Turtle Dive Logger

Submersible position, depth, temperature and immersion status data logger

Technical Manual

Version 4.0

Contents
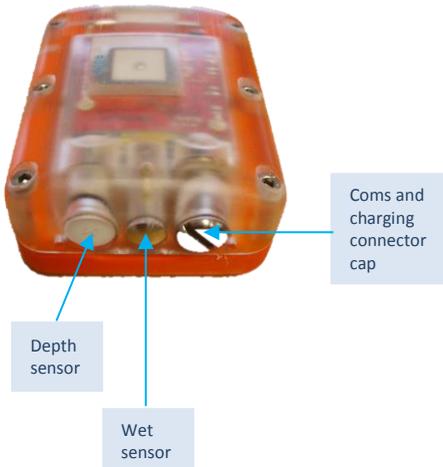
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1. Introduction

The **Turtle Dive Logger** is a fully self-contained submersible data logger. It is very simple to operate, logging automatically on contact with water. All the user need do is download the data and charge the batteries.

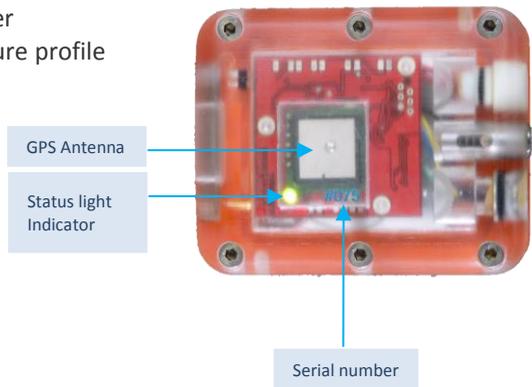The Turtle Dive Logger logs:
- The geographical position when on the surface of the water
- Dive depth and temperature profile while underwater

TOP VIEW OF TURTLE DIVE LOGGER
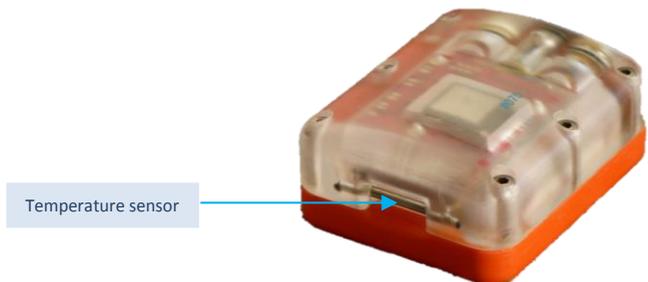
GPS Antenna

Status light Indicator

FRONT VIEW OF TURTLE DIVE LOGGER

Serial number

Coms and charging connector cap

BACK VIEW OF TURTLE DIVE LOGGER

Depth sensor

Wet sensor

Temperature sensor

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2. Turtle Dive Logger Specifications

Position:	GPS Module: Fastrax P500
Logging Interval:	Surface 10 to 60 seconds (user adjustable)
	Dive 1 to 60 seconds (user adjustable)
Depth:	40m water depth
Temperature:	Range 0 to 40˚C
Batteries:	3 x Sanyo Eneloop Nickel Metal Hydride
	Thermal and short circuit protection fitted
Memory:	4 megabytes: equivalent to about 200,000 surface records or 800,000 dive records.
	Data is retained even if the batteries go flat

Schematics

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PRESSURE SENSOR   VENT PLUG   CHARGING AND COMS PORT

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6 OF M4x8 DEEP
MOUNTING HOLES

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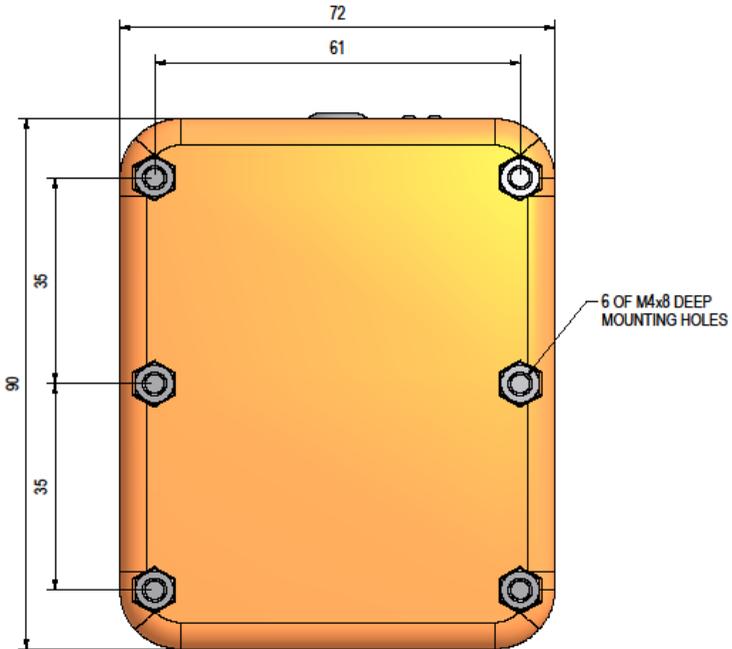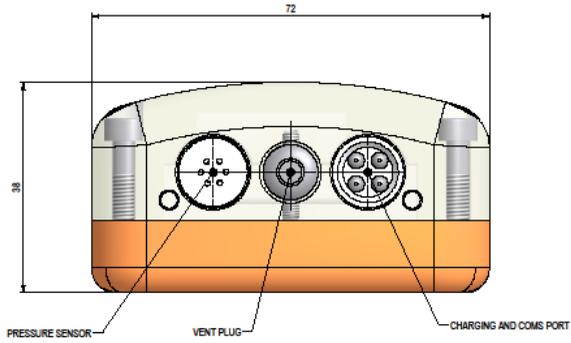
3. Operating the Turtle Dive Logger

Overview

Operation of the Turtle Dive Logger has been designed to be as simple and reliable as possible. When the Turtle Dive Logger is out of the water, it enters a low power deep sleep mode. When it detects water, it wakes up and enters the logging mode, logging data according to its situation, either on the surface or diving.

On the surface the Turtle Dive Logger records the position data - latitude, longitude and UTC date and time - from the GPS. During a dive, it records temperature, water depth, UTC date and time.

The Turtle Dive Logger features a small flashing light visible through the housing. The color and flashing sequence indicate the status and operation mode of the Turtle Dive Logger (see table below).

Every 12 seconds		Description
1 flash	Green	Idle
	Red	Idle, low battery
2 flashes	Green Green	Good battery, good GPS fix
	Red Green	Low battery, good GPS fix
	Red Red	Low battery, invalid GPS fix
	Green Red	Good battery, invalid GPS fix
	Green Orange	Good battery, diving (GPS Off)
	Red Orange	Low battery, diving (GPS Off)
3 flashes	All Red	Flat battery shutdown
4 flashes	All Red	Memory full
Long flash	Green	Dry to wet state change

When the diver comes out of the water, the Turtle Dive Logger will continue to record its position for 30 minutes, flashing as in surface swim mode before going into deep sleep mode.

The Turtle Dive Logger can store many days of dive data. To offload the data, the Turtle Dive Logger is connected to a computer using the download cable and then the program 'TurtleCom' is used.

Charging your Turtle Dive Logger

CHARGING CONNECTOR

Using a coin, unscrew the connector cap and attach the charging connector onto the Turtle Dive Logger.

Plug the charger into a mains power socket.

The red power and red charge light should light up and the green 'ready' light will flash for the first minute. During this time the charger is assessing the status of the batteries. After 1 minute the green light will stop flashing and the charge light will remain on until charging is complete. The red charge light will go off and the green 'ready' light will flash.

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Charging may take up to 4 hours.

Once the batteries are fully charged, disconnect the charger from the mains and THEN disconnect the charging plug from the Turtle. Do not replace the connector cap for at least 30 minutes, to allow any gas to vent off through the charging connector.

Ensure the O ring on the connector cap is clean and has some grease on it. If it is dry, apply a light wipe of grease, such as Vaseline. Screw the cap back into position using a coin. It is not necessary to apply excessive force to tighten the cap.

The batteries in the Turtle do not have a memory which reduces the capacity as with some other battery types. However it is recommended that every 6 months or so, the batteries should be completely discharged. This can be done by pressing the 'Discharge' button on the charger prior to following the charging sequence.

Activating the wet sensor

The stainless steel temperature sensor and charging vent plug are the contacts for the Wet Sensor.
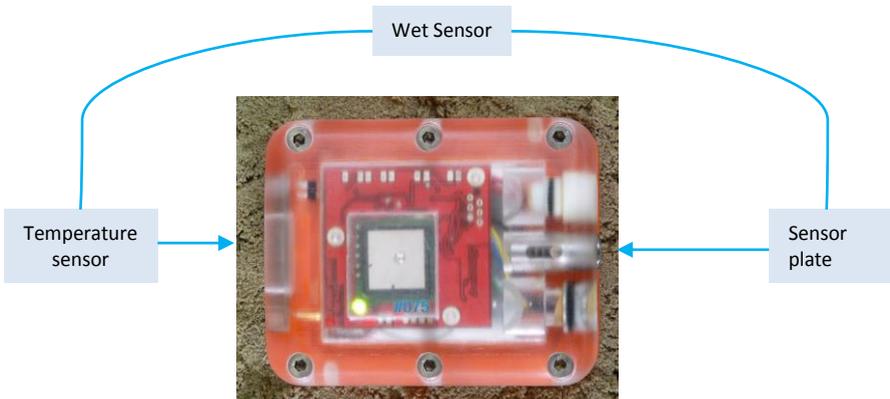
The Wet Sensor needs to be activated to prompt the Turtle to download data from satellites which assist with rapid position fixing. To activate the Wet Sensor, simply dip the Turtle briefly in water.

To minimize position acquisition time, it is recommended that the Turtle has 10 minutes of clear unobstructed sky view at the start of the day prior to use. This enables it to map the relevant satellite data and so re-acquire position data more quickly after a dive.

4. Communicating with the Turtle

To communicate with Turtle Diver Loggers, the windows software Paua Logger is required. This can be found on the USB flash drive supplied with the Logger coms cable or downloaded from:

http://www.zebra-tech.co.nz/downloads.

Paua Logger will operate on XP, Vista and Windows 7 computer operating systems. It will not run on a Mac.

Installing Paua Logger Software

Installation and operation of Paua Logger has been designed to be as simple as possible. Unfortunately, computers are complicated and vary greatly due to differing ages and operating system versions. As a result, there may be variations in the installation procedure.

> **NOTE!**
> **Do not connect the Paua Logger to your computer until you have installed the software.**

1) Insert the USB flash drive into your PC or visit the Zebra-Tech web site and download the install file. Locate "Install Paua Logger" file and double click it.

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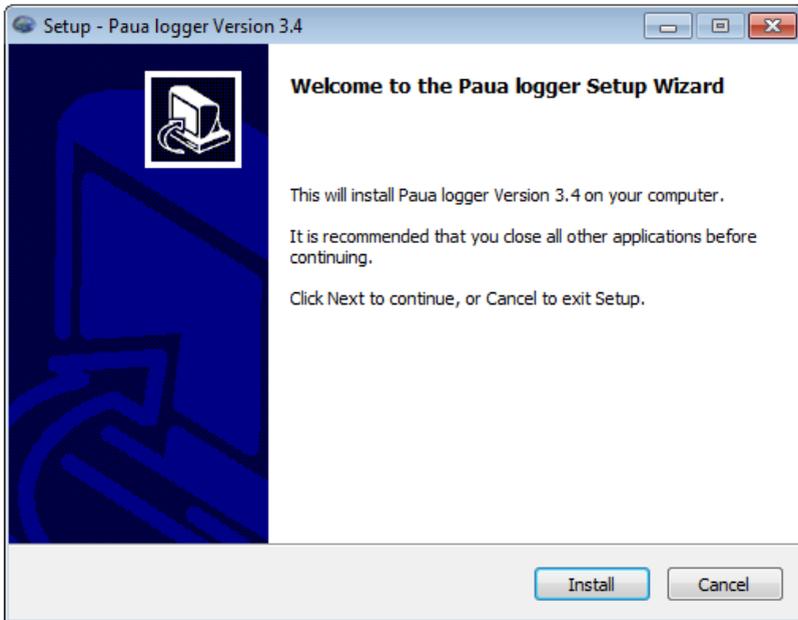
2) Clicking the install button should complete installation.

After installation, a separate install window will open whilst the necessary serial drivers are installed. If the window doesn't automatically close after 30 seconds, then it should be closed manually by clicking the close button in the top right hand corner.

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```
C:\DOCUME~1\John\LOCALS~1\Temp\ckz_5JF4\DPInst_Monx86.exe          _ □ ✕
32-bit OS detected
"C:\DOCUME~1\John\LOCALS~1\Temp\ckz_5JF4\DPInstx86.exe"
Installing driver....................
```
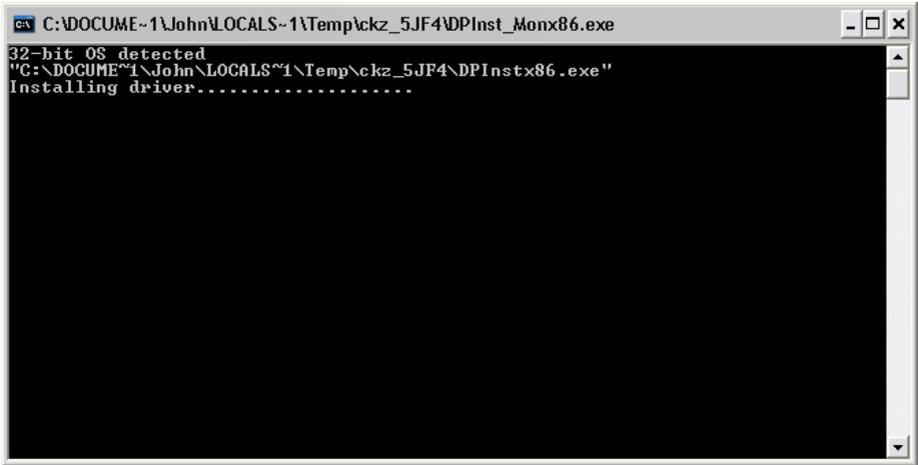
Operating Paua Logger Software

Once Paua logger software has been installed on your computer, connect the Paua Logger to the computer using the communication cable. Wait a few seconds while the computer detects the Boat Logger.

Locate Paua Logger. There should be an icon on your desktop. Double clicking the icon should start Paua Logger.

Paua Logger Icon

Alternatively, Paua Logger can be started from your program list in the usual way. (Click on 'start', then 'All Programs' and open 'Paua Logger' in your list of programs.)

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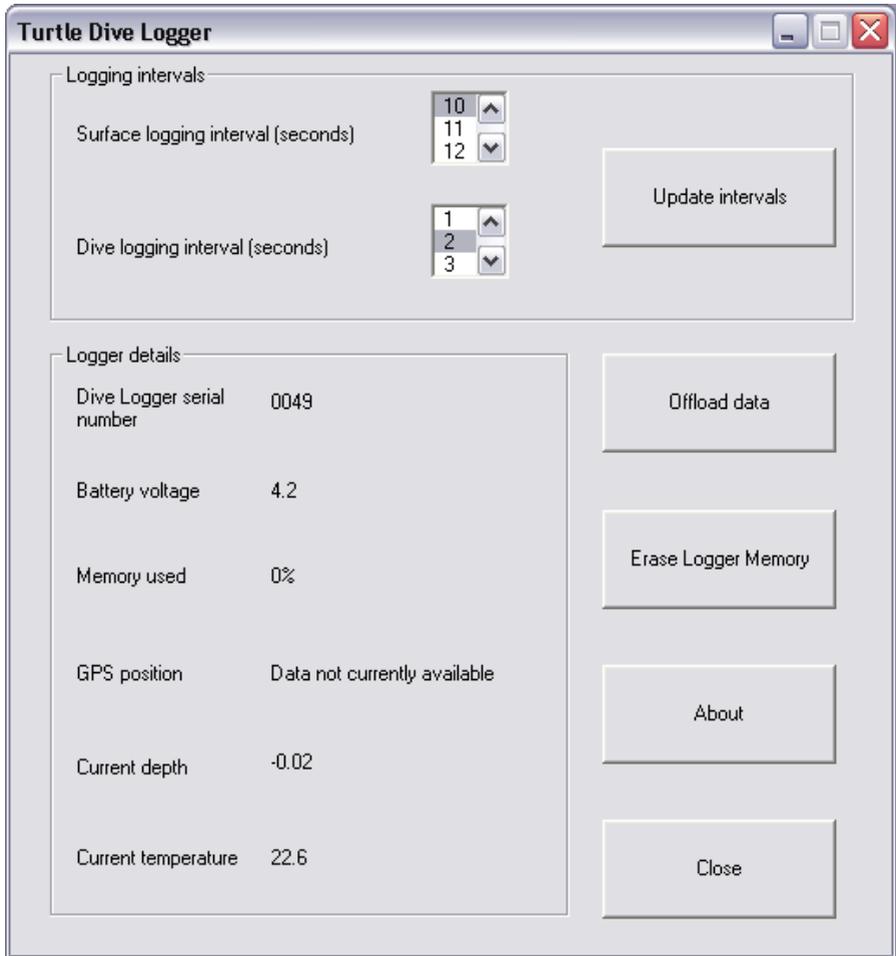
TURTLECOM MAIN WINDOW

Update Interval

To change either the surface logging or dive logging intervals, select the required interval and then press the 'Update intervals' button. Note that the logger memory has to be erased before this can occur. Once set, the update interval settings will always be retained, even if the battery runs flat.

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Erase Logger Memory
To avoid completely filling the Turtle Dive Logger memory, erase the memory after you have offloaded the data.

About
This displays the current version of TurtleCom and the firmware version running on your Turtle Dive Logger.

Diver Logger serial number
This is a unique number allocated to each Turtle Dive Logger. The same number is engraved on the housing of the Turtle Dive Logger.

Battery voltage
When fully charged, the Turtle Dive Logger battery voltage is around 4 volts. When the voltage is around 3.3 volts, the batteries are getting low and should be charged. The Turtle Dive Logger stops functioning at around 3 volts.

Memory used
This displays the percentage of memory currently used.

GPS Position
If the Turtle Dive Logger is receiving satellite position data, the current GPS position is displayed.

Current depth
This is the depth as measured by the sensor. At sea level in air, it should be measuring around 0 meters. It will vary slightly due to changes in atmospheric pressure.

Current temperature
This is the current temperature as measured by the Turtle Dive Logger. If you touch the temperature sensor, you should see this change.

Offload data

Press the 'Offload data' button to offload data from the Turtle Dive Logger to your computer. The format of the data file is ASCII text, comma separated.

An example section of the data file is shown below:

```
1,6,5:22:51,26/12/2009,-42.41525, 173.65549,1,1,0.00,15.3,4.0
1,6,5:23:1,26/12/2009,-42.41523, 173.65543,1,.8,-0.01,15.4,4.0
1,6,5:23:11,26/12/2009,-42.41522, 173.65532,1,.8,0.00,15.4,4.0
1,6,5:23:21,26/12/2009,-42.41523, 173.65527,1,.8,0.00,15.3,4.0
2,6,5:23:23,26/12/2009,,,,,1.20,15.3,4.0
2,6,5:23:24,26/12/2009,,,,,2.31,15.2,4.0
2,6,5:23:25,26/12/2009,,,,,3.11,15.2,4.0
2,6,5:23:26,26/12/2009,,,,,3.81,15.2,4.0
2,6,5:23:27,26/12/2009,,,,,4.21,15.2,4.0
2,6,5:23:28,26/12/2009,,,,,4.13,15.2,4.0
2,6,5:23:29,26/12/2009,,,,,3.94,15.1,4.0
2,6,5:23:30,26/12/2009,,,,,3.99,15.1,4.0
2,6,5:23:31,26/12/2009,,,,,4.20,15.1,4.0
2,6,5:23:32,26/12/2009,,,,,4.42,15.1,4.0
2,6,5:23:33,26/12/2009,,,,,4.36,15.1,4.0
2,6,5:23:34,26/12/2009,,,,,4.07,15.1,4.0
2,6,5:23:35,26/12/2009,,,,,3.81,15.1,4.0
2,6,5:23:36,26/12/2009,,,,,3.42,15.1,4.0
2,6,5:23:37,26/12/2009,,,,,2.37,15.1,4.0
2,6,5:23:38,26/12/2009,,,,,0.79,15.2,4.0
1,6,5:24:3,26/12/2009,-42.41526, 173.65526,1,.8,0.00,15.2,4.0
1,6,5:24:13,26/12/2009,-42.41526, 173.65526,1,.9,0.00,15.5,4.0
1,6,5:24:23,26/12/2009,-42.41527, 173.65524,1,1.3,0.03,15.2,4.0
1,6,5:24:33,26/12/2009,-42.41523, 173.65526,1,.8,-0.01,15.3,4.0
2,6,5:24:37,26/12/2009,,,,,1.19,15.5,4.0
2,6,5:24:38,26/12/2009,,,,,2.16,15.2,4.0
2,6,5:24:39,26/12/2009,,,,,3.20,15.2,4.0
2,6,5:24:40,26/12/2009,,,,,4.18,15.2,4.0
2,6,5:24:41,26/12/2009,,,,,4.56,15.2,4.0
2,6,5:24:42,26/12/2009,,,,,4.85,15.2,4.0
2,6,5:24:43,26/12/2009,,,,,4.84,15.1,4.0
2,6,5:24:44,26/12/2009,,,,,4.47,15.1,4.0
2,6,5:24:45,26/12/2009,,,,,3.91,15.1,4.0
2,6,5:24:46,26/12/2009,,,,,3.24,15.1,4.0
2,6,5:24:47,26/12/2009,,,,,2.25,15.1,4.0
2,6,5:24:48,26/12/2009,,,,,0.95,15.2,4.0
1,6,5:25:10,26/12/2009,-42.41524, 173.65527,1,.8,0.02,15.2,4.0
1,6,5:25:20,26/12/2009,-42.41525, 173.65526,1,.8,-0.01,15.2,4.0
2,6,5:25:22,26/12/2009,,,,,0.86,15.4,4.0
2,6,5:25:23,26/12/2009,,,,,1.89,15.2,4.0
2,6,5:25:24,26/12/2009,,,,,2.37,15.2,4.0
2,6,5:25:25,26/12/2009,,,,,2.79,15.2,4.0
2,6,5:25:26,26/12/2009,,,,,3.13,15.2,4.0
2,6,5:25:27,26/12/2009,,,,,3.68,15.2,4.0
2,6,5:25:28,26/12/2009,,,,,3.98,15.1,4.0
```

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The table below provides descriptions of the columns in the data file.

Column:	Description:
1	Dive log/surface log (1 = Surface log & 2= dive log)
2	Turtle Dive Logger serial number
3	UTC Time (H:M:S)
4	UTC Date (D/M/Y)
5	Latitude (Degrees. Decimal degrees)
6	Longitude (Degrees. Decimal degrees)
7	Fix indicator (1 = valid, 0 = invalid)
8	HDop (see below)
9	Depth (meters)
10	Temperature (degrees C)
11	Battery voltage

HDop Value Rating Description

<1 Ideal This is the highest possible confidence level to be used for applications demanding the highest possible precision at all times.

1-2 Excellent At this confidence level, positional measurements are considered accurate enough to meet all but the most sensitive applications.

2-5 Good Represents a level that marks the minimum appropriate for making a business decision. Positional measurements could be used to make reliable in-route navigation suggestions to the user.

5-10 Moderate Positional measurements could be used for calculations, but the fix quality could still be improved. A more open view of the sky is recommended.

10-20 Fair Represents a low confidence level. Positional measurements should be discarded or used only to indicate a very rough estimate of the current location.

>20 Poor At this level, measurements are inaccurate by as much as 300 meters with a 6 meter accurate device (50 DOP x 6 meters) and should be discarded.

After offloading data from the Turtle Dive Logger to your computer, check to ensure the offloaded data file is present on your computer. Once you are sure the data has been successfully offloaded, erase the Turtle Dive Logger memory by pressing Erase Logger Memory to avoid offloading duplicate data next time round.

Disconnect the communication cable from the Turtle. Ensure the O-ring on the connector cap is clean and has some grease on it. If it is dry, apply a light wipe of grease, such as Vaseline. Screw the cap back into position using a coin. It is not necessary to apply excessive force to tighten the cap.

Radio Linked Turtle Diver Logger and Paua Boat Loggers

A radio module can now be optionally fitted to the Turtle Diver Logger and Boat Logger. This allows data to be transferred easily from the Turtle to the Boat Logger.

How do you know if a Turtle or Boat Logger is Radio capable?
Radio capable loggers have a lightning bolt engraved next to the serial number on the top face.

⚡ 1234

How to offload data
The Boat Logger initiates the radio download. There are two places where this can be done: Main menu and at the end of the fishing trip.

How many Turtles will the Boat logger download?
The Boat Logger will search for and download up to four Turtles during each download event. If all Turtles are not downloaded, you can repeat the download process.

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Will the Boat Logger offload any radio Turtle?
Yes, any radio Boat Logger will offload any radio Turtle dive logger within range.
All Turtle data values are Turtle serial number linked. So even if different Boat
Loggers offload a single Turtle, the data will be re-assembled by the Dragonfly
database.

What is the range?
The Turtle needs to be less than 4 meters away the Boat Logger for a reliable
radio link, although this may vary with conditions.
Is the data secure?
Yes, only Paua Boat Loggers can offload the data from Turtle Diver Loggers. Other
devices such as smart phones cannot access the data.

Is the battery life of the Radio Turtle Diver Logger reduced?
The radio system is ultra-low power, so the battery life of radio capable Turtles
and Boat Loggers should not have noticeably changed.

What data is offloaded?
Only a statistical summary of new dive data is offloaded via the radio link. This
includes:

- the start position of each dive
- the dive duration
- average dive depth
- maximum dive depth

Only new data that has been collected since the last radio download is off-loaded.
The more detailed dive data is retained on the Turtle as previously and can be
offloaded onto a PC in the usual way at any time.

Trouble Shooting
During the download, an Error occurs.
This may occur if:

- the distance between Turtle and Boat Logger is too great
- there is excessive interference from other devices
- there are too many radio Turtles within range
- the battery on the Turtle is getting flat

The Boat Logger doesn't detect any Radio Turtles
If you know there are Radio Turtles within range, try again.
The Turtle batteries may be getting too flat.

The data download takes a long time
The data rate of the radio link is slower than the PC data download method. If there is a lot of data, this could take many minutes. To avoid long downloads, download the Turtle regularly, ideally after every fishing trip.

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5. Google Earth

When data is offloaded from the Turtle, in addition to the data file, a file is created containing of all the valid geographical positions logged. This file can be displayed using Google Earth if installed on the PC.

The position data file can be found in the same location as the data file. It has the same name as the data file, but the extension is .kml. Simply double clicking this file should cause it to open it in Google Earth.

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6. Further Assistance

For further assistance with this or any other **Zebra-Tech** product, please contact:

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Fax: International 0064 3 548 0466

Email: enquiry@zebra-tech.co.nz
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