Tag User Manual

Draft version 1.93



Contents	
1 Connecting a Tag to a PC using Bluetooth	3
1.1 Bluesoleil Bluetooth	3
1.1.1 Bluesoleil Software Installation	3
1.1.2 Using Bluesoleil	5
1.1.3 Re-assigning a COM Port	8
1.1.4 Closing an Established Link	13
1.1.5 Running TagConfig from an Established Bluetooth Link (Bluesoleil)	13
1.2 Toshiba Bluetooth	15
1.2.1 Installing the Drivers	15
1.2.2 Establishing a Connection using Bluetooth	15
1.2.3 Running TagConfig from an Established Bluetooth Link (Toshiba)	22
1.3 Bluetooth Using Windows 10 Standard Driver	23
1.3.1 Establishing a Bluetooth Connection using Windows 10	23
1.3.2 Running TagConfig Using Windows 10 Bluetooth Driver	27
2 TagConfig	29
2.1 Downloading TagConfig	29
2.2 Running TagConfig	29
2.2.1 Setting the Tag Time	32
2.2.2 Downloading Data from a Tag	32
2.2.3 Setting GPS Sample Rate	38
2.2.4 Configuring CTD for Test Mode	38
2.2.5 Changing the PTT Number	41
3 Programming a Tag	43
3.1.1 Installing Renesas Software v4.09	43
3.1.2 Configuring the Renesas fdt v4.09 Software	44
3.1.3 Tag Programming with Renesas fdt v4.09 Basic Software	47
4 Tag Operation	52
4.1 Tag Activation and Functionality	52
4.1.1 Tag Testing	53
4.2 Tag Operation	55
4.3 Synchronising two SMRU tags via Bluetooth	55

4.3.1 Synchronising SMRU tag with Vemco VMTs

1 CONNECTING A TAG TO A PC USING BLUETOOTH

All recent tags (v1.80 PCBs onwards) incorporate a Bluetooth device for communication. These may be identified by the presence of the Bluetooth module on the underside of the tag (similar to the large silver can inscribed with the text RN-42 below):



In addition, these tags usually have the test-port on the side of the tag back-filled with epoxy resin.

Please consult with SMRU if you wish to communicate or program a tag which is not equipped with Bluetooth.

Almost any Bluetooth device installed on a PC may be used to communicate with a tag. Once a Bluetooth communication channel has been established between a PC and a tag then it is possible to either re-program a tag (using Flash Development Toolkit) or re-configure tag parameters/ download data using "TagConfig", a program developed by SMRU.

The method of establishing a Bluetooth connection varies among PC's. This document will show three different approaches:

- using a proprietary Bluetooth driver (Bluesoleil) and dongle.
- using a Toshiba Bluetooth, common on many Toshiba laptop PCs.
- using the Windows 10 standard driver and dongle.

Note 1: There is a limitation of approximately 2Mb data exchange when the Bluesoleil driver is used with an un-licenced Bluetooth dongle. A licence however may be purchased from the Bluesoleil website.

1.1 Bluesoleil Bluetooth

1.1.1 Bluesoleil Software Installation

Installation of Bluesoleil software requires several PC re-boots so it is advisable to close all other applications before commencing with the installation.

Use Add/remove programs in the control panel to first remove all previous Bluetooth Installations – conflict can occur between different Bluetooth drivers, then re-start the PC.

Install the Bluesoleil software is from the CD provided with the dongle or downloaded from the BlueSoleil website. Use default settings, when prompted. The following is the installation sequence from a CD:

Select the appropriate language from the drop-down menu and press 'OK'.



Select 'Next' when prompted.



Tick the 'Accept Licence Agreement' button and then press 'Next'



Select 'Next' when prompted



Select 'Install' when prompted to commence software installation.



When installation is complete, press the 'Finish' button.



Re-booth the PC by pressing the 'Yes' button.



1.1.2 Using Bluesoleil

Insert the Dongle provided in to one of the PC's USB ports and allow time for the PC to recognise the new device.

A Bluetooth symbol () should be evident in the corner of the desktop.

Hover the mouse over the Bluetooth icon and use the mouse button (usually right side) to open the menu, select 'Turn on Bluetooth'. **Note** – the device may automatically turn-on when the device is inserted into the PC.



Place a magnet behind the tag, on the right-hand side (as shown) – a red LED will flash once per second then the magnet has successfully engaged the Bluetooth.



V1.8PCB



Note: On more recent PCB designs (v1.84b) the flashing red LED is located on the same side as the magnet

Hover the mouse over the Bluetooth icon and use the mouse button (usually right side) to open the menu, select 'Display Classic View'



A new window will open and the Bluetooth device will search for all devices within range.



A manual search can be made using the mouse – using the right-hand button, hover over the orange disc and select 'Search Devices'



Use the mouse to double-click on the tag device (tags are generically identified as RN42...). With the mouse over the device, use the right hand mouse button to select 'Connect Bluetooth Serial Port'.



Note: Bluesoleil may flash a prompt window requesting a pairing code. If this occurs then use "1234" as the pairing code and press enter. Where tags have been specifically paired for operation then the pairing code becomes the 5-digit serial number of the other tag.

When pairing is successful then a new COM port will be created, and identified in a pop-up menu. Also, the 'device' will change to a green colour. The LED on the back of the tag will also change from a red flash to a continuous green. In the following example, the software has automatically chosen COM16 for the Bluetooth device.



Once the Bluetooth link is established it is possible to use TagConfig to view and set the various tag parameters, provided the appropriate COM port is selected in TagConfig. Valid ranges are from 1-99.

Note 1: Each connection to a different tag will result in a new icon on the screen. To simplify when using with many tags, it would be advisable to delete a tag from the window when finished using. This is achieved by using the right-hand mouse button over the appropriate icon and selecting 'Delete', as shown:



The following details how to re-assign a COM port.

1.1.3 Re-assigning a COM Port

From an established link, use the right mouse button to select 'Disconnect Bluetooth Serial port'. In the example below, the established connection was COM port 16.



The icon will change from green to blue and the LED on the back of the tag will turn from a continuous green to a flashing red, once a second.



Close the Bluesoleil application.

Via the Control Panel, navigate to the 'Ports' sub-menu (Control Panel -> System Properties -> Device Manager -> Ports) – see below.

Select the COM port which the Bluetooth device identified (in the above example, this was COM 16) and use the right mouse button and select 'Properties'.



A new window will open corresponding to the Bluetooth COM port. Select 'Port Settings' from the tab menu.

Bluetoot	h Serial Port	COM16) Properties	? 🗙
General	Port Settings [Driver Details	
Į	Bluetooth Seria	Port (COM16)	
	Device type:	Ports (COM & LPT)	
	Manufacturer:	IVT Corporation	
	Location:	Location 3	
Devic	ce status		
This If you start	device is working u are having prob the troubleshoote	properly. ems with this device, click Troubleshoot to r.	
		Iroubleshoot	
<u>D</u> evice	usage:		
Use th	is device (enable)		*
		ОКС	ancel

Select 'Advanced'

20200	Port Settings	Dian	Detaile		
eneral	1 on Settings	Driver	Details		
		<u>B</u> its pe	er second:	9600	*
			<u>D</u> ata bits:	8	~
			<u>P</u> arity:	None	*
			<u>S</u> top bits:	1	*
		<u>F</u> lo	ow control:	None	~
			<u>A</u> d	vanced <u>B</u>	estore Defaults
					100 B

Use the drop-down menu to Set a new COM port number, recommended values are 1, 2, 3, 4, 5, 6, 7 or 8. Ignore the fact that the port may already be in use.

Select lower settings to	ires 16550 compatible L	JART)		ОК
Select higher settings (ior faster performance	Diomis.		Cancel
Select higher settings i	or raster performance.			Defaults
<u>R</u> eceive Buffer: Low (1)		6	— 🗍 High (14) (14)
<u>I</u> ransmit Buffer: Low (1)	r <mark></mark>	i.		16)
COM Port Number: COM3 (i	n use) 🔽			
COM3 (in COM4 (in	n use)		ice Manager	
COM5 (ii COM6 (ii	n use)		ee manager	Eile Action U
COM7 (ii	nuse)			
COM8 (ii COM9 (ii	n use)		led drivers are	
COM10 COM11	(in use		e for drivers.	SMPC-SNH
COM12 COM13	(in use 0	K Cancel		E Bluetool
COM14	(in use			E 😨 Comput
COM16	pfiles			
COM17	rdware profile	s provide a way for you t	o set up and store	E S DVD/CD
СОМ19	erent hardwa	re configurations.		🗄 🖾 Human I
cut to WM Convert COM21		Ha	ardware Profiles	H C IDE ATA
tox COM22 COM23				🗄 🕥 Mice and
	(in use			
COM25	(in use)		Canad	E B Network
asa 3 Shortcut to COM27 TextPad COM28	20 23			📕 🗐 Athe
COM29				Blue
		POF	8	Rea
COM32		CTD Duither D		

Press 'OK'

Advanced Setting	s for CON	116						? 🛛
Use FIFO t Select lowe Select high	ouffers (requ er settings to ier settings f	ires 16550 o correct co or faster pe	compatible UAR nnection probler rformance.	T)				OK Cancel
<u>R</u> eceive Buffer:	Low (1)				-0	High (14)	(14)	Defaults
<u>I</u> ransmit Buffer:	Low (1)				 7	High (16)	(16)	
COM Port Number:	COM3 (i	n use) 🗸						

Press 'Yes' if prompted in a 'Communication port Properties' window.

Co	mmur	nications Port Properties
(Ų	This COM name is being used by another device (such as another com port or modem). Using duplicate names can lead to inaccessible devices and changed settings. Do you want to continue?
		<u>Y</u> es <u>N</u> o

Close the 'Bluetooth Serial Port Window' by pressing 'OK', then close the 'Device Manager', 'System Properties' and 'Control Panel' windows.

Restart the PC.

The Bluetooth should now operate as detailed in Section 2.3.2, with the new COM port selected.

Note: In exceptional circumstances an error may occur when trying to reconnect when using the new COM port. If this occurs then use 'Device Manager' to re-asign to another COM ports which are available (remember; 1-8 is the full range available), the re-start the PC.

1.1.4 Closing an Established Link

From an established link, use the right mouse button to select 'Disconnect Bluetooth Serial port'. In the example below, the established connection was COM port 16.



The icon will change from green to blue and the LED on the back of the tag will turn from a continuous green to a flashing red, once a second.



Close the Bluesoleil application.

1.1.5 Running TagConfig from an Established Bluetooth Link (Bluesoleil)

Establish a Bluetooth connection as described in the previous section

Once the Bluetooth link is established, run the file TagConfig.exe. A window similar to the following window will open:

🕡 TaqConfiq v207		_ D X
Body Null settings Clear form Retrieve for Tag monitor PC time 04Mar-2020 09:36:48 UTC Pause Tag time not connected UTC Set time Decidal Depth AD m Accelerometer VetDy Wet <	ntag Save to tag tex Owner Calibrate Error Pitch 2 *	Beset count Serial port COM1 Connect Baud: (V1.83 and earlier (13.2k) (V1.84 and later (57.6k) Port: - not connected TxRx
Battery mV Calibrate Factor: x Pressure sensors C.C. k1 mV/bar x FSD: m GPS Debugging	k2 k3 k3 k5 k6	Temp *C InPPFD umol/m2/s Tag memory
Interval mins Test Levet Thermistor calibration 0ffset 0 C H0 2740 ohm Slope 0 C H0 4220 ohm Slope 10 C H1 6180 ohm Slope 25 C H3	Try: Interval s BT slave Set Serial no: Passkey:	Allocated Used TDR Save Debug Save Dump All Reset
Extra thermistor calibration Offset 0 C H0 2740 ohm Image: Comparison of the compar	CTD calibration Interval: TDR duration: Initial delay:	s (99 = off) Log when dry days (0 = text) Enable Fluoro s Offset s <u>CTD test</u>
Artest Potting: (no transmissions) Argos: every ges: after secs, then every mins Phone: kB after secs, then every mins Logging: /100s Schedule: h to Tag software	GSM Interval: hours Offset: mins Provider V 0 APN:	Detecting serial ports Found 18 serial ports
	FTP IP:	Sea Mammal Research Unit Instrumentation

Use the drop-down menu to select the connected Bluetooth COM port and then press the "Connect" button.

The TagConfig application should now be running, indicating tag time etc. and the Bluetooth status LED on the tag should show continuous green rather than flashing red.

To disconnect from TagConfig, press the "Disconnect" button (see below) and then close the application.

Before removing the magnet from the tag ensure the Bluetooth is disconnected on the BlueSoleil program (sometimes auto-disconnects when TagConfig is closed, but this is not always the case).

TagConfig v207		_ D X
Body 1 Null settings Clear form Retrieve fro	m tag Save to tag	Reset count: 5
Tan monitor PTT_ numbers		Serial port
PC time 04-Mar-2020 09:41:51 LITC Pause Decimal	Hex Owner	COM1 Disconnect
Tag time 14-lan-2020 18:19:29 UTC Set time 0		
		Baud: V1.83 and earlier (19.2k) BN42
Depth 51753 AD -0.01 m Accelerometer		
WetDry 155 Wet < 10 0 do 0 × 4096	256 Calibrate	Port: LUM1: 57600 baud
Temp. 20039 AD 2878 ohms 14.965 °C Y 4096	256 Error Pitch	4F: 81291918 [33]
Extra T AD ohms C Z 4096	256 % *	4F: 82281918 [33] 4F: 84271918 [33]
Battery 0 mV Calibrate Factor: 2 × Hamamatsu light	t	
Pressure sensors 🔽 C.C. k1 0	k2 1 k3 0	Temp -36.88 ℃
mV/bar 3 22.276 x FSD: 2963 m k4 0	k5 0 k6 0	InPPFD 14.0000 umol/m2/s
GPS Debugging		T ag memory
Interval 20 mins Test Level: 2	Try: 250 Interval 900 s	Allocated Used
- Thermister exlibution	PT alaua 🔽 Sat	TDR 13.0 MB 0.2 kB Save
Offset	Serial no:	D. 11 740 1048 Court
2/40 onm 2/34/ 3.16045 0°C 3504.1 H0 C	0000000000	Debug 11.7 MB TO NO Save
4220 ohm 42133 Slope 10L 3541.8 H1 L	1.00029210: Passkey:	Dump All Reset
6180 ohm 61719 1.00081 25C 1931.9 H3 5	5.56071e-09	
Extra thermistor calibration	CTD calibration	
2740 ohm 19311 -0.809175 0 C 5442 H0 C	0.00127215 Interval: 99	s (99 = off) Log when dry 🔽
4220 ohm 29738 Slope 10C 3529.3 H1 C	0.00026644! TDR duration: 0	days (0 = text) Enable Fluoro 🗔
6180 ohm 43548 0.141931 25C 1931.4 H3 1	.52261e-07 Initial delay: 0	s Offset: 0 s CTD test
Airtest	GSM	Detecting serial ports
Potting: 🔲 (no transmissions)	Interval: 6 hours	Found 18 serial ports
Argos: 🔽 every 60 secs, +/- 10 secs	Offset: 0 mins	COM3 is connected
GPS: 🗌 after 10 secs, then every 20 mins		Disconnecting Detecting serial ports
Phone: 🗌 20 kB after 30 secs, then every 10 mins	Provider V 0 auto	Found 18 serial ports
Logging: 200 /100s Depth/temp: Accel:	APN: spe.inetd3.gdsp	COM3 is connected
Schedule: 8 h to 16 h	APN user: web	 Trying COM1 COM1 is connected
Tag software	pwd: web	Body details retrieved OK
buildtest v209	SMS: 310000202	
Self-test and logging Oct 11 2018 13:	FTP IP: 138.251.190.100	Sea Mammal
v1.85TWIC;FluoroCTD; v 209	Directory: test	Research Unit Instrumentation

1.2 Toshiba Bluetooth

1.2.1 Installing the Drivers

To avoid driver conflict it is strongly advisable to first remove all other Bluetooth drivers from the PC and re-boot the PC.

If the PC already has Toshiba stack bluethooth installed then it would be worth trying this rather than installing from scratch again.

To install the Toshiba Bluetooth stack for windows, first download the driver *TC00636200A.exe* from our downloads area:

http://www.smru.st-and.ac.uk/Instrumentation/Downloads/

This is v9.10.32T, check for later versions here:

http://www.support.toshiba.com/support/viewContentDetail?contentId=4007183

Run the executable installation file **BEFORE** plugging in the dongle – wait until prompted by the installation process.

Note: The installation may appear to run slowly and hang near to completion. Once installed, restart machine – installation should complete.

1.2.2 Establishing a Connection using Bluetooth

Ensure the Toshiba Bluetooth is activated on the PC (usually enabled using the function buttons).

Show Hidden icons in the corner of the desktop (Windows 7) and run the Toshiba

Bluetooth Manager (🍍).

Click on *Bluetooth settings*, the following window will appear:



Ensure the following option is set in "Bluetooth settings", as follows:

Bluetooth Settings	
Bluetooth View Help	
Add New Connection	TOSHIBA
Connect	
Disconnect Detail	
Delete	
Create Shortcut on Desktop	
Rename Change Ison	
Options	
Exit	
New Connection	💽 Detai) 🔀 Delete

Select the "Security" tab.



Select "Custom Level"

Scroll down to "Security Setting ofg Serial Port (SPP)" and ensure the following box is ticked.



Close down the window by pressing the "OK" button.

If you had to select the tick-box then press "Apply before pressing "OK" to close the options window:

Options				?>
Assistant	Windows7	Other	Diagnostics	IT Admin
General	Security	Bluetooth Infor	mation Exchanger	Audio
Bluetoot	h security level			
	Custom			
	Custom settings			<u> </u>
	-To change the settin -To use the recomme	igs, click the Custor nded settings, click	n button. the Default button.	
	Secure Simple Pairing settings is certified in (SSP)	(SSP) which is not the device support	related to the securit ting Secure Simple Pa	ty iring
				<u>~</u>
	File Transfer Passwo	ord		
	Cus	tom Level	<u>D</u> efault Le	vel
Delete P	aired Device Informatic	n		
All or s	elected pairing informa	ation with the remo	te device is deleted.	
	View Raired Devis		Delete All	1
	Mew Pailed Devic		Delete All	1
		ОК	Cancel	Apply

Place a magnet behind the tag, next to the reed-switch to activate the Bluetooth on the tag. The Bluetooth LED will flash red.





v1.84b PCB

Note: On more recent PCB designs (v1.84b) the flashing red LED is located on the same side as the magnet.

Press the 'New Connection' button. The Bluetooth connection wizard will appear:



Select 'Custom Mode' and press 'Next'. The PC will search for active devices:



Found devices will be depicted in a new window:



Of the various Bluetooth devices detected above, the generic format for the tag's Bluetooth device is "RNBT...".

Using the mouse, highlight the tag's Bluetooth device and press "Next"

Add New Connection Wiza Select a device	rd	X
	Please choose the Bluetooth device you wish to use. Bluetooth device Device Name C3590 RNDT-5AFF SimonHallwell LENOVO-PC SimonHallsmrupc David's iMac <u>Refresh</u>	
[< <u>B</u> ack <u>N</u> ext > Cancel Help	

The PC and tag will attempt to connect, as depicted below:



A further window will now be shown, as shown below, asking for the service required

- select Serial Port SPP

Add New Connection Wiza	rd	×
Select a service.		
	Please choose the service to use. Service selection Service Cl Service Name Serial Port SPP	
[< Back Next > Cancel Help	

Press the Next button

The next window allows the user to specify the COM port required – any COM port number will work with TagConfig, in which case the Default COM port (as suggested by the tick-box) may be used.

Add New Connection Wiza	rd	×
Select a COM port		
	Set the COM port for use. (We recommend using the default COM port.) Assignment of COM Port Name COM41	
[< Back Next > Cancel Help	

And press okay when prompted with the follwing window

Bluetooth	Settings	×
1	We recommend using the default setting. If a setting other than the default COM port setting is selected, a problem might occur.	

Select an appropriate COM port from the drop-down menu – it is fine to use any port providing the corresponding device is not currently plugged in.

Add New Connection Wiza	d	×
Select a COM port		
	Set the COM port for use. (We recommend using the default COM port.) Assignment of COM Port Name COM2 COM1 COM1 COM4 CO	t Help

In the example above the Bluetooth has been switched from the default of COM port 41 to COM port 2.

Note: At this point there may be a prompt for a pairing code. If this occurs then use "1234" as the pairing code and press enter. Where tags have been specifically paired then the pairing code becomes the 5-digit serial number of the paired tag.

Press "Next"



Press "Next"

8 Bluetooth Settings
<u>Bluetooth View H</u> elp
TOSHIBA
RNBT-5AFF
New Detail 🔀 Delete
Connection

Use the mouse to highlight the Tag's Bluetooth device, right click and press "Connect"



The following security warning may show to confirm connection is genuine:

Bluetooth Man	ager - Bluetooth Security		
Ń	Allow this device to connect? Request Device Bluetooth Device Address: Bluetooth Device Name:	00:06:66:67:5A:FF RNBT-5AFF	
	Share authentication inform	nation among all users	No

Press the "Yes" button.

The Bluetooth setting window now shows the Bluetooth link is established:

Bluetooth Settings	
TOS	HIBA
RNETSAFE	
New Connection 💓 Detail 🗶 Delet	

At this point the RED LED on the back of the tag will probably still be flashing. This will only turn GREEN when communication is established between the PC and the tag using TagConfig.

1.2.3 Running TagConfig from an Established Bluetooth Link (Toshiba)

Establish a Bluetooth connection as detailed in the previous section.

Once the Bluetooth link is established, run the file TagConfig.exe. A window similar to the following window will open:

🕜 TagConfig v207		_ 🗆 X
Body Null settings Clear form Retrieve fro	om tag Save to tag	Beset count
Tag monitor PTT numbers		Serial port
PC time 04-Mar-2020 09:36:48 UTC Pause Decimal	Hex Owner	COM1 Connect
Tag time not connected UTC Set time		, C v1.83 and earlier (19.2k) PM/2
Depth AD m - Accelerameter		Baud: (• v1.84 and later (57.6k)
WetDry Wet < Odo X	Calibrate 1	Port: not connected
Temp. AD ohms *C y	Error Pitch	TxRx
Extra T AD ohms °C Z	× · ·	
Battery mV Calibrate Factor: x Hamamatsu ligh	t	P
Pressure sensors 🔽 C.C. k1	k2 k3	Temp °C
mV/bar x FSD: m k4	k5 k6	InPPFD umol/m2/s
GPS Debugging		Tag memory
Interval mins Test Level:	Try: Interval s	Allocated Used
Thermistor calibration	BT slave Set	TDR Save
2740 ohm Offset 0 C H0	Serial no:	Debug Save
4220 ohm Slope 10C H1	Passkev	
6180 ohm 25C H3		Dump All Reset
Extra thermistor calibration	CTD calibration	
2740 ohm 0 Offset 0 C H0	Interval:	s (99 = off) Log when dry 🗔
4220 ohm Slope 10C H1	TDR duration:	days (0 = text) Enable Fluoro 🗆
6180 ohm 25C H3	Initial delay:	s Offset: s CTD test
Airtest	GSM	Detecting equiplements
Potting: 🥅 (no transmissions)	Interval: hours	Found 18 serial ports
Argos: every secs, +/- secs	Offset: mins	
GPS: after secs, then every mins		
Phone: kB after secs, then every mins	Provider V 0	
Logging: /100s Depth/temp: Accel:	APN:	
Schedule: h to h	APN user:	
Tag software	pwd:	
	SMS:	Car Mammal
	FTP IP:	Research Unit
v	Directory:	

Use the drop-down menu to select the connected Bluetooth COM port and then press the "Connect" button. The drop-down box ahoes the available COPM ports the app can see. In this example COM Port 1 is selected.

The TagConfig application should now be running, indicating tag time etc. and the Bluetooth status LED on the tag should show continuous green rather than flashing red.

To disconnect from TagConfig, press the "Disconnect" button (see below) and then close the application.

Before removing the magnet from the tag ensure the Bluetooth is disconnected on the Toshiba program (sometimes auto-disconnects when TagConfig is closed, but this is not always the case).

🕜 TagConfig v207		- 🗆 X
Body 1 Null settings Clear form Retrieve from	ag Save to tag	Reset count: 5
Tag monitor PTT numbers		Serial port
PC time 04-Mar-2020 09:41:51 UTC Pause Decimal He	x Uwner	COM1 Disconnect
Tag time 14-Jan-2020 18:19:29 UTC Set time 0		Paud: C v1.83 and earlier (19.2k) BN42
Depth 51753 AD -0.01 m		• v1.84 and later (57.6k)
WetDry 155 Wet < 10 0do 0 × 4096 2	56 Calibrate	Port: COM1: 57600 baud
Temp. 20039 AD 2878 ohms 14.965 °C Y 4096 2	56 Error Pitch	B5F752: 4F: 81291918 [33]
Extra T AD ohms °C Z 4096 2	56 % *	4F: 82281918 [33] AF: 84271918 [33]
Battery 0 mV Calibrate Factor: 2 x Hamamatsu light		
Pressure sensors V C.C	k2 1 k3 0	Temp -36.88 *C
mV/bar 3 22.276 x FSD: 2963 m k4 0	k5 0 k6 0	InPPFD 14.0000 umol/m2/s
GPS Debugging		- Tag memory
Interval 20 mins Test Level: 2	ry: 250 Interval 900 s	Allocated Used
Thermistor calibration	BT slave Set	TDR 13.0 MB U.2 kB Save
2740 ohm 27347 0 C 5504.1 H0 0.0	0114146 Serial no:	Debug 11.7 MB 10 kB Save
4220 ohm 42133 Slope 10C 3541.8 H1 0.0	0029210: Passkey:	Dump All Beset
6180 ohm 61719 1.00081 25C 1931.9 H3 5.5	6071e-09	
Extra thermistor calibration	CTD calibration	
2740 ohm 19311 -0.809175 0 C 5442 H0 0.0	0127215 Interval: 99	s (99 = off) Log when dry 🔽
4220 ohm 29738 Slope 10C 3529.3 H1 0.0	0026644! TDR duration: 0	days (0 = text) Enable Fluoro
6180 ohm 43548 0.141931 25C 1931.4 H3 1.5	2261e-07 Initial delay: 0	s Offset: 0 s <u>CTD test</u>
Airtest	GSM	Detecting serial ports
Potting: no transmissions)	Interval: 6 nours	Found 18 serial ports Trying COM3
GPS: After 10 secs then every 20 mins	orrsec jo mins	COM3 is connected Disconnecting
Phone: 20 kB after 30 secs then every 10 mins	Provider VIII auto	Detecting serial ports Found 18 serial ports
Logging: 200 /100s Depth/temp: Accel:	APN: spe.inetd3.adsp	 Trying COM3 COM3 is connected
Schedule: 8 h to 16 h	APN user: web	 Trying COM1 COM1 is compacted
Tag software	pwd: web	Body details retrieved OK
buildtest v209	SMS: 310000202	
Self-test and logging Oct 11 2018 13:	FTP IP: 138.251.190.100	Sea Mammal
v1.85TWIC;FluoroCTD; v 209	Directory: test	- Instrumentation

1.3 Bluetooth Using Windows 10 Standard Driver

The following details how to connect to a tag using Bluetooth using a standard Bluetooth dongle using Mocrosoft's Windows 10 standard driver.

1.3.1 Establishing a Bluetooth Connection using Windows 10

Insert a Bluetooth dongle in to the PC and allow time for the PC to recognise the device.

Place a magnet behind the tag, next to the reed-switch to activate the Bluetooth on the tag. The Bluetooth LED will flash red.



V1.8PCB

v1.84b PCB

Note: On more recent PCB designs (v1.84b) the flashing red LED is located on the same side as the magnet

Run the Bluetooth app in Windows 10 device settings, looks something like the following:

Bluetooth & other devices



Activate the Bluetooth by sliding the slider from 'Off' to 'On'



Helpful tip: Windows 10 stores all the previous Bluetooth links so the list under "Other Devices" can be quite long. This includes the list of previously connected tags. Consequently the list can get very long and since all tags start with "RN42…" it can quickly become confusing. To make things much simpler it may be helpful to

delete other peripherals from this list before connecting a new device (select device with left mouse button and press "Remove Device".

To connect a new tag, press the "Add a new device" icon, the Bluetooth option:



Allow the Bluetooth to scan available devices. The tag Bluetooth will look something like "RN...xxxx" with the xxx being the last 4 digits on the back of the Bluetooth device on the tag – this is stamped on the silver can near to where the magnet has been positioned. In this example the device is RNBT-3DD7.



Select the Bluetooth for the tag, the PC will attempt to connect to the tag



The PC will ask to confirm a code, press "Connect", regardless of what the number is. The number is different every time.

If around this point in the proceedings an additional code is required to be entered then the code is likely to be "1234).

The tag and PC should now pair, press "Done"



Press "Done", then open the "More Bluetooth Options" and select the "COM Ports" tab.

hether yo ith your I	ou need a COM Bluetooth devic	port, read the documentation that came e.
Port	Direction	Name
COM3	Outgoing Incoming	RNBT-3DD7 'RNI-SPP' RNBT-3DD7

Search down the list for the "**Outgoing**" COM port assigned to the tag to be connected – in this example, the COM port assigned to RNBT-3DD7 would be COM3.

Note: There may be various other RN42 modules shown in the window above – these are from previous connections. It may avoid confusion if the Bluetooth

connection is deleted in the Windows 10 Bluetooth program once finished with a tag to prevent the list from getting very long (see helpful tip above).

1.3.2 Running TagConfig Using Windows 10 Bluetooth Driver

Establish a Bluetooth connection as described in the previous section.

Run TagConfig v207 or later. Previous versions can have additional complications with establishing a connection using the Windows 10 driver.

TagConfig v207				– 🗆 X
Body Null settings Clear form	Retrieve from	n tag	Save to tag	Reset count:
Tag monitor	PTT numbers			Serial port
PC time 14-Jan-2020 18:49:47 UTC Pause	Decimal H	lex	Owner	COM3 - Connect
Tag time not connected UTC Set time				
				Baud: C ut 24 and later (57 Ci) RIN42
Depth AD m	Accelerometer			V 1.04 and later (57.6K)
WetDry Wet < Odo	X		Calibrate	Port: not connected
Temp. AD ohms °C	Y		Error Pitch	TxRx
Extra T AD ohms °C	7		* *	
Battery mV Calibrate Factor: x	- Hamamatsu light	I		1
	k1	k2	k3	Temp °C
mV/bar 7 ohms FSD m	k4	k5	k6	InPPED umol/m2/s
GPS	Debugging			Tag memory
Internal mine Text	Level	Teu	himmed and a	rag menory
Interval Test	Level.	ity.]	interval j s	Allocated Used
Themistor calibration			BT slave Set	TDR Save
2740 ohm	с но		Serial no:	Debug Save
4220 ohm Slope 1	0C H1		Paakau	
6180 ohm 2	5С НЗ		rasskey.	Dump All Reset
Extra themister eslibration				
Offset			CID calibration	
0	с но		Interval:	s (99 = off) Log when dry
4220 ohm Slope 1	0C H1		TDR duration:	days (0 = text) Enable Fluoro
6180 ohm 2	5C H3		Initial delay:	s Offset: s CTD test
Airtest	1	GSM		Detection exist and
Potting: (no transmissions)		Interval:	hours	Found 2 serial ports
Argos: every secs, +/- sec	s	Offset:	mins	
GPS: after secs, then every	mins	10000		
Phone: kB after secs then	every mins	Provider	VIOL	-
		APN		-
Columbia Calendaria Ca	cel. j	ADN.		-
			<u> </u>	
Type here to search	Ļ			

With TagConfig still running, select the appropriate COM por from the drop-down menu and then press "Connect". This is COM 3 in the example set-up in the previous section. TagConfig should now be connected to the tag. The Bluetooth LED will indicate green.

🕼 TagConfig v207		- 🗆 X
Body 1 Null settings Clear form	Retrieve from tag Save to tag	Reset count: 6
Tag monitor	PTT numbers	Serial port
PC time 14-Jan-2020 18:50:23 UTC Pause	Decimal Hex Owner	Disconnect
	0	
Tag time 14-Jan-2020 10:50:35 UTC Set time		Baud: RN42
Depth 51753 AD -0.01 m		C v1.84 and later (57.6k)
WetDry 155 Wet < 10 Odo 0	Accelerometer	Port: COM3: 19200 baud
Temp 18828 AD 2704 ohme 16.488 °C	A 4056 256 Calibrate	4F: 12355018
	Y 4096 256 Error Pitch	4F: 09345018 [33]
Extra I AD onms C	Z 4096 256 % *	4F: 04335018 [33] //F: 53325018 [33]
Battery 0 mV Calibrate Factor: 2 x	Hamamatsu light	
Pressure sensors 🔽 C C	k1 0 k2 1 k3 0	Temp -36.88 °C
mV/bar 3 22 276 x ESD: 2963 m	k4 0 k5 0 k6 0	InPPED -14.0000 umol/m2/s
CPC	Debugging	Tag manage
		Tag memory
Interval 20 mins Test	Level: 2 Try: 250 Interval 900 s	Allocated Used
- Thermietor calibration	RT elave C Set	TDR 13.0 MB 0.2 kB Save
Offset	Serial no:	1140 0
2/40 ohm 2/34/ 3.16045 0	C 5504.1 H0 0.00114146	Debug 11.7 MB 11Kb Save
4220 ohm 42133 Slope 1	OC 3541.8 H1 0.00029210! Passkey:	Duma All Breat
6180 ohm 61719 1.00081 2	5C 1931.9 H3 5.56071e-09 1234	Dump Air
Extra themistor calibration	CTD calibration	
2740 ohm 19311 Offset 0	C 5442 H0 0 00127215 Interval: 99	s (99 = off) log when dry 🔽
-0.809175		
4220 ohm 23730 Slope	C 3525.3 H1 0.00026644: TDR duration: 0	days (U = text) Enable Fluoro I
6180 ohm 43548 0.141931 2	5C 1931.4 H3 1.52261e-07 Initial delay: 0	s Offset: 0 s CTD test
Airtest	GSM	Detecting serial ports
Potting: (no transmissions)	Interval: 6 hours	Found 2 serial ports
Argos: very 60 secs +/- 10 secs	Offset: 0 mins	Trying COM3
GPS: after 10 secs, then every 20	mins	Body details retrieved OK
Phone: 20 kB after 30 secs, then e	every 10 mins Provider V 0 auto	-
Logging: 200 /100s Depth/temp: Ac	APN: spe_inetd3.gdsp	-
Schedule 8 h to 16 h	APN user web	
Type here to search	Q 🔄 🤤 📻	🔒 🚖 🌣 🐐

To disconnect, press "Disconnect" on TagConfig before removing the magnet from the tag.

2 TAGCONFIG

2.1 Downloading TagConfig

Download "TagConfig" from the downloads section of the web page, copying the whole 'Configuration' folder across.

The download section is located here:

http://www.smru.st-and.ac.uk/protected/downloads.html

Do not run directly from a CD since the program will be unable to write to its log files.

Depending upon the version of Windows, it may be necessary to run the program as a user with Local Administrator rights to get proper access to the serial port.

2.2 Running TagConfig

Establish a Bluetooth connection between the tag and the PC.

Double-click the file TagConfig.exe to run the program:



Select the appropriate COM port from the drop-down menu located in the right corner of the screen. In the picture below COM3 is selected.

TagConfig will automatically search for <u>all</u> available COM ports, one will be the tag, others will be other peripherals (both existing and previously connected).

👩 TagConfig v207			_ = X
Body Null settings Clear form Re	trieve from tag	Save to tag	Reset count:
Tag monitor	umbers		Serial port
PC time 04-Mar-2020 11:35:25 UTC Pause Decima	al Hex	Owner	COM1 V Connect
Tag time not connected UTC Set time			
Depth AD m			Baud: V1.83 and earlier (19.2k) RN42 RN42
WetDru Wet < Odo	rometer		Port: not connected
		Calibrate	4F: 58153511
Fishe T AD official C Y		Error Pitch	4F: 54143511 [33]
Exita i AD Units C Z		%	4F: 97133911 [33] [R5F752-10]
Battery mV Calibrate Factor: x Hamam	iatsu light		
Pressure sensors 🔽 C.C. k1	k2	k3	Temp °C
mV/bar x FSD: m k4	k5	k6	InPPFD umol/m2/s
GPS	ging		T ag memory
Interval mins Test Level:	Try:	Interval s	Allocated Used
Thermistor calibration		BT slave 🗔 Set 🚽	TDR Save
2740 ohm 0 C	но	Serial no:	Debug Save
4220 obm 100	H1	Developm	
6180 ohm 250	НЗ	F dsskey.	Dump All Reset
Extra thermistor calibration		CTD calibration	
2740 ohm I Offset	но	Interval	s (99 = off) Log when dru
100 June 100		TDD durations	dava (0 - tavit) Eagline Francis
4220 0mm 1 5lope 10C		Initial deleter	adays (0 - text) Enable Fidolo F
6180 onm	пэј	Thical delay:	s onsec s <u>crotest</u>
Airtest	GSM	-	Detecting serial ports
Potting: (no transmissions)	Interval:	hours	Found 18 serial ports Traing COM1
Argos: every secs, +/- secs	Offset:	mins	COM1 is connected
GPS: 🗖 after secs, then every mins			Eody details retrieved UK Clock changed to 04-Mar-2020 11:34:01
Phone: 🗌 kB after secs, then every	mins Provider	VO	at 04-Mar-2020 11:34:01
Logging: /100s Depth/temp: Accel: 🗆	APN:		
Schedule: h to h	APN user		-
Tag software	pwd:		-
	SMS:		- '
O Type here to coproh		H: 🍋	
~ Type nere to search	-0	음 🥶	🔲 💾 🗠 🛄 💟

In this example, the correct COM port is COM1. Press the "Connect" button.

The "Body" serial number and other configuration data should now appear on the screen (may take a few seconds). The "Tag time" field should begin to increment, as the TagConfig program continuously interrogates the tag. All times must be in UTC. The "Tag time" field shows ***No response*** when no tag is detected on the specified serial port.

👩 TagConfig v207			_ D X
Body Null settings Clear form Lag monitor	Retrieve from tag PTT numbers Decimal Hex 43826 3415C26 s	Save to tag Owner eal	Reset count: 0 Serial port COM1 Disconnect Com1 Disconn
Depth 917/33 AD -0.01 m WetDry 155 Wet < [10	0 Accelerometer × 4096 256 Y 4096 256 7 4096 256	Calibrate Error Pitch	Baud: v1.84 and later (15.6k) PN42 Port: COM1: 57600 baud [4F: [85F752: [0] [47: 5273411] (33]
Battery 0 mV Calibrate Factor: 2 x Pressure sensors IV C.C. C.C. mV/bar 3 22.276 x FSD: 2963 m	2 4096 206 Hamamatsu light k1 0 k2 1 k4 0 k5 0	k3 0 k6 0	LE: 48365411 i331 Temp
LPS Test Interval 20 mins Test Thermistor calibration 0ffset 0 C 2740 ohm 27347 3.16045 0 C 4220 ohm 42133 Slope 100 6180 ohm 61719 1.00081 250	Debugging Level: 2 Try: 25 [5504.1] H0 0.00114146 : [3541.8] H1 0.00029210 : [131.9] H3 [5.56071e-05]	0 Interval 900 s BT slave Set Serial no: Passkey: 1234	Allocated Used TDR 13.0 MB 0.2 kB Save Debug 11.7 MB 13 kB Save Dump All Reset
Extra memistor calibration Offset 0 C 2740 ohm 19311 -0.809175 0 C 4220 ohm 29738 Slope 100 6180 ohm 43548 0.141931 250	5442 H0 0.00127215 3529.3 H1 0.00026644 1931.4 H3 1.52261e-03	CTD calibration Interval: 99 TDR duration: 0 Initial delay: 0	s (39 = off) Log when dry 🔽 days (0 = text) Enable Fluoro 🗌 s Offset 0 s <u>CTD test</u>
Aitest Potting: (no transmissions) Argos: √ every 60 secs, +/- 10 secs GPS: Garder 4fer 10 secs, then every 20 Phone: 20 AB after 30 secs, then every 20 AB after 30 secs, then every 20 AB after 30 secs 400	GSM Interval: Offset: ery 10 mins Provider	6 hours 0 mins V 0 auto	Detecting serial ports Found 18 serial ports Trying COM1 DOM1 is connected Body detail retrieved OK Elock changed to 04Mar-2020 11:34:01 at 04Mar-2020 11:34:01
Schedule: 8 h to 16 h Tag software buildtest v209 Comparison of the search	APN use pwd: SMS:	web 310000202	- -

If the body number is not displayed then it could be because the wrong COM port is selected – try selecting another one.

If TagConfig generates an error titled "Unknown PTT number…", as shown below, then this is because the tag is loaded with a PTT number which is not present in the TagConfig look-up table.

Unknown PTT number.	Check that this PTT is in the file ptt_list.ini	x
A PTT 43826		
	OK	

Once OK is pressed then ??? is displayed in the PTT Numbers field:

🕜 TagConfig v207				– 🗆 X
Body 1 Null settings Clear form	Retrieve fro	m tag S	ave to tag	Reset count: 0
Tag monitor PC time 04-Mar-2020 11:36:47 UTC Pause Tag time 04-Mar-2020 11:36:47 UTC Set time Denth 51753 AD -0.01 m	Decimal H 43826 ????	Hex ????? ?????	Owner ???	Serial port □COM1
WelDry 155 Vet < 10 0 do 0 Temp. 16182 AD 2325 ohms 20.256 °C Estra T AD ohms °C °C Battery 0 mV Calibrate Factor. [2] x	Accelerometer X 4096 Y 4096 Z 4096	256 E 256 E 256	Calibrate rror Pitch	Port CDM1: 57600 baud 4F: 58473611 4F: 54463611 [33] 4F: 56453611 [33] BEF752 (0)
Pressure sensors C.C. mV/bar 3 22.276 x FSD: 2963 m	k1 0 k4 0	k2 1 k5 0	k3 0 k6 0	Temp -36.88 °C InPPFD -14.0000 umol/m2/s
GPS Interval 20 mins Test Thermistor calibration	Debugging Level: 2	Try: 250	Interval 900 s	Tag memory Allocated Used TDR 13.0 MB 0.2 kB Save
2740 ohm 27347 0.0364 0 4220 ohm 42133 Slope 1 6180 ohm 61719 1.00081 2	С (5504.1 HO (0 ОС (3541.8 H1 (0 5С (1931.9 H3 (5	.00114146 .00029210! .56071e-09	Passkey: 1234	Debug 11.7 MB 13 kB Save Dump All Reset
2740 ohm 19311 Offset 4220 ohm 29738 Slope 1 6180 ohm 43548 0.141931 2	C 5442 HO 0 OC 3529.3 H1 0 5C 1931.4 H3 1	.00127215 .00026644! .52261e-07	CTD calibration Interval: 99 TDR duration: 0 Initial delay: 0	s (99 = off) Log when dry 🔽 days (0 = text) Enable Fluoro 🗌 s Offset: 0 s CTD test
Aitest Potting: (no transmissions) Argos: IV every 60 secs, +/- 10 secc GPS: I after 10 secs, then every 20 Phone: I 20 kB after 30 secs, then every Acc Logging: 200 /100s Depth/temp: II Acc	s mins every 10 mins cet: T	GSM Interval: 1 Offset: 1 Provider <u>V</u> APN: 1	6 hours 0 mins 0 auto spe.inetd3.gdsp	Detecting serial ports Found 18 serial ports Trying CDM1 CDM1 is connected Body details retrieved DK Clock changed to 04-Max-2020 11:34:01 at 04-Max-2020 11:34:01 Disconnecting Trying CDM1 Trying CDM1
Schedule: (8 h to (16 h Tag software buildtest v209		APN user: pwd: SMS:	web 310000202	Body details retrieved 0K

To correct this error:

- First close TagConfig by pressing "Disconnect"
- Close the TagConfig application
- Go to the downoad section of the SMRU website (<u>http://www.smru.st-and.ac.uk/protected/downloads.html</u>) and download the latest PTT list from the Software Tools section.
- \circ Copy the file in to the same directory as the TagConfig applicaton on the PC.
- o Re-establish Bluetooth communication between the tag and the PC
- Re-run the TagConfig application, remembering then to set the correct COM port

2.2.1 Setting the Tag Time

Once the PC and tag times are updating in the 'Tag monitor' box then the tag time may be changed simply by pressing the 'Set time' button within the same box.

This synchronises the tag time with the PC - it is important before changing the tag time to ensure that the clock on the PC is synchronised to Universal Standard time.

Double-click the time display in the PC taskbar, then select the "Internet Time" tag. Check that the time has been synchronised recently, or choose a different time server and click the "Update Now" button until successful.

2.2.2 Downloading Data from a Tag

There are two types of download:

- Downloading data from a deployed tag (i.e. to download all dive history data from a tag).
- Downloading debug data from a tag (i.e. when a tag has been used for diagnostics, e.g. GPS/GSM logging, sensor calibration etc.). Under normal circumstances there is no need to download the debug data from a deployed tag.

2.2.2.1 Downloading Data from a Deployed Tag

Once communication is established with the tag then the data may be downloaded by simply pressing the "Save" button under TDR in the Tag Memory window, as indicated below.

🕐 TagConfig v207	-		x
Body 1 Null settings Clear form Retrieve from tag Save to tag	Reset co	unt 0	
Tag monitor PTT numbers Serial port			
PC time 04-Mar-2020 11:37:44 UTC Pause Decimal Hex Owner COM1	• D	isconnecl	
Tag time 04-Mar-2020 11:37:44 UTC Set time 43826 3415C26 seal	and earlier	(19.24)	
Depth 51753 AD -0.01 m Baud: • v1.84	and later (!	57.6k)	RN42
WetDry 155 Wet < 10 Odg 0 Accelerometer	: 57600 ba	ud	
Temp 16143 4D 2319 ohms 20.317 1C Jack End B5F752			
Extra T AD ohms C = 1000 Error Pitch 4F: 58443711	[33]		
Battery 0 mV Calibrate Eactor 2 x	1221		
Hamamatsu light	.26.9	ā +c	
Pressure sensors V C.C. KI U K2 I K3 U Temp	*30.0	o. 	
mV/bar j3 22.276 x FSD: 2363 m k4 j0 k5 j0 k6 j0 inPPF) -14.000	umol/m	2/s
GPS Tag memory			
Interval 20 mins Test Level: 2 Try: 250 Interval 900 s			
Thermistor calibration BT slave Set	омв С	.2 kB	Save
2740 ohm 27347 0/fset 0.C 5504.1 H0 0.00114146 Serial no: Debug 11.	7 MB 1	3 kB	Save
4220 ohm 42133 Sinne 10C 3541.8 H1 0.00029210! Passkev			
6180 ohm 61719 1.00081 25C 1931.9 H3 5.56071e-09 1234 Dump All		R	eset
Extra thermistor calibration			
2740 ohm 19311 0 0ffset 0.C 5442 H0 0.00127215 Interval: 99 s (99 = off	Lo	a when dr	
4220 obm 29738	En	able Fluor	
5180 ohm 43548 0.141931 250 1931 4 H3 1 52261e-07 Initial delay 0 s Offset		CTD	test
Potting: Experimentation Detecting a	erial ports		
Araps: V every 60 sees +/- 10 sees	il		
Angus. 10 every 00 secs 11 no secs 0 onset. 10 nimits UUM1 is co GPC: after 10 secs then every 20 mine	nnected s retrieved (эк	
Dick char Dispersion 20 kP after 20 sees then even 10 mins Dispersion VI 01 with the sees then even 10 mins	ged to 04-N 020 11-34-I	1ar-2020 1 11	1:34:01
Lessing 200 /100a Daph / and C Asat C ARM and ARM Towned To add	ing		
Colorida 2 Las 12 L	nnected		
The software web Body detail	; retrieved (JK	
huidtest v209			
	6		-
🕂 \mathcal{P} Type here to search \mathbf{O} 🖃 📑	2		D

Once pressed, a default filename and path is automatically specified.



The status of the download will be indicated via a separate progress window. Cease download when the download file size reaches the agreed limit.

Download in progress	? 🛛
Transferred:	7.8 kB
Time remaining:	86:56
<u> </u>	
Ca	ncel

Download is ceased by pressing "Cancel".

Once downloaded, TagConfig decompresses the file Data is decoded and formatted in to four files by the TagConfig application and presented in a readable format for subsequent use.

For GPS tag variants, the data needs to be sent to SMRU for further decoding in to location data.

Once downloaded, the data may be erased from FLASH memory by pressing the "Reset" button.

😥 TagConfig v207		– – ×
Body 1 Null settings Clear form Retrieve from	n tag Save to tag	Reset count: 0
Tag monitor PTT numbers		Serial port
PC time 04-Mar-2020 11:38:56 UTC Pause Decimal H	lex Owner	COM1 Disconnect
Tag time 04-Mar-2020 11:38:56 UTC Set time 43826 3415	5C26 seal	
Depth 51753 AD -0.01 m		Baud: V1.84 and later (57.6k) RN42 RN42
ViciDm 155 Vicit / 10 Ode 0		Port COM1: 57600 baud
T 16104 AD 2213 A 20 378 C	256 Calibrate	AE: 60563911
Temp. 10104 AD 2010 0nms 2000 C Y 4096	256 Error Pitch	4F: 57553811 [33]
Extra AD onms C Z 4096	256 *** * *	B5F752: [U] AF: 585A3811 [33]
Battery 0 mV Calibrate Factor: 2 x Hamamatsu light		
Pressure sensors 🔽 C.C. k1 0	k2 1 k3 0	Temp -36.88 °C
mV/bar 3 22.276 x FSD: 2963 m k4 0	k5 0 k6 0	InPPFD -14.0000 umol/m2/s
GPS Debugging		Tag memory
Interval 20 mins Test Level: 2	Try: 250 Interval 900 s	Allocated Used
- Thermister calibration	RT alaya Set	TDR 13.0 MB 0.2 kB Save
2740 abr 1 27347	00114146 Serial no:	Debug 11.7 MR 13 kB Save
4230 shin 42122 3.16045 10C 2541.9 H1 00	00029210	Debug Hirring Parket State
4220 0mm 42133 Slope 100 33410 mm 0.	50023210. Passkey: 50071-09 1234	Dump All Reset
Extra thermistor calibration	CTD calibration]
2740 ohm 19311 -0.809175 0 C 5442 H0 0.	00127215 Interval: 99	s (99 = off) Log when dry 🔽
4220 ohm 29738 Slope 10C 3529.3 H1 0.	00026644! TDR duration: 0	days (0 = text) Enable Fluoro
6180 ohm 43548 0.141931 25C 1931.4 H3 1.	52261e-07 Initial delay: 0	s Offset: 0 s CTD test
Airtest	GSM	Detecting serial ports
Potting: 🔲 (no transmissions)	Interval: 6 hours	Found 18 serial ports
Argos: 🔽 every 60 secs, +/- 10 secs	Offset: 0 mins	COM1 is connected
GPS: after 10 secs, then every 20 mins		Body details retrieved OK Clock changed to 04-Mar-2020 11:34:01
Phone: 20 kB after 30 secs, then every 10 mins	Provider V 0 auto	at 04-Mar-2020 11:34:01
Logging: 200 /100s Depth/temp: Accel:	APN: spe.inetd3.gdsp	Trying COM1
Schedule: 8 h to 16 h	APN user: web	COM1 is connected Body details retrieved OK
Tag software	pwd: web	
buildtest v209	SMS: 310000202	
🕂 🔎 Type here to search	O 🛱 🗳	📄 💼 🕺 🗉 🔘

2.2.2.2 Downloading Debug Data from a Tag

Debug software will write data to FLASH memory. The following details how to download debug data from a tag.

Once communication is established with the tag then the data may be downloaded by simply pressing the "Save" button in the debug part of the 'Tag memory usage' box, as indicted below:

TagConfig v207		_ 🗆 X
Body T Null settings Clear form Tag monitor PC time 04-Mar-2020 11:38:23 UTC Pause Tag time 04-Mar-2020 11:38:23 UTC Set time Depth 51753 AD -0.01 m WeIDry 155 Wet < 10	Retrieve from tag Save to t PTT numbers Owner Decimal Hex Owner 43826 3415C26 seal 0	ag Reset count: 0 Serial port COM1 → Disconnect Baud: C v1.83 and earlier (19.2k) RN42 Port: COM1: 57600 baud Port: COM1: 57600 baud 4f: 57233811 4f: 55233811 4f: 55233811 4f: 5523811 4f: 5523811 133
Battery 0 mV <u>Calibrate</u> Factor 2 x Pressure sensors ▼ CC mV/bar 3 22.276 x FSD: 2963 m GPS Interval 20 mins Test	Z 4095 256 % Hamamatsu light k1 0 k2 1 k k4 0 k5 0 k Debugging	3 0 Temp 36.88 °C 6 0 InPPFD 14.0000 umol/m2/s 1 900 s Tag memory Allocated Used
Thermistor calibration Offset 2740 ohm 27347 3.16045 4220 ohm 42133 Slope 1 6180 ohm 61719 1.00081 2 Extra thermistor calibration Offset 0 2740 ohm 19311 0.689175 0 2740 ohm 19311 0.889175 0 4220 ohm 29738 Slope 1	C 5504.1 H0 0.00114146 DC 3541.8 H1 0.000292107 5C 1931.9 H3 556071e.09 C 5442 H0 0.00127215 DC 3529.3 H1 0.000265447 TDR du	ve Set Debug 11.7 MB 0.2 kB Save Debug 11.7 MB 13 kB Save Dump All Reset alibration t: 39 s (39 = off) Log when dy ⊽ ration: 0 days (0 t text) Enable Fluoro
orou orm 143046 0.141301 2 Airest Potting: (no transmissions) Argos: ✓ every §0 secs, +/- 10 sec GPS: □ after 10 secs, then every 20 Phone: □ 20 kB after 30 secs, then Logging: 200 /100s Depth/temp: Ac Schedule: 8 hto 16 h	s mins svery 10 mins cet □ Provider ⊻ 0 a APN: specinet APN user: web pvd: web SMS: 310000	Image Image <th< td=""></th<>

As with other types of download, for convenience a default filename and type is automatically selected.

Save flash cont	ents to file	? 🗙
Savejn:	🞯 Desktop 🔹 🔶 🛗 🕂	
My Recent Documents Desktop My Documents My Computer	My Documents in monitor tag My Computer is todo list My Network Places GLOGCON Mouse Plans Master Flash Website I 11477_2 I 11490 I 1552 I 1552 prepot I 1552 I 11532 I 11622 I 11632	
My Network Places	File name: 11523_debus Save as type: Text files (".txt)	<u>S</u> ave Cancel

The status of the download will be indicated via a separate progress window. Download will cease automatically and be indicated in the text box as completed.

Download in progres	s ? 🔀
Transferred:	2.0 kB
Time remaining:	00:00
C	ancel

Once downloaded, the data may be erased from FLASH memory by pressing the "Reset" button.

C TagConfig v207		X
TagConfig v207 Body 1 Null settings Clear form Retrieve fror Tag monitor PC time 04-Mar-2020 11:38:56 UTC Pause PTT numbers Decimal F 138:56 UTC Pause 14382c5 3411 Depth 51753 AD -0.01 m PAccelerometer Accelerometer	m tag Save to tag Hex Owner SC26 seal	COM1 Disconnect Baud: \label{eq:state} Plander(F) - Ski
WetDry 135 Wet < 10 Udo ✓ ¥ 4096 Temp. 16104 AD 2313 ohms 20.378 °C Y 4096 Extra T AD ohms °C Z 4096 Battery 0 mV Calibrate Factor: 2 x Pressure sensors ✓ C.C k1 0	256 Calibrate 256 Error Pitch 256 * * k2 1 k3 0	Рот: СОМ: 57600 Байа 447: 6055311
mV/bar 3 22.276 x FSD: 2963 m k4 0 GPS	k5 0 k6 0	InPPFD 114.0000 umol/m2/s Tag memoty Allocated Used TDR 13.0 MB 0.2 kB Save
2740 ohm 27347 Offset 0 C 5504.1 H0 0 4220 ohm 42133 Slope 10C 3541.8 H1 0 6180 ohm 1610 ohm 517.9 1.00081 25C 1331.9 H3 5	00114146 00029210! 56071e-09	Debug 11.7 MB 13 kB Save
Extra mermistol Calibration Offset 0 C 5442 H0 0. 2240 ohm 19311 -0.809175 0 C 5442 H0 0. 4220 ohm 29738 Slope 10C 3529.3 H1 0. 6180 ohm 43548 0.141931 25C 1931.4 H3 1.	00127215 Interval: 99 00026644! TDR duration: 0 52261e-07 Initial delay: 0	s (99 = off) Log when dry 🔽 days (0 = text) Enable Fluoro 🗌 s Offset: 0 s <u>CTD test</u>
Aitest Potting: (no transmissions) Argos: ✓ every 50 secs, +/- 10 secs GPS: after 10 secs, then every 20 mins	GSM Interval: 6 hours Offset: 0 mins	Detecting serial ports Found 18 serial ports Trying COM1 COM1 is connected Body details retrieved OK Clock channed to 0.44Mar/2020 11:34:01
Phone: 20 kB after 30 secs, then every 10 mins Logging: 200 /100s Depth/temp: Accet Schedule: 8 h to 16 h	Provider V 0 auto APN: spe.inetd3.gdsp APN user: web pwd: web	at 04-Mar 2020 11:34:01 Disconnecting Trying CDM1 COM1 is connected Body details retrieved OK
Puildtest v209	SMS: 310000202 O ⊟t 🍅	📻 🖻 💁 🗉 D

2.2.2.3 Downloading Compressed Data

Under <u>exceptional circumstances</u> it is necessary to download the complete contents of tag memory in a compressed format. Such instances may occur when the tag's memory has been corrupted and/or the original data has been partially over-written by new data (as can happen if the tag is re-started following the original deployment).

Using this function generates a very large data binary file which ultimately needs to be sent back to SMRU for decoding.

This method of data download should only be undertaken on request of SMRU.

To commence download of the entire memory, press the "Download All" button, as shown below.

G TagConfig v207		_ D X
Body 1 Null settings Clear form Retrieve from	m tag Save to tag	Reset count: 1
Tag monitor		Serial port
PC time 04-Mar-2020 11:41:57 UTC Pause Decimal	lex Owner	COM1 Disconnect
Tag time 04-Mar-2020 11:41:57 UTC Set time 0		C ut 92 and extint (19.2k)
Depth 51753 AD -0.01 m		Baud: V1.84 and later (57.6k) RN42
WetDru 155 Wet < 10 Odo 0		Port: COM1: 57600 baud
Temp 16014 AD 2301 ohme 20.519 °C	256 Calibrate	4F: 57574111
Extra T AD ohms C Y 4096	256 Error Pitch	4F: 59564111 [33] B0E25C: 01EE [2]
Battery 0 mV Calibrate Eactor 2 x	256 %	E436D.4: 00002798 (39)
Hamamatsulight		7 26.00 +0
Pressure sensors C.C.	KZ K3 0	1 pppp 110000
mV/bar 3 22.276 x FSD: 2363 m k4 U	k5 U k6 U	INPPED -14.0000 umol/m2/s
GPS Debugging		Tag memory
Interval 20 mins lest Level: 2	Try: 250 Interval 900 s	Allocated Used
Thermistor calibration	BT slave Set	TDR 13.0 MB 0.2 kB Save
2740 ohm 27347 Offset 0 C 5504.1 H0 0	.00114146 Serial no:	Debug 11.7 MB 14 kB Save
4220 ohm 42133 Slope 10C 3541.8 H1 0	.00029210! Passkey:	
6180 ohm 61719 1.00081 25C 1931.9 H3 5	56071e-09 1234	Dump All Reset
Extra thermistor calibration	CTD calibration	
2740 ohm 19311 0 0ffset 0 C 5442 H0 0	.00127215 Interval: 99	s (99 = off) Log when dry 🔽
4220 ohm 29738 Slope 10C 3529.3 H1 0	.00026644! TDB duration: 0	davs (0 = text) Enable Fluoro
6180 ohm 43548 0.141931 25C 1931.4 H3 1	52261e-07 Initial delay: 0	s Offset: O s CTD test
- Airtest	- 69M	
Potting: (no transmissions)	Interval: 6 hours	Body details retrieved OK Clock changed to 04-Mar-2020 11:34:01
Arros: v every 60 secs +/- 10 secs	Offset: 0 mins	at 04-Mar-2020 11:34:01
GPS: Green after 10 secs, then every 20 mins	enter le maie	Trying COM1
Phone: 20 kB after 30 secs then every 10 mins	Provider VI 0 auto	COM1 is connected Body details retrieved OK
Longing 200 /100s Depth/temp: Accel:	APN: sne inetd3 adsp	 Disconnecting Traing COM1
Schedule: 8 hto 16 h	APN user web	COM1 is connected
Tag software	pwd: web	Trying COM1
buildtest v209	SMS: 310000202	CUM1 is connected
> Type nere to search		🔲 📫 🔽 📫 🔽

As with the download processes detailed in the sections previously, the use is prompted for a filename (with a suggested default). Cancellation of the download is possible at this stage, or at any time during the download process.

Once downloaded, the data may be erased from FLASH memory by pressing the "Reset" button.

🕡 TagConfig v207	_		x
Body 1 Null settings Clear form Retrieve from tag Save to tag	Rese	et count: 0	
Tag monitor	port		
PC time 04-Mar-2020 11:38:56 UTC Pause Decimal Hex Owner	COM1 -	Disconnec	zt
Tag time 04-Mar-2020 11:38:56 UTC Set time 43826 3415C26 seal	C v1.83 and e	arlier (19.2k)	
Depth 51753 AD -0.01 m Baud:	v1.84 and la	ter (57.6k)	HN42
WetDry 155 Wet < 10 Odo 0 × 4000 256 College Port	COM1: 5760) baud	
Temp. 16104 AD 2313 ohms 20.378 °C Y 4096 256 Error Bitch 4F: 600	563811		
Extra T AD ohms °C 7 4096 256	553811 [33] 2: [0]		
Battery 0 mV Calibrate Factor: 2 x Hamamateu linkt	5/13911 [33]		
	Temp	36.88 °C	
mV/bar 3 22.276 x FSD: 2963 m k4 0 k5 0 k6 0	InPPFD -14	0000 umol/i	m2/s
GPS Debugging Tag r	nemory		
Interval 20 mins Test Level: 2 Try: 250 Interval 900 s	Allocated	Used	
Thermiter collection	13.0 MB	0.2 kB	Save
Offset 0 C 5504.1 Ho 0.00114146 Serial no: Debu	- 11.7 MD	13 kB	Saua
2240 chm 42133 316045 010 3541 8 H1 0.000292101 Devi	ig n.rmo		3010
5180 ohm 61719 1.00081 25C 1931 9 H3 5 56071e/09 1234 Du	mp All	F	Reset
Extra thermistor calibration		_	
2740 ohm 19311 0 0ffset 0 0 5442 H0 0.00127215 Interval: 99 0 99	9 = off)	Log when c	ta 🔽
4220 ohm 29738 - 0.809175 0 C 0442 10 0.0026644 TDB duration 0 days	(0 = text)	Enable Eluc	ny F
5180 ohm 43548 0.141931 25C 1931.4 H3 1.52261e-07 Initial delay: 0 s	Offset: 0 s	CTE) test
	J		
Potting: (no transmissions) Interval: for hours For	etecting serial po ound 18 serial po	rts rts	
Argos: 🔽 every 60 secs, +/- 10 secs Offset: 0 mins Tr	ying COM1 DM1 is connecte	d	
GPS: 🗌 after 10 secs, then every 20 mins	ody details retriev	ed 0K	11-24-01
Phone: 20 kB after 30 secs, then every 10 mins Provider V 0 auto at	04-Mar-2020 11	:34:01	11.34.01
Logging: 200 /100s Depth/temp: Accel: Accel: APN: spe.inetd3.gdsp Tr	sconnecting ying COM1		
Schedule: 8 h to 16 h BC	JM1 is connecte ody details retriev	d red OK	
Tag software pwd: web			
buildtest v209 SMS: 310000202	_		
📲 🔎 Type here to search 🛛 🛛 🛱 🖕 🧮	:	<u>s</u> .	

2.2.3 Setting GPS Sample Rate

The following details how to set the GPS sample-rate:

With the tag connected to a PC and TagConfig running, move the PC's mouse over the GPS text box indicated below and press the mouse. Use the keyboard to edit the value to the required value. The value indicated in the picture below is 20 minutes (the default value).

🕜 TagConfig v207		_ 🗆 X
Body 1 Null settings Clear form Retrieve from	ag Save to tag	Reset count: 1
Tag monitor		Serial port
PC time 04-Mar-2020 11:41:57 UTC Pause Decimal He	x Owner	COM1 Disconnect
Tag time 04-Mar-2020 11:41:57 UTC Set time		. C v1.83 and earlier (19.2k)
Depth 51753 AD -0.01 m		Baud: • v1.84 and later (57.6k)
WetDry 155 Wet < 10 0 do 0 Accelerometer	56 Collingto I	Port: COM1: 57600 baud
Temp. 16014 AD 2301 ohms 20.519 °C V 4000 2	50 Calibrate	4F: 57574111
Extra T AD ohms °C 7 4096 2	56 Elioi Filch	4F: 59564111 [33] B0F25C: 01FE [2]
Battery 0 mV Calibrate Factor: 2 x Hamamateu linkt	30 / //	E436D4-00003798 [39]
	k2 1 k3 0	Temp -36.88 °C
mV/bar 3 22.276 x FSD: 2963 m k4 0	k5 0 k6 0	InPPFD -14.0000 umol/m2/s
Debugging		Tag memory
Interval 20 mins Test Level: 2 1	fry: 250 Interval 900 s	Allocated Used
Thereiter a floation	PT days 🗔 Cat	TDR 13.0 MB 0.2 kB Save
Offset	Serial no:	
2/40 ohm 2/34/ 3.16045 0.C 3304.1 H0 0.00	0000010	Debug 11.7 MB 14 KD Save
4220 ohm 42133 Slope 10L 3541.8 H1 0.00	023210t Passkey:	Dump All Reset
6180 ohm 61713 1.00001 - 200 1931.9 H3 9.00	507Te-03	
Extra thermistor calibration Offset	CTD calibration	
2740 ohm 19311 -0.809175 0 C 5442 H0 0.00	0127215 Interval: 99	s (99 = off) Log when dry I✔
4220 ohm 29738 Slope 10C 3529.3 H1 0.00	0026644! TDR duration: 0	days (0 = text) Enable Fluoro
6180 ohm 43548 0.141931 25C 1931.4 H3 1.52	2261e-07 Initial delay: 0	s Offset: 0 s CTD test
Airtest	GSM	Body details retrieved OK
Potting: (no transmissions)	Interval: 6 hours	Clock changed to 04-Mar-2020 11:34:01 at 04-Mar-2020 11:34:01
Argos: 🔽 every 60 secs, +/- 10 secs	Offset: 0 mins	Disconnecting
GPS: after 10 secs, then every 20 mins		COM1 is connected
Phone: 20 kB after 30 secs, then every 10 mins	Provider <u>V</u> 0 auto	Body details retrieved DK Disconnecting
Logging: 200 /100s Depth/temp: Accel:	APN: spe.inetd3.gdsp	Trying COM1
Schedule: 8 h to 16 h	APN user: web	Disconnecting
Tag software	pwd: web	COM1 is connected
buildtest v209	SMS: 310000202	
H P Type here to search	O 🛱 😆	📒 🟦 💁 🗉 ൮

Once the correct value has been entered, press the save to tag button, then the 'Retrieve from Tag' button. Once again check the value in the GPS text box is still the correct value required.

2.2.4 Configuring CTD for Test Mode

It is possible to configure the tag to manually log the data from the CTD (and other oceanographic sensors) to the on-board flash memory.

The parameters which control the measurements must be pre-set using TagConfig. All reside within the CTD calibration window and are as follows:

⑦ TaoConfig ∨207		- D X
Body 1 Null settings Clear form	Retrieve from tag Save to tag	Reset count: 1
Tag monitor PC time 04-Mar-2020 11:44:11 UTC Pause Tag time 04-Mar-2020 11:44:11 UTC Set time	PTT numbers Decimal Hex Owner	Serial port COM1 Disconnect Disconnect
Depth 51753 AD -0.01 m WelDry 155 Wet < 10	Accelerometer Calibrate X 4096 256 Calibrate Y 4096 256 Error Pitch Z 4096 256 % %	Babb. • v1.84 and later (57.6k) Port: COM1: 57600 baud 4F: 72114411 B5F752: (0) 9F7752: (0) 4F: 74104411 [33]
Battery 0 mV Calibrate Factor: 2 x Pressure sensors ✓ C.C mV/bar 3 22.276 x FSD: 2963 m	Hamamatsu light k1 0 k2 1 k3 0 k4 0 k5 0 k6 0	Temp -36.88 °C InPPFD -14.0000 umol/m2/s
GP5 Interval 20 mins Test	Levet: 2 Try: 250 Interval 900 s	Allocated Used TDR 13.0 MB 0.2 kB Save
2740 ohm 27347 Uffset 0 4220 ohm 42133 Slope 1 6180 ohm 61719 1.00081 2	C 5504.1 H0 0.00114146 DC 3541.8 H1 0.00029210 5C 1931.9 H3 5.56071e-09	Debug 11.7 MB 14 kB Save Dump All Reset
Extra thermistor calibration Offset _2740 ohm 19311 -0.809175 0 _4220 ohm 29738 Slope 1 _6180 ohm 43548 0.141931 2	C 15442 H0 0.00127215 Interval: 98 0C 3529.3 H1 0.00026644 TDR duration: 0 5C 1931.4 H3 1.52261e-07 Initial delay: 0) s (99 = off) <u>Log when dtv</u> □ days (0 = text) Enable Fluoro □ s Offset: 0 s <u>CTD test</u>
Aittest Potting: (no transmissions) Argos: ✓ every 60 secs, +/- 10 sec: GPS: □ after 10 secs, then every 20	GSM Interval: 6 hours 0ffset: 0 mins	Body details retrieved OK Clock changed to 04-Mar-2020 11:34:01 at 04-Mar-2020 11:34:01 Disconnecting Trying CDM1 COM1
Phone: 20 kB after 30 secs, then a Logging: 200 /100s Depth/temp: Ac Schedule: 8 h to 16 h Tag software	vvery 10 mins Provider ⊻ 0 auto APN: spe.inetd3.gdsp APN user: web pwd: web	UMI Is connected Body deals retrieved 0K Disconnecting Trying C0M1 C0M1 is connected Disconnecting Trying C0M1 C0M1 is connected
Pundest v205	O ⊟t 🧉	📻 🔒 💁 🖬 🖸

- Interval sets the frequency of measurement (in seconds) and takes the range from 1-255. The special value 99 must be entered to switch off the logging mode.
- Offset -synchronises the measurements to the real time of day (see examples below)
- Initial Delay sets the delay (in seconds) from the initial activation of the tag.
- Log when Dry when this is checked, the tag will continue to take measurements after the tag has been removed from the water. Note, regardless of whether this is checked, the tag still needs to be activated to start data collection. Be aware of this function, there is a danger that the tag may be left in this mode following tests in which case the battery would drain...
 - e.g. 1) Interval = 5, Initial delay = 0, Offset = 0, if activated at 12:34:56, samples at
 - 12:34:56
 - 12:35:01
 - **12:35:06** ...
 - e.g. 2) Interval = 5, Initial delay = 20, Offset = 0, if activated at 12:34:56, samples at
 - 12:35:16
 - 12:35:21
 - 12:35:26 …

- e.g. 3) Interval = 5, Initial delay = 0, Offset = 3, if activated at 12:34:56, samples at
 - 12:34:58
 - 12:35:03
 - 12:35:08 …

The reason for using offset would typically be to prevent CTDs in relatively close proximity from sampling at the same time where cross-coupling of magnetic fields may be an issue.

2.2.4.1 Calibration mode

In this mode the tag logs CTD readings to the Debug flash in a simple text format. The size of this part of the flash is capped at 1Mb, equating to a maximum of nominally 10,000 samples before the flash is filled.

To set the tag to log in Calibration mode:

- Establish communication between a PC and the tag using Bluetooth.
- Use the TagConfig application to view the various tag parameters (Section 3.2).
- Use the PC to set the four parameters detailed in Section 3.2.4 above.
- o Set the "TDR duration" parameter to zero to enable text format.
- Save the parameters to the tag by pressing the "Save to Tag" button, as shown below.
- Press the "Retrieve from Tag" button to ensure tag parameters are set.

Following the tests, the data may be downloaded from the 'Debug' part of the flash memory (refer to Section 3.2.2).

2.2.4.2 Field-test mode

In this mode the tag logs CTD readings to the TDR flash in a compressed format. This effectively removes the limit on the duration of the test (subject to battery consumption) and is intended for at-sea tests in which the tag may be underwater for many hours or even days.

To set the tag to log in field-test mode:

- Establish communication between a PC and the tag using Bluetooth.
- Use the TagConfig application to view the various tag parameters (Section 3.2).
- Use the PC to set the four parameters detailed in Section 3.2.4 above.
- Prepare the tag and plug in to a computer using the test lead provided.
- Use the TagConfig application to view the various tag parameters.
- Use the PC to set the four parameters detailed above.

- Set the "TDR hours" parameter to a non-zero value. This specifies that compressed readings should be stored and stipulates the maximum duration of the test in hours.
- Save the parameters to the tag by pressing the "Save to Tag" button, as shown below.
- Press the "Retrieve from Tag" button to ensure tag parameters are set.

Following the tests, the data may be downloaded from the 'TDR' part of the flash (refer to Section 3.2.2).

NOTE: Whichever mode is used, remember to set the "Interval" parameter back to 99 to prepare the tag for deployment. Failure to do so will mean the tag will not run the operational deployment software and relay data back via Argos/GSM.

It is also advisable to uncheck the "Log when dry" option, if it has been used, to reduce the danger that the tag is inadvertently left in an active state. Always reconfirm with a 'Retrieve from tag' operation. Never deploy a tag with the "Log when dry" feature ticked.

2.2.5 Changing the PTT Number

With the TagConfig application running, change the number in the first of the PTT Numbers dialogue box to the required PTT number (example shows 92388 and the owner being seal).

🕜 TagConfig v207		- 🗆 X
Body 1 Null settings Clear form Retrieve	from tag Save to tag	Reset count: 1
Tag monitor PTT number:	5	Serial port
PC time 04-Mar-2020 11:45:05 UTC Pause Decimal	Hex Owner	COM1 Disconnect
Tag time 04-Mar-2020 11:45:05 UTC Set time 92:300 [3	300E 34U 300	, C v1.83 and earlier (19.2k)
Depth 51753 AD -0.01 m		Baud: V1.84 and later (57.6k)
WetDry 155 Wet < 10 Odo 0 X 4096	256 Calibrate	Port: COM1: 57600 baud
Temp. 15926 AD 2288 ohms 20.659 °C Y 4096	256 Error Pitch	B5F752: 45: 77054511 [22]
Extra T AD ohms °C Z 4096	256	4F: 73044511 [33]
Battery 0 mV Calibrate Factor: 2 × Hamamatsu li	aht	
Pressure sensors 🔽 C.C. k1 0	k2 1 k3 0	Temp -36.88 °C
mV/bar 3 22.276 x FSD: 2963 m k4 0	k5 0 k6 0	InPPFD -14.0000 umol/m2/s
GPS Debugging		Tag memory
Interval 20 mins Test Level: 2	Try: 250 Interval 900 s	Allocated Used
Thermistor calibration	BI slave Set	TDR 13.0 MB 0.2 kB Save
2740 obm 27347	0.00114146 Serial no:	Debug 11.7 MB 14 kB Save
4220 ohm 42133 Slope 10C 3541.8 H1	0.00029210! Passker	
6180 ohm 61719 1.00081 25C 1931.9 H3	5.56071e-09 1234	Dump All Reset
Extra thermistor calibration	CTD calibration	
2740 ohm 19311 0 0ffset 0 C 5442 HC	0.00127215 Interval: 99	s (99 = off) Log when dry
4220 ohm 29738 Sione 10C 3529.3 H1	0.00026644! TDR duration: 0	days (0 = text) Enable Fluoro
6180 ohm 43548 0.141931 25C 1931.4 H3	1.52261e-07 Initial delay: 0	s Offset: O s CTD test
Airtest	GSM	Tuine COMI
Potting: 🦳 (no transmissions)	Interval: 6 hours	COM1 is connected
Argos: 🔽 every 60 secs, +/- 10 secs	Offset: 0 mins	Body details retrieved UK Disconnecting
GPS: 🔲 after 10 secs, then every 20 mins		Trying COM1 COM1 is connected
Phone: 🗌 20 kB after 30 secs, then every 10 min	s Provider V 0 auto	Disconnecting
Logging: 200 /100s Depth/temp: Accel:	APN: spe.inetd3.gdsp	COM1 is connected
Schedule: 8 h to 16 h	APN user: web	Save to tag: OK
Tag software	pwd: web	Save to tag: OK Body details retrieved OK
buildtest v209	SMS: 310000202	
🕂 🔎 Type here to search	O 🛱 🗳	📄 💼 🕺 💷 🖸

Press "Save to Tag. The new PTT number and corresponding owner should now be shown in the text boxes.

Double check the value has been stored on the tag correctly by pressing "Retrieve from Tag" button.

The new PTT number has now been successfully loaded on to the tag. Disconnect the tag from the application by pressing the "Disconnect" button in the Serial Port window.

Note: If the new PTT number does not exist then an error "Unknown PTT Number ???" will show. This is because the PTT list which TagConfig uses will need updating using the procedure detailed in Section 3.2.

3 PROGRAMMING A TAG

3.1.1 Installing Renesas Software v4.09

Download the Flash Development Toolkit v4.09 from the download section of the SMRU website:

http://www.smru.st-and.ac.uk/Instrumentation/Downloads/

Copy the installation file on to the PC desktop and run the installer by using the mouse to double click on the icon.



fdt_4_01_01

Note: Where the images in the document refer to fdt version 4.01, the same is true for version 4.09. The processes and procedures are identical.

nesas Flash Development Toolkit (v4.01) - InstallShield Wizard

Navigate through the various installation windows, ensuring the correct 'radio buttons' are checked for each window before pressing either 'next' or 'ok':





3.1.2 Configuring the Renesas fdt v4.09 Software

The following section details how to configure the Renesas software for programming a tag.

This process only needs to be complete once for a given software installation on a PC. The configuration values are preserved for next time the software is run.

Start the 'Flash Development Toolkit 4.09 Basic' application from the start menu on the PC.



Scroll down the list and select the processor 'H8/3048BF'



Using the drop-down menu, select the COM port used by the Bluetooth device then press 'next'.

mmunications Port		2
Work space and by PF SB	The FLASH Development Toolkit supports connection through the standard PC Senal port and the USB port. Use this page to select your desired communications port. All settings may be changed after the project is created.	
B 05 EC-10 Device Inager 0 00 00 01 Target files 00 0 05 60 rs 01 LCD.mobir A 72 E6 B1 T Sikeyboard.mot 1 55 8A 33-4 Si Comms.mot	Select port: COM2	
Motor Control Device Image Target files	Select an Interface type to connect to the target device with. Normally this will be "Direct Connection" or simply left blank.	
8 92 1A 2C of St Drive mot 8 27 91 08 1 St Data mot 6 70 58 7D 51 St TAlgorithm.ms 5D 9A DE AS 5 64 85 97	Select Interface: Direct Connection	
0 24 04 40 73 34 AU 20 76 8 47 EF 84 80 83 6F 60 12 1		
	< <u>B</u> ack <u>N</u> ext > Cancel	

Set the clock frequency to 24MHz, then press 'next'

Device Settings		×
Work store	Please enter the specific device options based on: [H8/30488F] using [Protocol B] Select the external clock or the Internal clock: Enter the CPU crystal frequency for the selected device: Enter the clock mode for the selected device: Select the multiplier for the Main clock frequency (CKP); Select the multiplier for the Perpheral clock frequency (CKP);]
	< Back Next > Cancel	

Set the connection type to 'Boot Mode'. Deselect the 'Use Default' and set the recommended speed to 9600 (for programming with Bluetooth from the drop-down list. Press 'next'

Note: For Bluetooth the default rate must be set to 9600.

Connection Type	X
Workspace DA FF SF Workspace Industry of the Display Jose B F Display Jose	The FLASH Development Toolkit can connect to your device in a number of different ways. All the options on this page may be changed after the Project has been created. Select Connection: BOOT Mode USER Program Mode Kemel already running H BOOT Program mode the device erases its FLASH prior to connection. The Toolkit downloads programming kernels to the device as required. The Recommended Speed setting is based on the current device and clock. The user may also input their own, if this is supported by the kernel (and the interface board). Recommended Speeds: Green Specified: Back S7600 S800 S800 S800 S800 S800 S800 S800 S
Connection Type	The FLASH Development Toolkit can connect to your device in a number of different ways. All the options on this page may be changed after the Project has been created. Select Connection: © BOOT Mode © USER Program Mode © USER Program Mode © Mode © USER Program Mode © USER Program Mode © Mode after adaption of the device erases its FLASH prior to connection. The Toolkit downloads programming kernels to the device as required. The Recommended Speed setting is based on the current device and clock. The user may also input their own, if this is supported by the kernel (and the interface board). @ Recommended Speeds: 9600
	< <u>B</u> ack <u>N</u> ext > Cancel

Set the Programming Options to 'Protection – Automatic' and 'Messaging – Advanced'. Press 'Finish'.

Programming Options	×
The FLASH Development Toolkit offers a device protection system, plus an advanced messaging level for use with hardware and kernel development. What level of device protection would you like? Protection Device Image Target files Comms.met To see 10 Device Image Torget files Comms.met Target files Device Image Target device This mode is useful for Interface hardware development, and Kernel development.	
< <u>B</u> ack Finish Cancel	

When the 'Finish' button is pressed, the main window used for programming a tag opens automatically.

FDT Simple Interface (Unsupported Freeware Version)
Options
BASIC FILE PROGRAMMING Exit
Device : H8/3048BF Port : COM2
File Selection
© Download File
🔽 User / Data Area
User Boot Area
Program Flash Disconnect
Flash Development Toolkit and flash programming components are provide
FDT API initialised: version 4, 01, 00, 010

3.1.3 Tag Programming with Renesas fdt v4.09 Basic Software

If the Renesas software is being used for the first time then follow the configuration instructions in the preceding section, else as follows:

Place a magnet against the glass reed-switch located on the side of the tag, as shown – although tag configurations differ somewhat, the relative position of the reed-switch in relation to the battery and the front of the tag remains the same.



A rather faint yellow LED mounted along the edge of the PCB will flash approximately once every 4 seconds. If it doesn't flash, remove magnet and try again.

Once the yellow LED is flashing, place a second magnet to the rear of the tag, behind the battery but close to the corner where the first magnet was positioned.



Note: The order in which the two magnets is positioned against the tag is important for programming. The magnet on the side of the tag **<u>must</u>** be positioned first, <u>then</u> the magnet to the rear of the tag.

When the second magnet is correctly then a flashing red LED should be visible through the epoxy near this magnet (refer to Figure in Section 1 if necessary)



Establish a Bluetooth connection with the PC (but don't try to run TagConfig) – refer to Section 1. Make a note of the COM port established with the PC. If the Windows 10 driver is being used then this is the "Outgoing" Connection

Run the 'flash development toolkit v 4.09 Basic' from the 'Start menu:



When the application opens, the following error may occur:



This is a windows error. The operation of the programming software will be unaffected – press OK and continue with the following procedure.

In the FDT Simple Interface window, confirm that the COM port setting identified in the window is the same as that for the established Bluetooth connection. If not then follow the procedure in Section 4.1.2 to set the COM port to be the same as that for the Bluetooth.

tions		
	BASIC FILE PROGRAMMING	Exit
Device : H	8/30488F Port : COM2	
File Selection		
Ownload File		
🗖 User / Data Area 🗌		Þ
🗖 User Boot Area 📘		•
	Program Flash	Disconnect
lash Development T	colvit and flash programming of	monents are provid
DT API initialised	: version 4, 01, 00, 010	mponenos are provia

In the FDT Simple Interface window, press on the right-hand arrow button

FDT Simple Interface	(Unsupported Freeware Version)	
Options		
	BASIC FILE PROGRAMMING	Exit
Device :	H8/3048BF Port: COM2	
File Selection		
Ownload File		
🗖 User / Data Area		
🗖 User Boot Area		
	Program Flash	Disconnect
Flash Developmen	t Toolkit and flash programming compon	ents are provide
FDT API initiali	sed: version 4, 01, 00, 010	
•		

Navigate to the file to load on to the tag



When the file has loaded in to the application, ensure the "User Data Area" tick-box is ticked then press the 'Program Flash' button.

FDT Simple Interface (Unsupported Freeware Version)		
Options		
BASIC FILE PROGRAMMING Exit		
· · · · · · · · · · · · · · · · · · ·		
Device : H8/3048BF Port : COM3		
File Selection		
Ownload File		
✓ User / Data Area M:\h8_progs\building\MADE\building_vp.mot		
🗖 User Boot Area		
Program Flash Disconnect		
Flash the specified file or cancel an executing operation		
This is an unsupported freeware version		

Progress is reported in a status window, as follows:

FDT Simple Interface (Unsupported Freeware Version)	FDT Simple Interface (Unsupported Freeware Version)
Options	Options
BASIC FILE PROGRAMMING Exit	BASIC FILE PROGRAMMING Exit
Device : H8/3048BF Port : COM3	Device : H8/30488F Port : CDM3
- File Selection	File Selection
🕫 Download File	O Download File
User / Data Area M:\h8_progs\building\MADE\building_vp.mot	Vulter / Data Area M:\h8_progs\building\MADE\building_vp.mot
User Boot Area	User Boot Area
Cancel Disconnect	Program Flash Disconnect
8%	
Changing baud rate to 19200 bps Set baud rate value = 19200 Downloading main kernel 'C:\Program Files\Renesas\FDT4.00\kernels\Pr Main kernel download complete Connection complete Processing file :"M:\h8_progs\building\MADE\building_vp.mot" Operation on User Flash Downloaded the operation module Writing image to device [0x00000000 - 0x0000007F] Writing image to device [0x0000010 - 0x000007F] Viting image to device [0x0000010 - 0x000007F]	Operation on User Flash Downloaded the operation module Writing image to device [0x00000000 - 0x000007F] Writing image to device [0x00000100 - 0x00007B7F] Data programmed at the following positions: 0x00000000 - 0x00007FF Length : 0x0000080 0x0000100 - 0x00007FF Length : 0x00007A80 30.75 K programmed in 52 seconds Image successfully written to device

When programming has completed successfully, press the 'Disconnect' button then close the application.

The magnets may then be removed from the tag (the order of removal is not important).

Note: Due to the nature of some of the Bluetooth drivers, re-programming tags can take some time. From past experience, of the various drivers attempted, the Toshiba driver seems to be the fastest (2 Mins typically). BlueSoleil and Windows 10 drivers seem to take around 10-15 mins to program a tag.

Note 2: The BlueSoleil Driver seems to be the most unreliable when it comes to reprogramming, occasionally failing part way through. If this happens then the

magnets should be removed from the tag, the application shut-down and the reconnection/re-programming procedure repeated.

4 TAG OPERATION

All tags are shipped in sleep mode. In this state the tags can be left for many months with only minimal power drain from the battery. The photograph below show the location of the red status LED, between the base of the antenna and the left-hand contact when viewed from the battery end. In sleep mode the red status LED flashes a double flash once every 10 seconds:

The example shown below is for a CTD tag but other tags are genetically identical.



4.1 Tag Activation and Functionality

The tag activates automatically when it detects immersion in sea-water.

Upon immersion in sea-water, the red status LED changes from a double red flash every 10 seconds to a more rapid series of triple flashes. If the tag remains immersed for a few seconds the pattern changes to a single flash every 4 seconds. This signifies that the deployment software is operating.

Upon removal from sea-water, this single flash continues as ARGOS or GSM transmissions commence. These will continue for approximately 6 hours, but will then reduce in frequency to preserve battery life. In this condition the tag is in 'haul-out' mode. The tag will remain in this mode until re-immersed in sea-water.

The tag can be returned to sleep mode by holding a magnet against the reed switch (refer to photograph above) for 10 seconds. Upon removal of the magnet the red status LED will perform double flashes every 10 seconds.

Note: On newer PCBs the blue reed switch has been replaced with glass ones – the position and functionality are otherwise the same.



4.1.1 Tag Testing

Please perform the following tag test prior to deployment:

Check that the tag is in sleep mode: i.e. the red status LED is flashing double pulses every 10 seconds.

Activate the tag by shorting the two wet / dry contacts using a piece of wire. Almost any wire is suitable for this. Keep these contacts shorted until the red status LED goes through a sequence of triple flashes and changes to a single flash approximately every 4 seconds.

On recent versions of software a yellow LED will illuminate continuously as the tag goes through its start-up sequence, single flash once and then switch off (the yellow LED is easier to see in bright conditions. The yellow LED is located at the front of the tag, symmetrically opposite the red LED, as shown below:



Remove the shorting wire and position the tag in a position with good visibility of the sky and leave for several hours (min 6 hrs). If more than one tag is being tested at any one time then the tags should ideally be spaced several feet apart.

Put the tag back in to sleep mode after 6 hours or more by holding a magnet against the reed switch on the side of the tag. Hold the magnet in this position for 10 seconds.

Remove the magnet and check the status of the red LED. In sleep mode the red LED should flash with the characteristic double flash every 10 seconds. If it still flashes once every 4 seconds then repeat.

The tag's location and ARGOS / GSM diagnostic data will update automatically on the SMRU web-site <u>http://www.smru.st-and.ac.uk/protected/technical.html</u>.

Argosweb may also be used to check for uplinks.

4.1.1.1 GSM Tags

For GSM tags, each deployment website has a near real-time link to our text message server. This is located at the bottom of the particular deployments website:



This shows the text messages as they are generated by each of the GSM tags and may be used to ascertain if the tags are working correctly.

After activation, GSM tags run through a 6 hour test period where text messages are generated once per hour, and data calls once per 2 hours

Received	(UTC)																			
2015-09-11	15:36:01	FTP	138.	251	.190	.100	/tes	st/1	413	5.00	006a	a OK	10k	B/OkI	3 D	T=5	6 (2	2+18	+6+	5+18
2015-09-11	15:35:31	2015	/09/	'11	14:2	9:36	12	3 3	34	7b5	8 10	:83	22 6	4f 19	9 41	.08	11	4d4	7 21	7 79
2015-09-11	14:36:37	FTP	138.	251	.190	.100	/tes	st/1	413	5.00	005a	a OK	10k	B/OkI	3 D	T=9	1 (2	2+13	+12-	+37+
2015-09-11	14:35:32	2015	/09/	'11	13:2	9:36	12	3 3	3 27	4c7	88	11b	6 22	6190) 19	24	38	18	5eb	54
2015-09-11	13:36:04	FTP	138.	251	.190	.100	/tes	st/1	413	5.00	00 4 a	a OK	10k	B/OkE	3 D	T=5	8 (2	2+14	+8+1	10+1
2015-09-11	13:35:29	2015	/09/	'11	12:2	9:36	12	3 3	3 16	cb7	27	70a:	f 22	1971	. 19	9 77	7d	18	4f70	c 8
2015-09-11	12:36:01	FTP	138.	251	.190	.100	/tes	st/1	413	5.00	003a	a OK	10k	B/OkE	3 D	T=5	5 (2	2+19	+6+3	5+19
2015-09-11	12:35:30	2015	/09/	'11	11:2	9:36	11	3 3	3 27	a26	26	521	8 16	3701	. 21	. 71	d2	72	6a2	18
2015-09-11	11:36:01	FTP	138.	251	.190	.100	/tes	st/1	413	5.00	002a	a OK	10k	B/OkE	3 D	T=5	6 (2	2+11	+5+1	11+1
2015-09-11	11:35:26	2015	/09/	'11	09:4	3:07	6 3	33	31	44a5	26	9e3	27	4975	23	978	16	5 a8	3 21	1 37

Confirmation of the data transmissions is in the format commencing FTP...

FTP 138.251.190.100/test/14134.00007a OK 10kB/0kB I

This details the tag number success/failure of a data connection and the data packet size.

The other message has the following structure:

Date > Time > number of satellites detected > Satellite Data...

2015/09/11 14:29:36 12 3 3 4 7b5 8 1c83

This is a GPS location attempt and has the format:

On an open position (good visibility of the sky) the number of satellites should be larger than 6 for a good GPS location to be determined.

4.2 Tag Operation

4.3 Synchronising two SMRU tags via Bluetooth

Activate the slave tag (i.e. the tag which <u>will not</u> relay the data back to SMRU) by shorting the wet/dry contacts (refer to Section 5.1). For example, for a GSM / CTD tag pairing this would usually be the CTD tag as the GSM tag would normally perform the data relay.

Once the slave tag is activated then the red Bluetooth LED starts to flash (below the battery on the base of the tag, note slight differences in PCB layout between different variants of PCB).



V1.80 PCB



v1.84 PCB

Now activate the master tag (i.e. the tag which <u>will</u> relay the data back to SMRU) by shorting the wet/dry contacts (refer to Section 5.1). For example, for a GSM / CTD tag pairing this would usually be the GSM tag.

The red Bluetooth LED on the master tag should also flash briefly. The LEDs on both tags should then illuminate green for a second or so and then go out.

The two tags are now actively running, synchronised and ready for deployment.

4.3.1 Synchronising SMRU tag with Vemco VMTs

Whilst looking at the end window of the Vemco VMT, remove the magnet from the side of the VMT.

When short red flashes are seen from the LED behind the end window, quickly replace the magnet back to the indicated position on the VMT. The same red LED will then begin to flash once per second.



Whilst the red led on the VMT is flashing once per second, remove the magnet from the side of the VMT.

Note: the VMT will only flash for once per second for 10 seconds. After this time the VMT will go back to stand-by. To activate the VMT the magnet <u>must</u> be removed before the 10^{th} flash.

Once the VMT has been activated then activate the SMRU tag by following the procedure detailed in Section 5.1.1. The two tags need to be within approximately 1 metre of each other.

As soon as the SMRU tag has activated then the red Bluetooth LED on the underside of the tag will begin to flash once per second. This indicates that the Bluetooth on the tag is searching for its paired VMT.



Once pairing is achieved then the flashing red LED on the underside of the tag will briefly turn green, for about 1 second, before extinguishing. This indicates that the tags have established communication.

To further confirm an established pairing, look carefully at the yellow LED on the front of the tag (For most tag designs this will be close to the GSM or Argos antenna). This yellow LED should be flashing once per second.



Note: For the GSM tag, the **yellow** LED will <u>only</u> commence flashing once the GSM has completed it's test transmission following activation – the test transmission could take up to 5 minutes to complete.