivity section of the electrode supplied with your **WP-84** consists of two platinum wires that are plated with a layer of “platinum-black”. This is quite a soft layer and is required for stable, accurate measurements. In time, the platinum-black layer may wear off in some applications, at which time the electrode will require replatinising (see section 18.2). You can help to maintain the platinum-black layer by following these simple rules:

1. **NEVER** touch or rub the electrode wires with your fingers, cloth etc.
2. Avoid using the electrode in solutions that contain a high concentration of suspended solids, such as sand or soil, which can abrade the electrode wires. Filter these types of solutions first, if possible.
3. Avoid concentrated acids. If you must measure acids, remove the electrode immediately after taking the measurement and rinse well with distilled water.

Conductivity electrodes can be stored dry. Ensure that the electrode is stored in a covered container, to avoid dust and dirt build-up.

18.1.2 Cleaning of Conductivity of Electrodes.

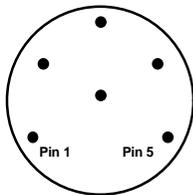
Platinised platinum Conductivity electrodes can only be cleaned by rinsing in a suitable solvent. **DO NOT wipe the electrode wires**, as this will remove the platinum-black layer.

1. Rinsing in distilled water will remove most build-ups of material on the electrode wires.
2. Films of oils or fats on the electrode wires can usually be removed by rinsing the electrode in methylated spirits.
3. Stubborn contamination can be removed by soaking the electrode in a solution of 1 part Concentrated HCl and 10 parts distilled water. The electrode should not be soaked for more than approximately 5 minutes, otherwise the platinum-black layer may start to dissolve.
4. If all of these methods fail, then the last resort is to physically scrub the electrode wires, which will remove the contaminant and the layer of platinum-black. Use only a cloth or nylon scouring pad. **DO NOT USE STEEL WOOL.** The electrode will then need to be cleaned in HCl, as per step 3 and replatinised, as per section 18.2.

18.2 Replatinising Conductivity Electrodes

There are several ways to replatinise Conductivity electrodes.

1. The simplest way is to return the electrode to the TPS factory. We can fully clean the electrode, replatinise it and test all aspects of its performance.
2. An automatic replatiniser is available from TPS, along with replatinising solution. This will plate the electrodes for the right amount of time at the correct current. Ordering details are as follows:
Automatic Conductivity Electrode Replatiniser Part No 122160
20mL Platinising Solution (suitable for approx 30 uses) Part No 122300
1. Conductivity electrodes can be manually replatinised, according to the following procedure:
 - 1) Soak the electrode in a solution of 1 part Concentrated HCl and 10 parts distilled water for approximately 5 minutes.
 - 2) Rinse the electrode well in distilled water.
 - 3) Immerse the electrode in platinising solution at least to the vent hole in the white plastic cover. Platinising solution is available from TPS (part no 122300). Alternatively, platinising solution can be prepared by dissolving 1g of Hydrogen Chloroplatinate (H_2PtCl_6) in 30mL of distilled water, and including about 0.01g of Lead Acetate ($(\text{CH}_3\text{COO})_2\text{Pb}$) and a drop or two of concentrated HCl.
 - 4) Apply a direct current of 10mA between pins 1 and 5 of the electrode plug, as per the diagram below. Reverse the polarity every 30 seconds. After approximately 8 minutes (4 minutes per electrode wire), they should have an even “soot” like appearance. Avoid excess current and this will cause incorrect platinising.
 - 5) After platinising, rinse the electrode well in distilled water.
 - 6) If you have any doubts about any of these steps, then you should consider returning the electrode to the factory. The cost of replatinising is quite low, and you will be guaranteed of the best possible result.



Electrode Connector