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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-licensed 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’.



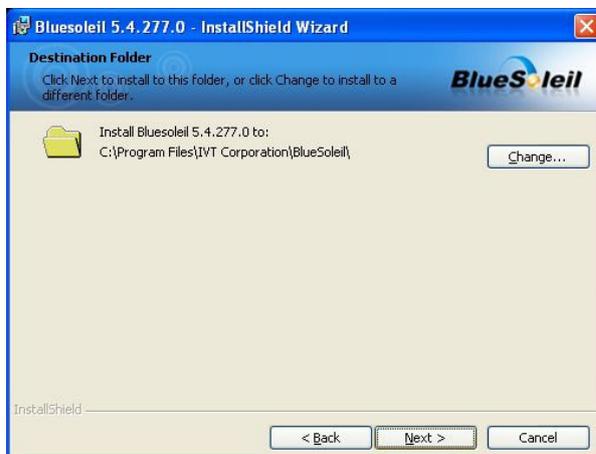
Select 'Next' when prompted.



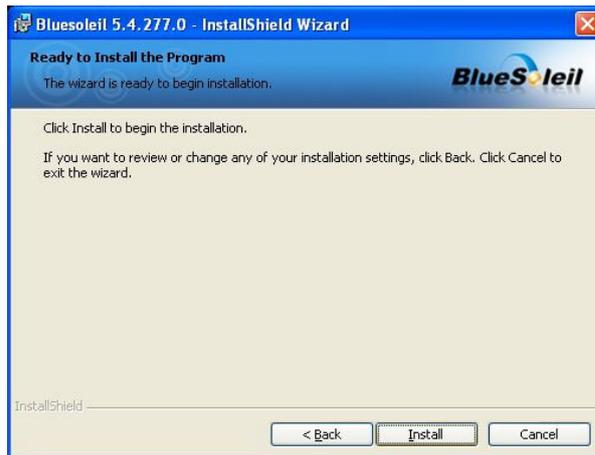
Tick the 'Accept Licence Agreement' button and then press 'Next'



Select 'Next' when prompted



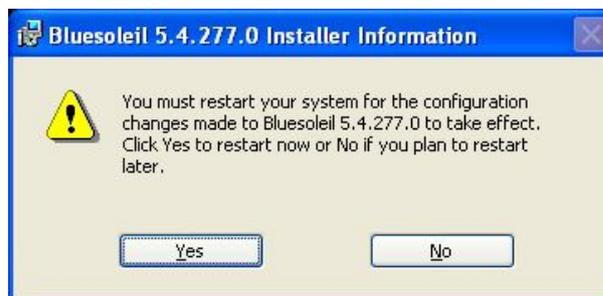
Select 'Install' when prompted to commence software installation.



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



Re-boot 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



v1.84b PCB

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’

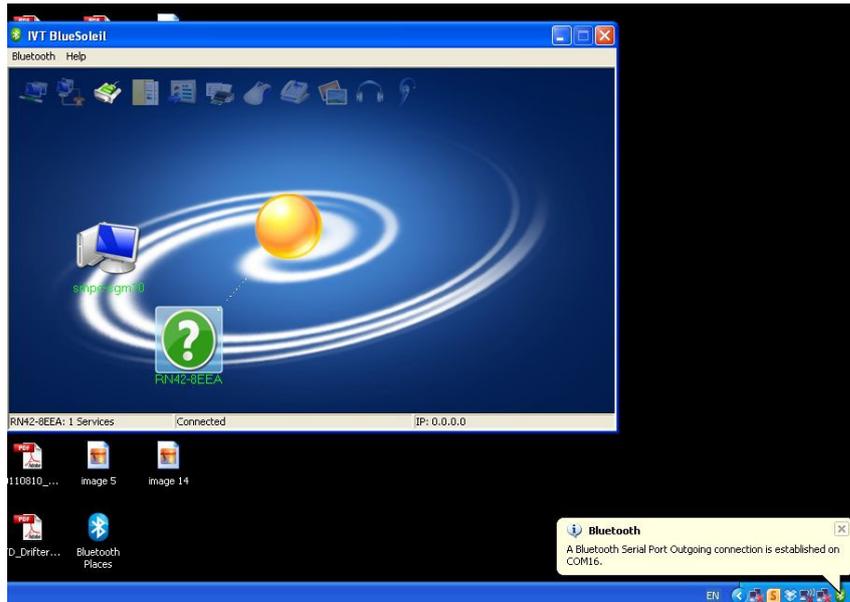


Use the mouse to double-click on the tag device (tags are generically identified as RN42...). With the mouse over the device, use the right hand mouse button to select ‘Connect Bluetooth Serial Port’.



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.



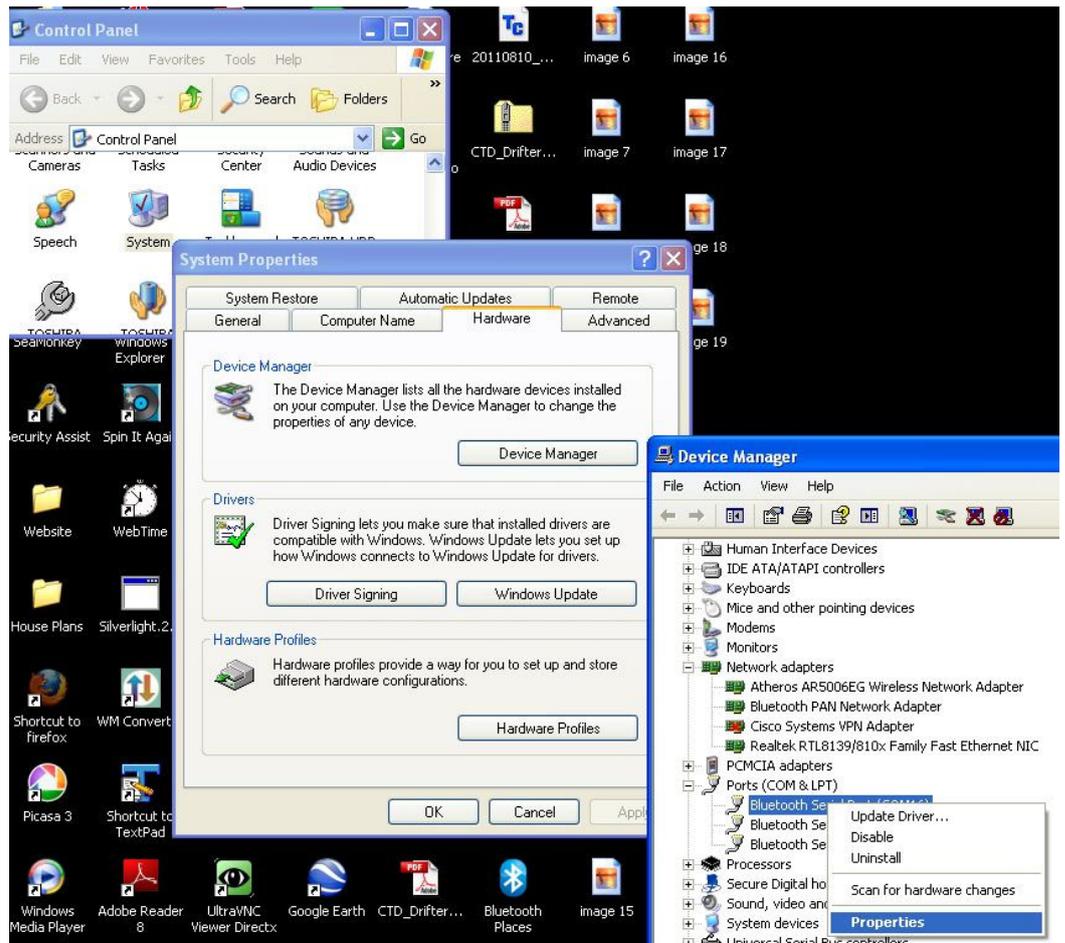
The icon will change from green to blue and the LED on the back of the tag will turn from a continuous green to a flashing red, once a second.



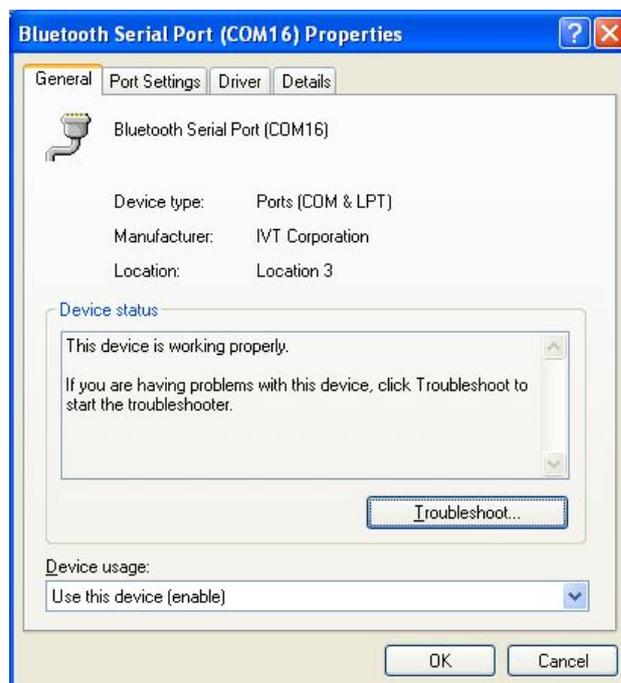
Close the Bluesoleil application.

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'.



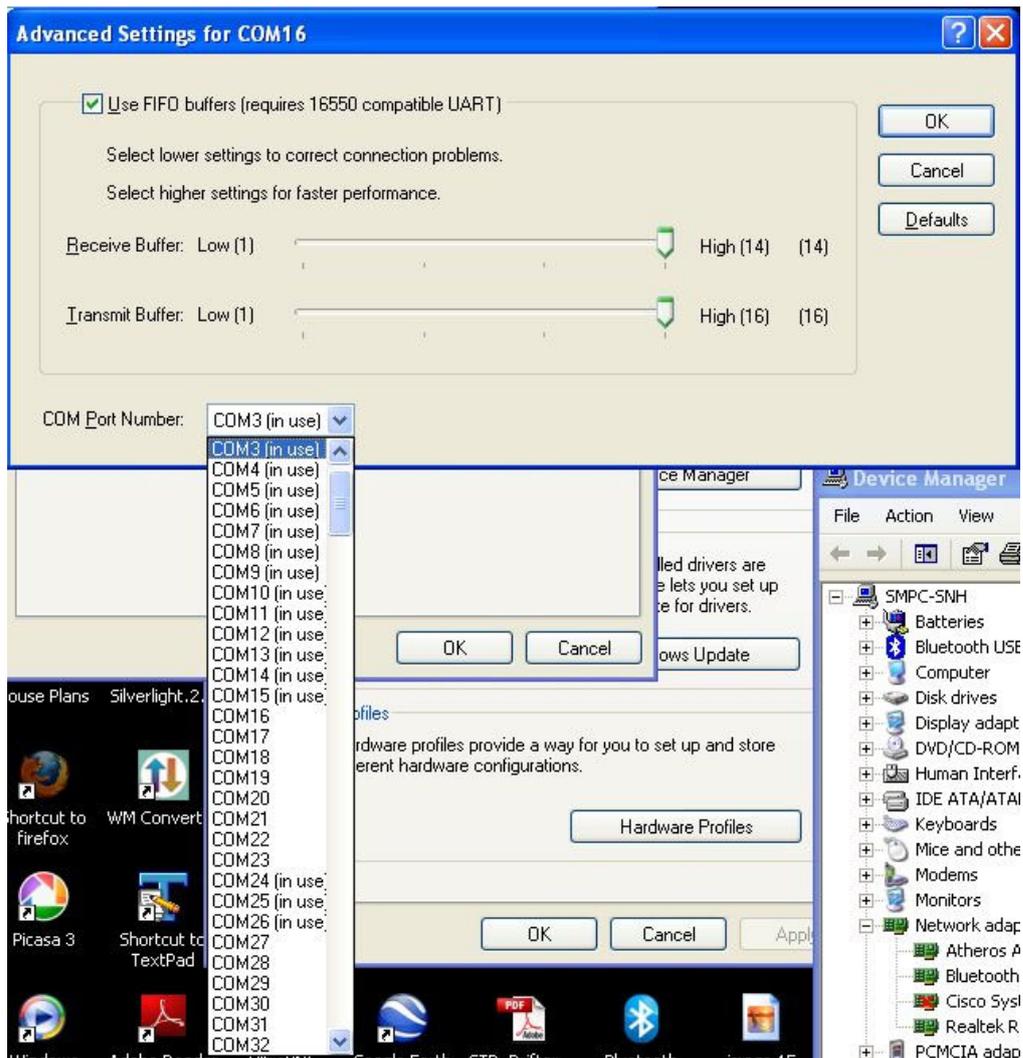
A new window will open corresponding to the Bluetooth COM port. Select 'Port Settings' from the tab menu.



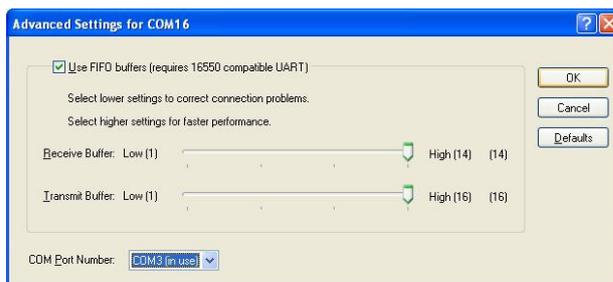
Select 'Advanced'



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.



Press 'OK'



Press 'Yes' if prompted in a 'Communications Port Properties' window.



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-assign 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.

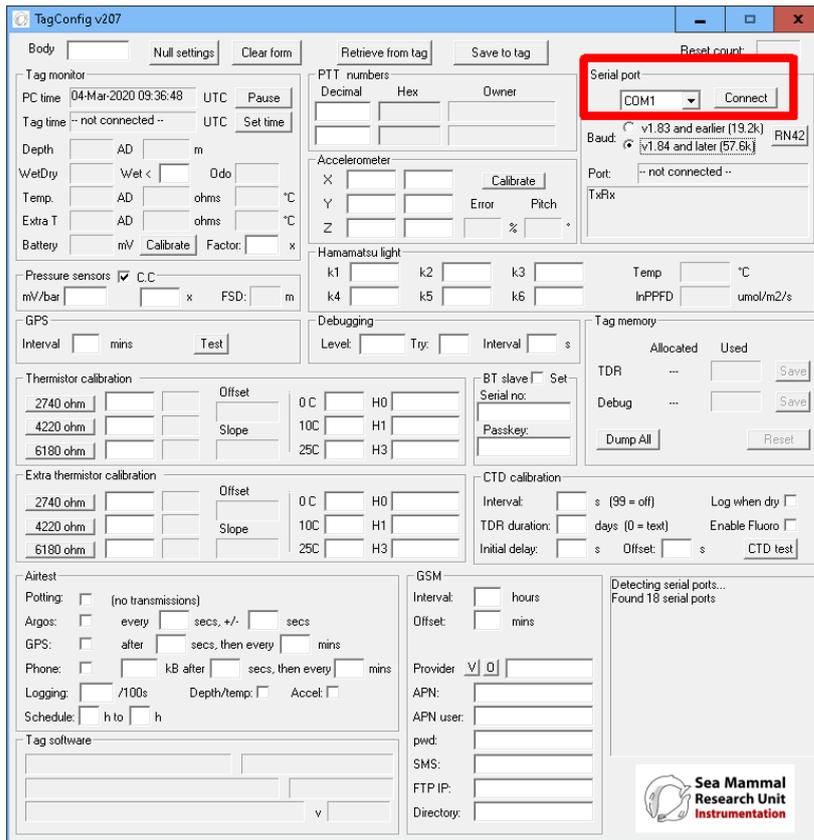


Close the Bluesoleil application.

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:

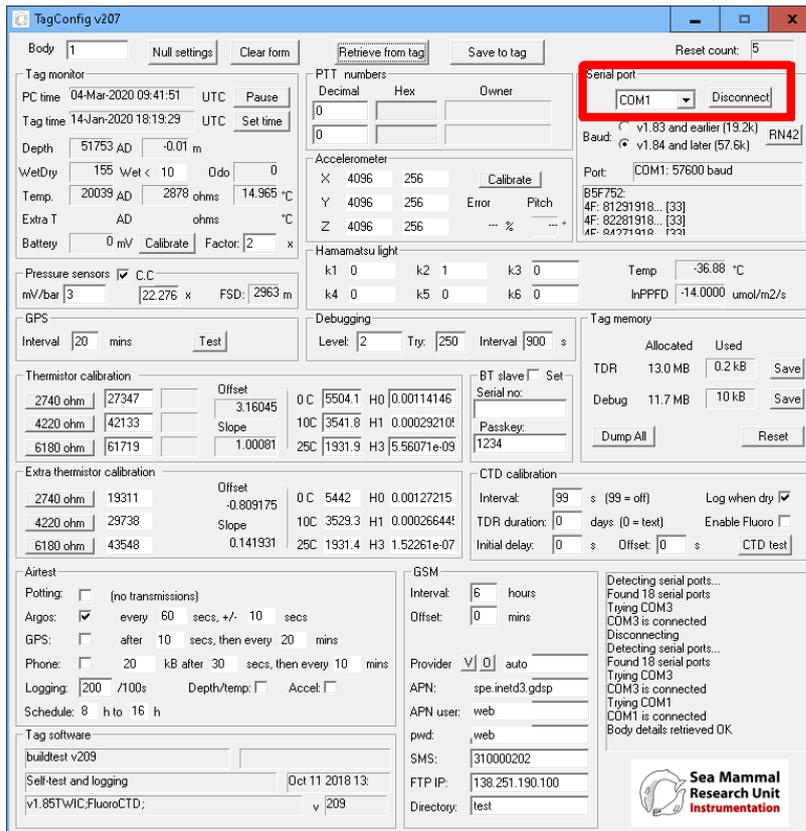


Use the drop-down menu to select the connected Bluetooth COM port and then press the “Connect” button.

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).



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 bluetooth 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

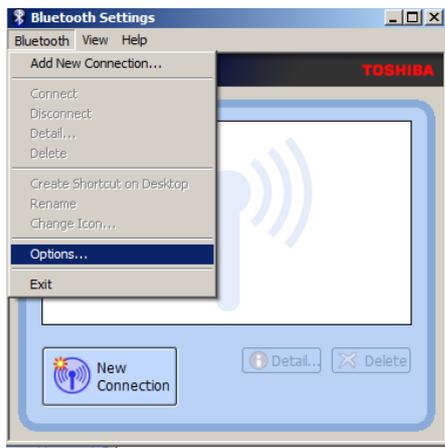
Ensure the Toshiba Bluetooth is activated on the PC (usually enabled using the function buttons).

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

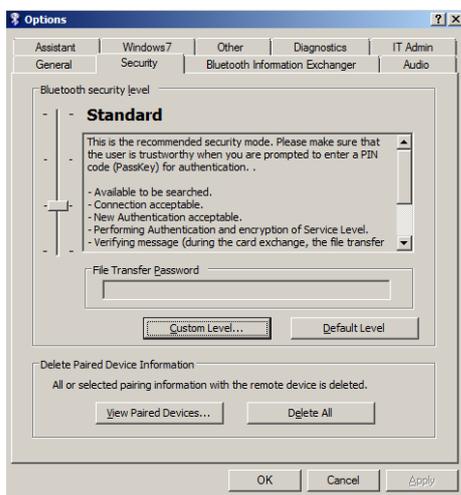
Click on *Bluetooth settings*, the following window will appear:



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

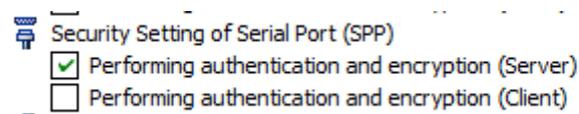


Select the “Security” tab.



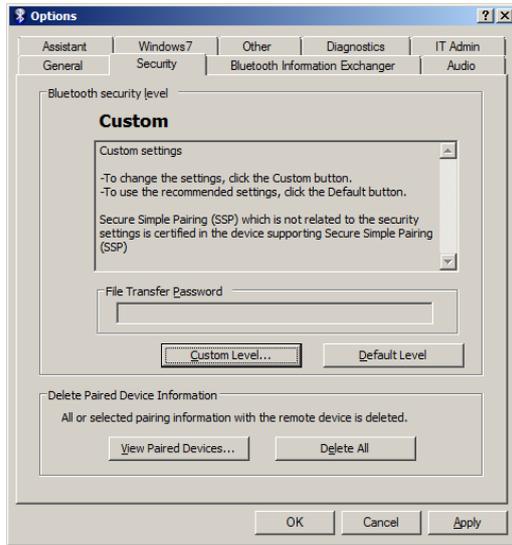
Select “Custom Level”

Scroll down to “Security Setting of Serial Port (SPP)” and ensure the following box is ticked.



Close down the window by pressing the “OK” button.

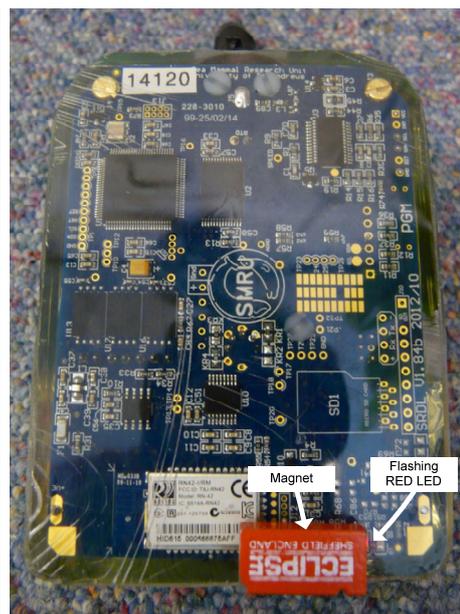
If you had to select the tick-box then press “Apply before pressing “OK” to close the options window:



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



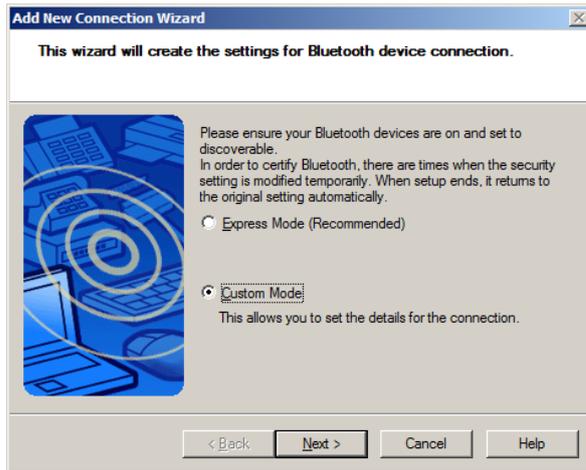
v1.8PCB



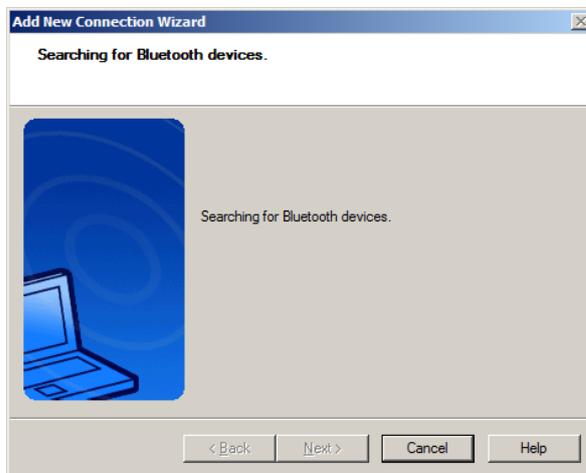
v1.84b PCB

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

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



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

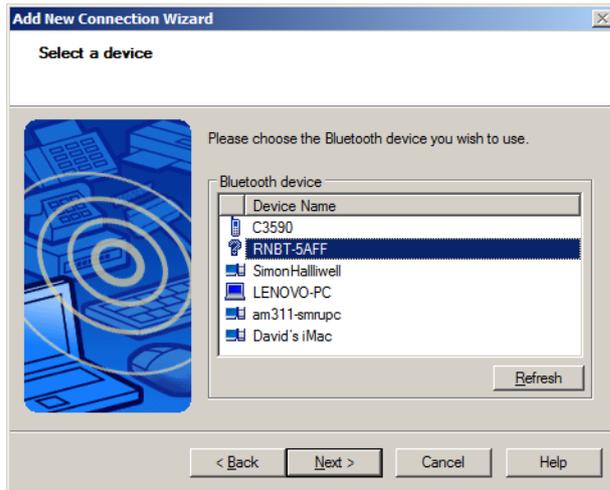


Found devices will be depicted in a new window:

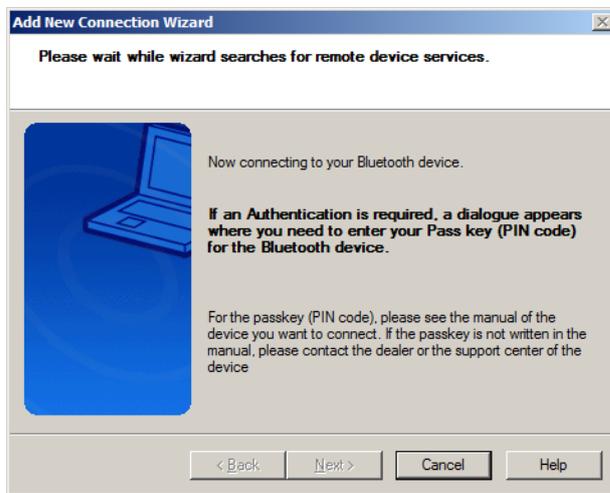


Of the various Bluetooth devices detected above, the generic format for the tag's Bluetooth device is "RNBT...".

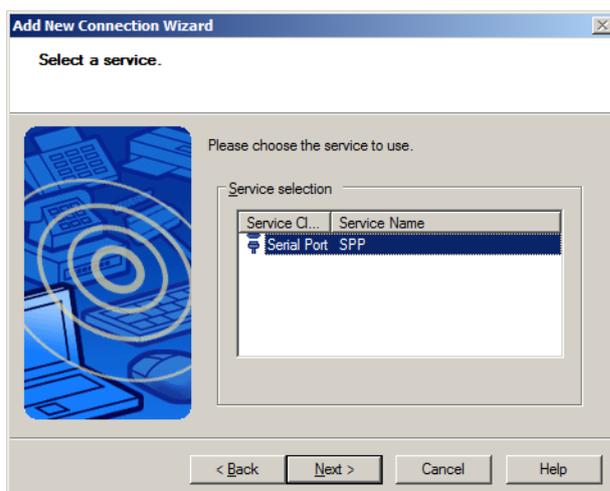
Using the mouse, highlight the tag's Bluetooth device and press "Next"



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

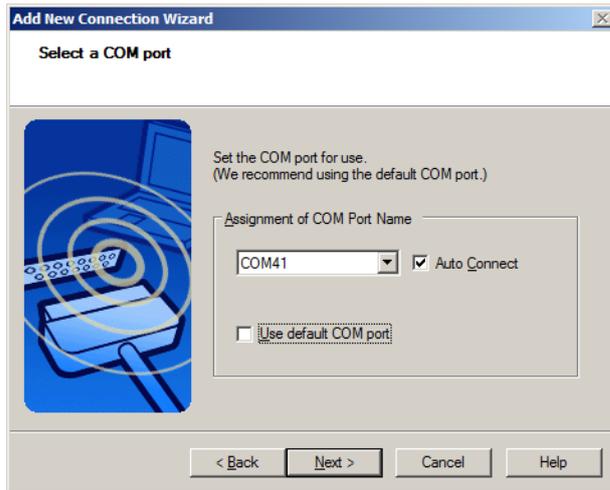


A further window will now be shown, as shown below, asking for the service required – select *Serial Port SPP*

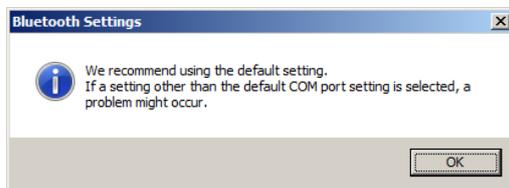


Press the *Next* button

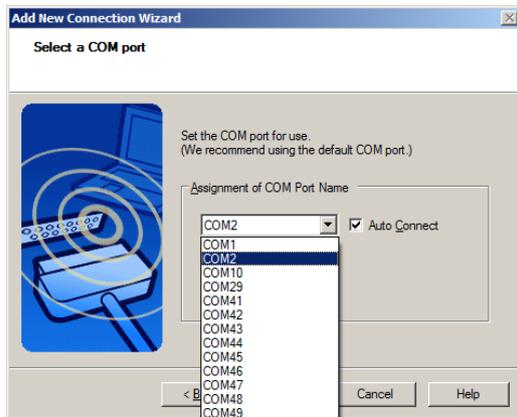
The next window allows the user to specify the COM port required – any COM port number will work with TagConfig, in which case the Default COM port (as suggested by the tick-box) may be used.



And press okay when prompted with the following window



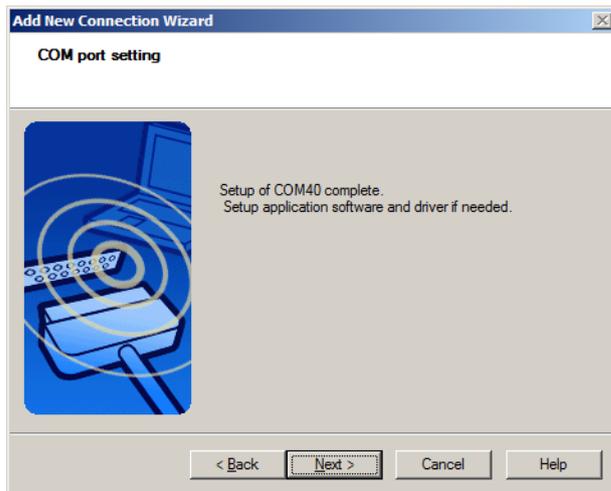
Select an appropriate COM port from the drop-down menu – it is fine to use any port providing the corresponding device is not currently plugged in.



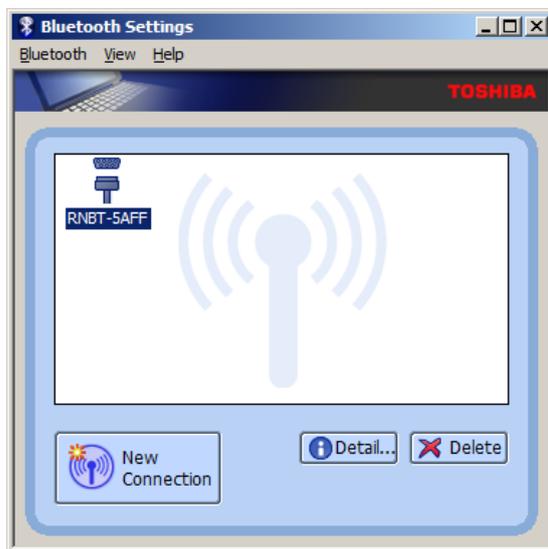
In the example above the Bluetooth has been switched from the default of COM port 41 to COM port 2.

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.

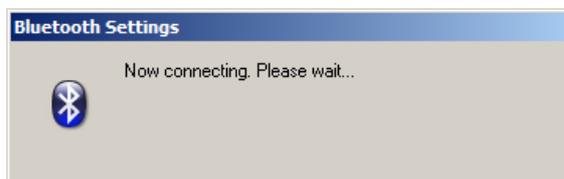
Press “Next”



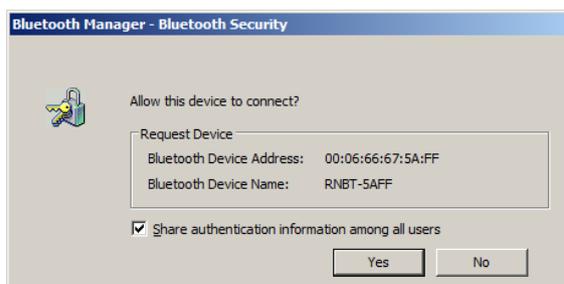
Press "Next"



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

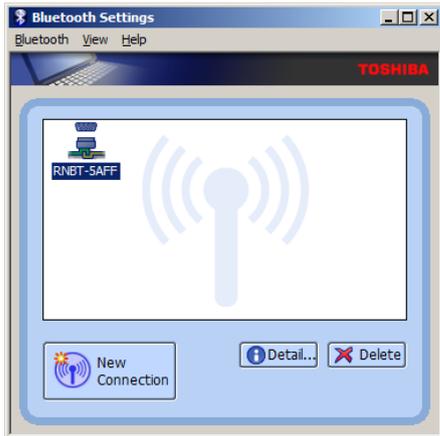


The following security warning may show to confirm connection is genuine:



Press the "Yes" button.

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

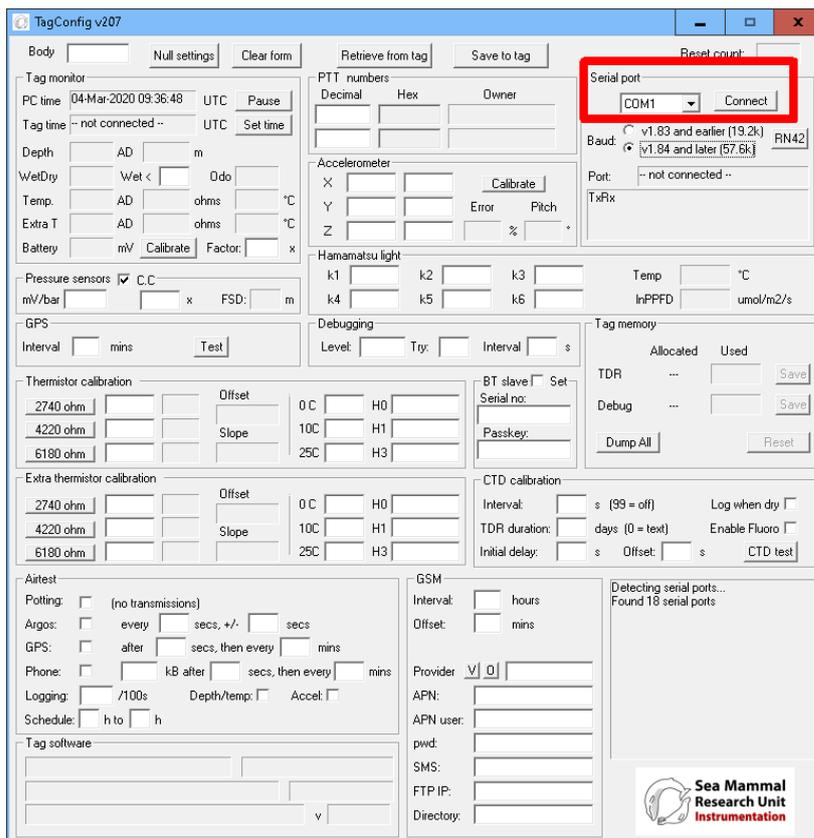


At this point the **RED** LED on the back of the tag will probably still be flashing. This will only turn **GREEN** when communication is established between the PC and the tag using TagConfig.

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:

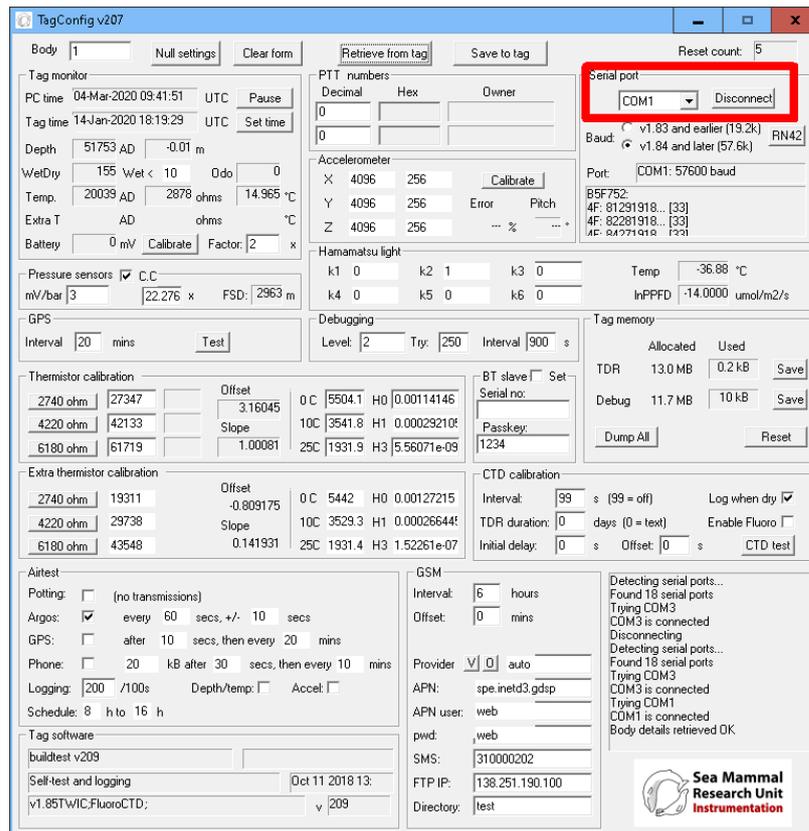


Use the drop-down menu to select the connected Bluetooth COM port and then press the “Connect” button. The drop-down box shows the available COM ports the app can see. In this example COM Port 1 is selected.

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).



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 Mocosoft’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

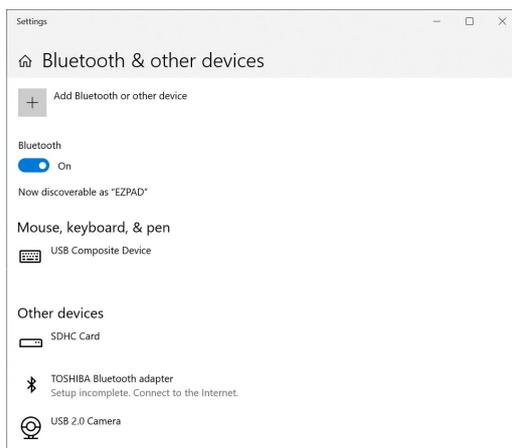
Note: On more recent PCB designs (v1.84b) the flashing red LED is located on the same side as the magnet

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

Bluetooth & other devices



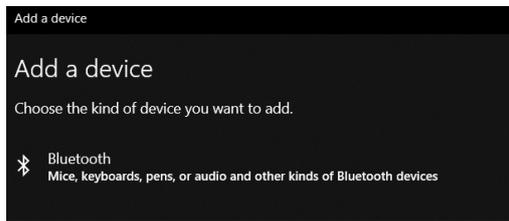
Activate the Bluetooth by sliding the slider from 'Off' to 'On'



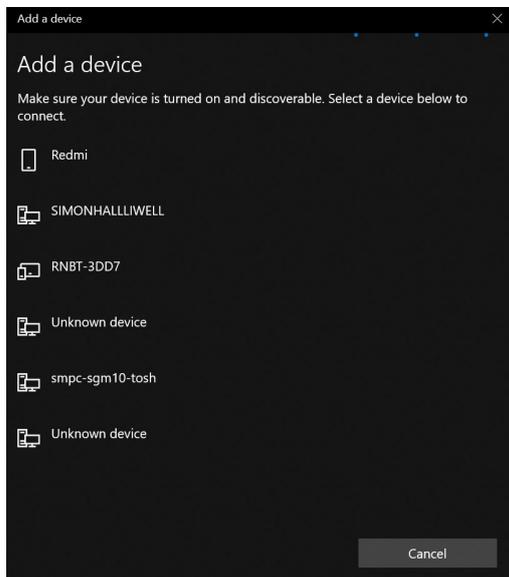
Helpful tip: Windows 10 stores all the previous Bluetooth links so the list under “Other Devices” can be quite long. This includes the list of previously connected tags. Consequently the list can get very long and since all tags start with “RN42...” it can quickly become confusing. To make things much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

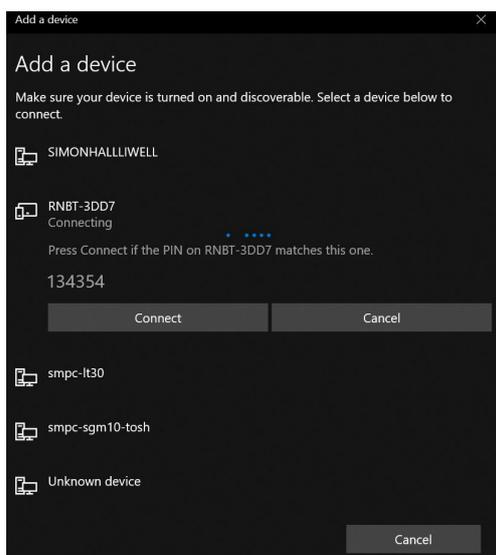
To connect a new tag, press the “Add a new device” icon, the Bluetooth option:



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.



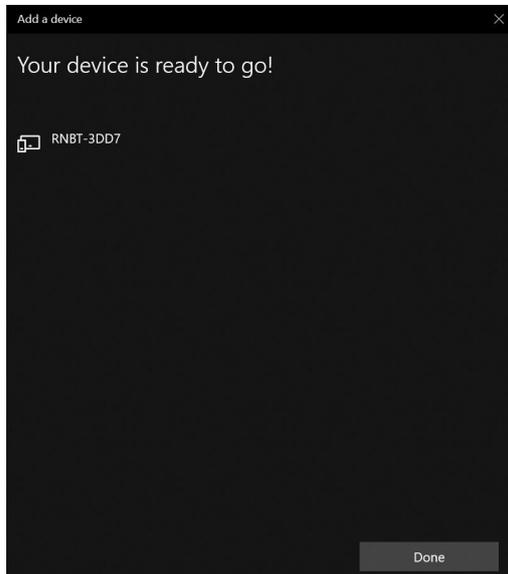
Select the Bluetooth for the tag, the PC will attempt to connect to the tag



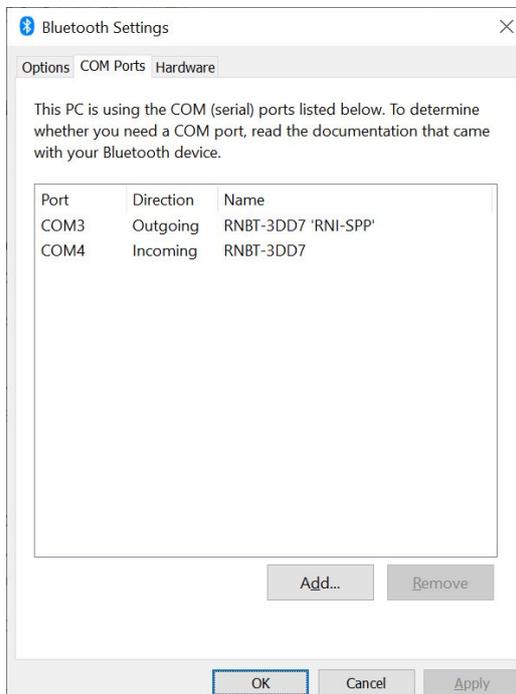
The PC will ask to confirm a code, press “Connect”, regardless of what the number is. The number is different every time.

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.



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.

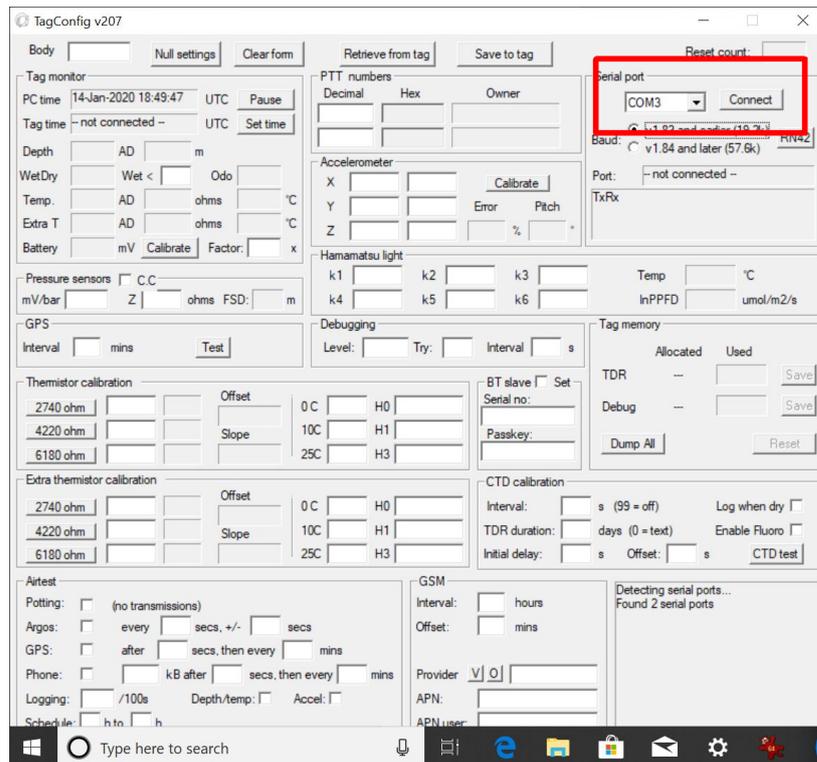
Note: There may be various other RN42 modules shown in the window above – these are from previous connections. It may avoid confusion if the Bluetooth

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).

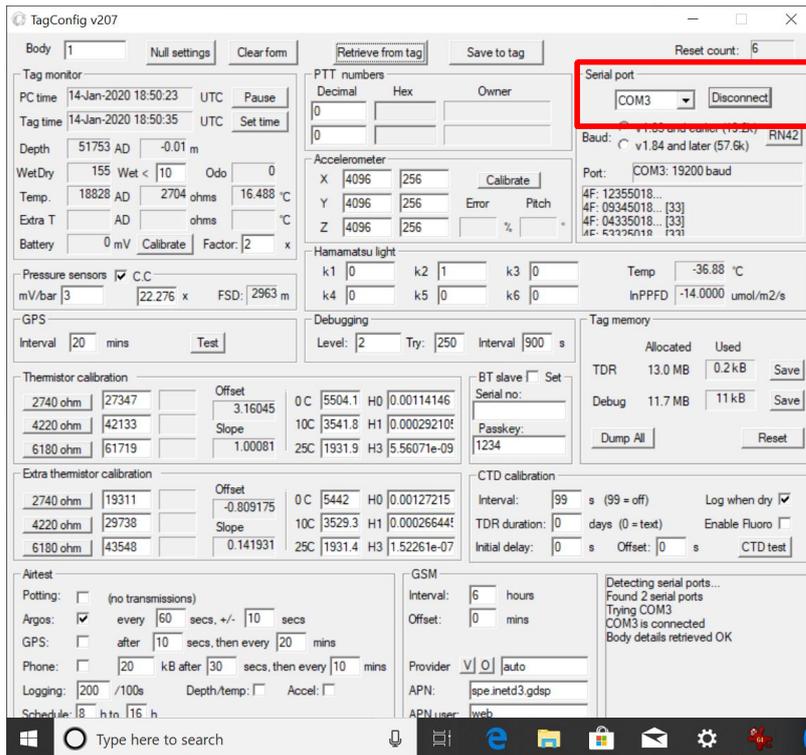
1.3.2 Running TagConfig Using Windows 10 Bluetooth Driver

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.



With TagConfig still running, select the appropriate COM port 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**.



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>

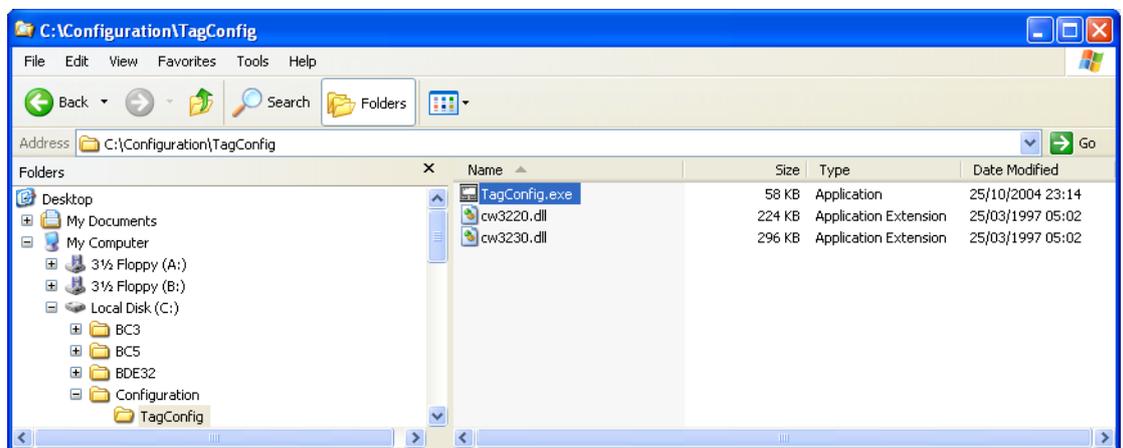
Do not run directly from a CD since the program will be unable to write to its log files.

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

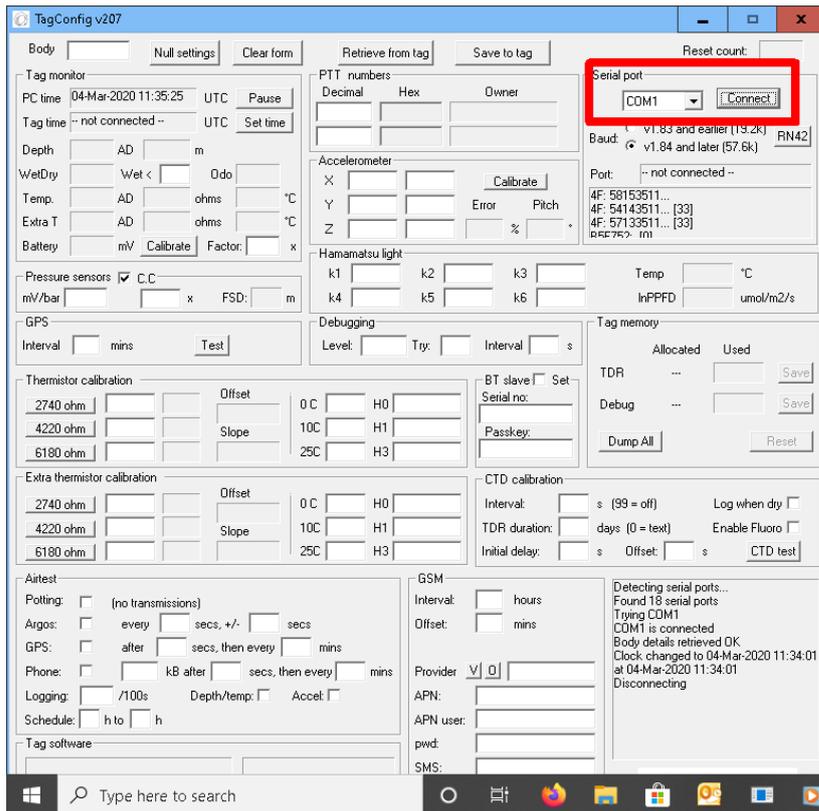
Establish a Bluetooth connection between the tag and the PC.

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



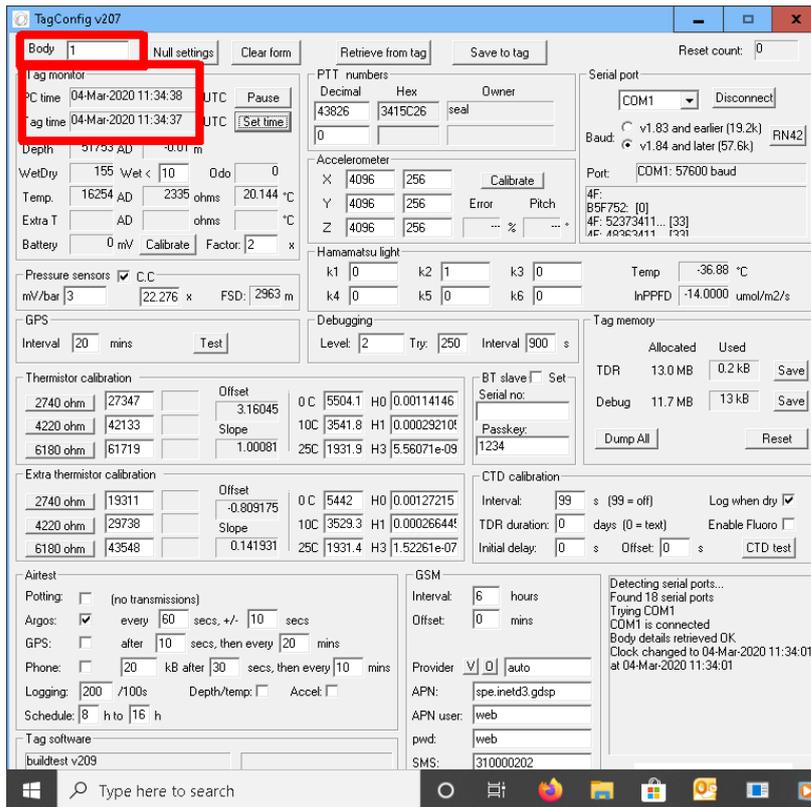
Select the appropriate COM port from the drop-down menu located in the right corner of the screen. In the picture below COM3 is selected.

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



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.

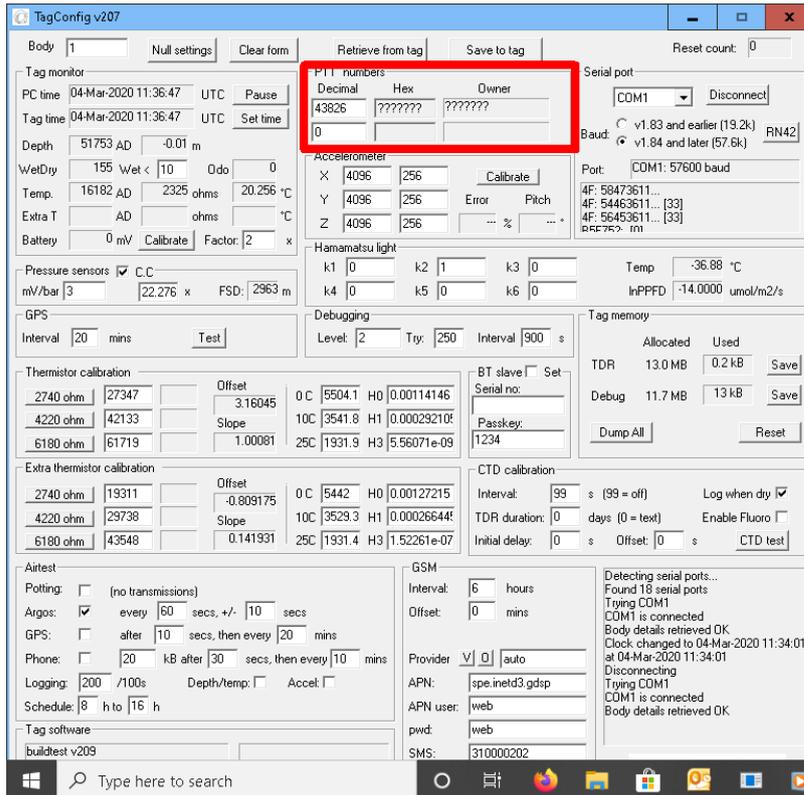


If the body number is not displayed then it could be because the wrong COM port is selected – try selecting another one.

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.



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



To correct this error:

- First close TagConfig by pressing “Disconnect”
- Close the TagConfig application
- Go to the download section of the SMRU website (<http://www.smru.st-and.ac.uk/protected/downloads.html>) and download the latest PTT list from the Software Tools section.
- Copy the file in to the same directory as the TagConfig application on the PC.
- 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.

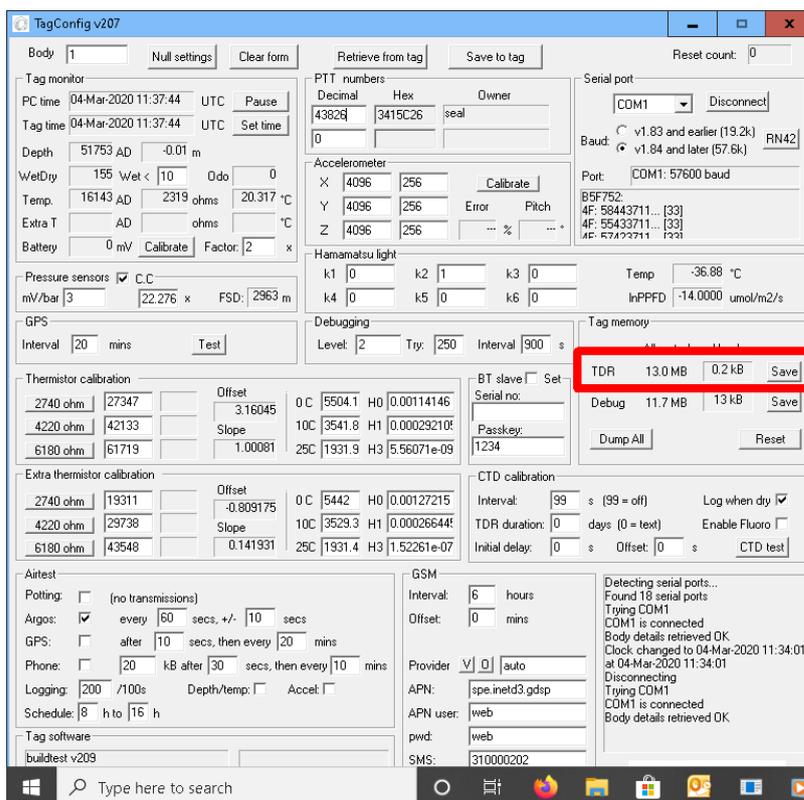
2.2.2 Downloading Data from a Tag

There are two types of download:

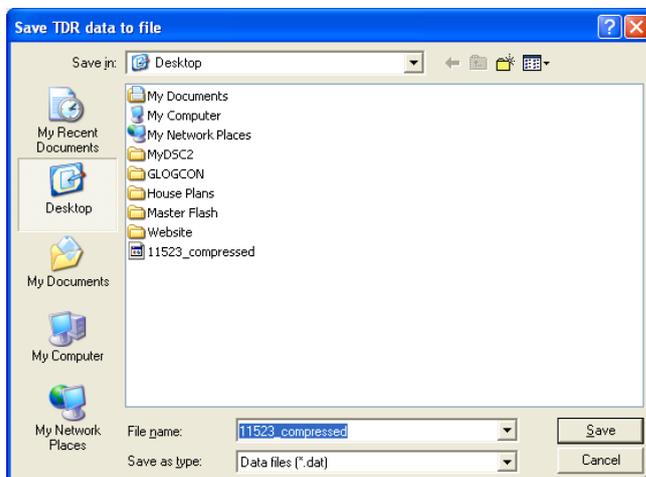
- Downloading data from a deployed tag (i.e. to download all dive history data from a tag).
- Downloading debug data from a tag (i.e. when a tag has been used for diagnostics, e.g. GPS/GSM logging, sensor calibration etc.). Under normal circumstances there is no need to download the debug data from a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

2.2.2.1 Downloading Data from a Deployed Tag

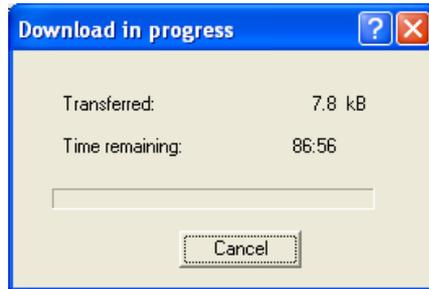
Once communication is established with the tag then the data may be downloaded by simply pressing the “Save” button under TDR in the Tag Memory window, as indicated below.



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.

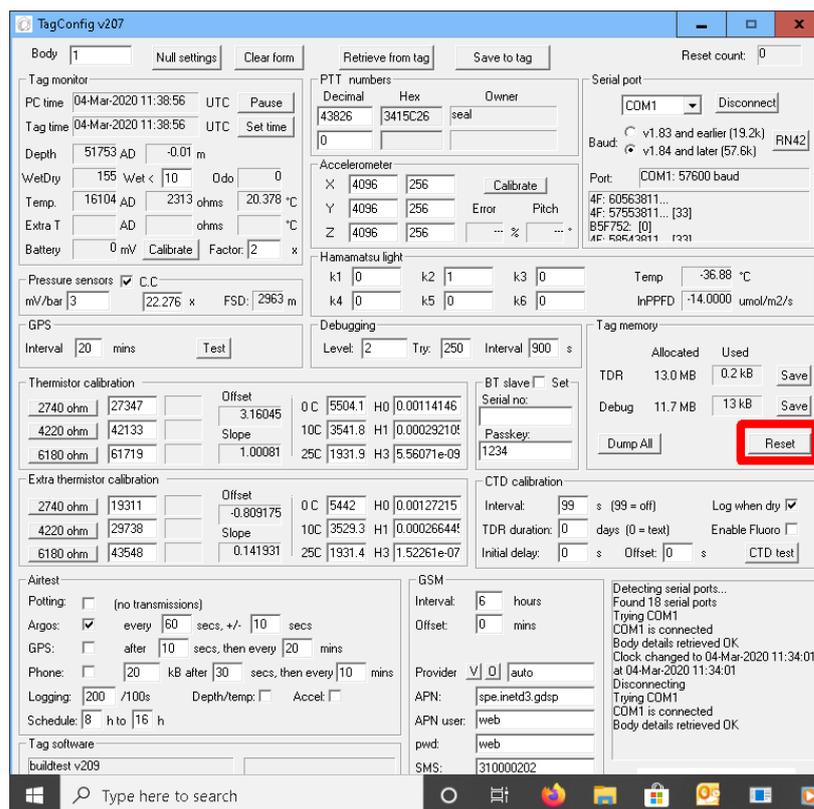


Download is ceased by pressing “Cancel”.

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.

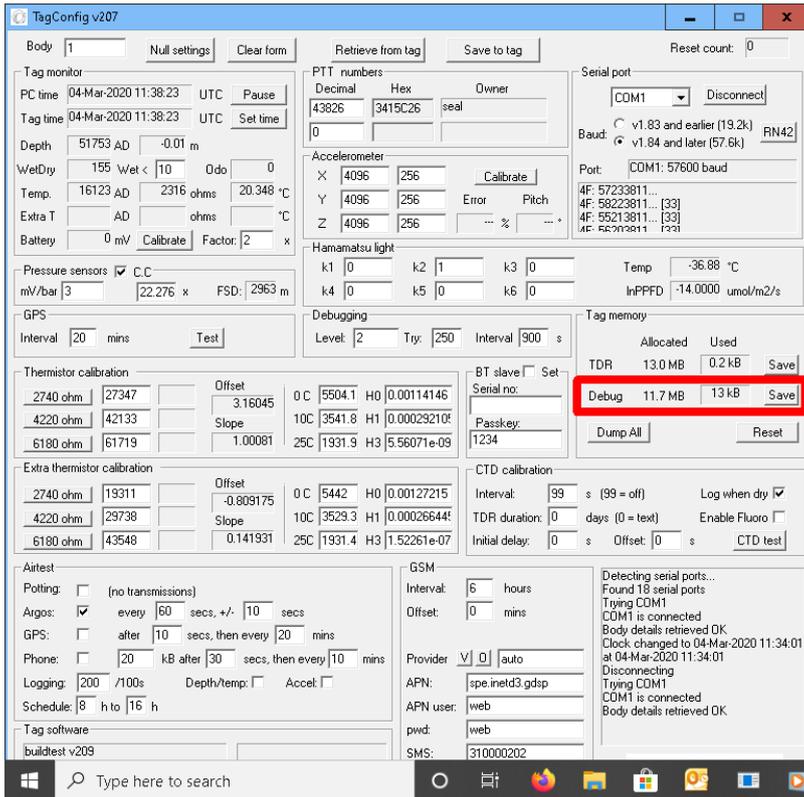
Once downloaded, the data may be erased from FLASH memory by pressing the “Reset” button.



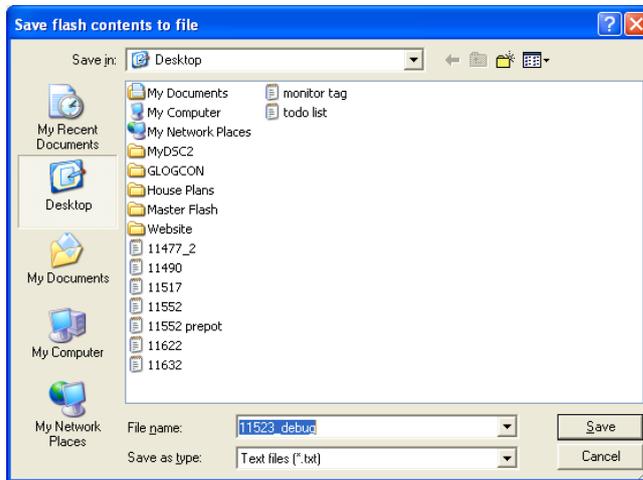
2.2.2.2 Downloading Debug Data from a Tag

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

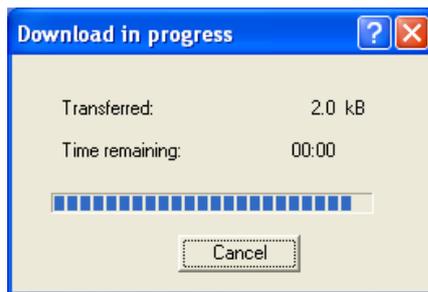
Once communication is established with the tag then the data may be downloaded by simply pressing the “Save” button in the debug part of the ‘Tag memory usage’ box, as indicted below:



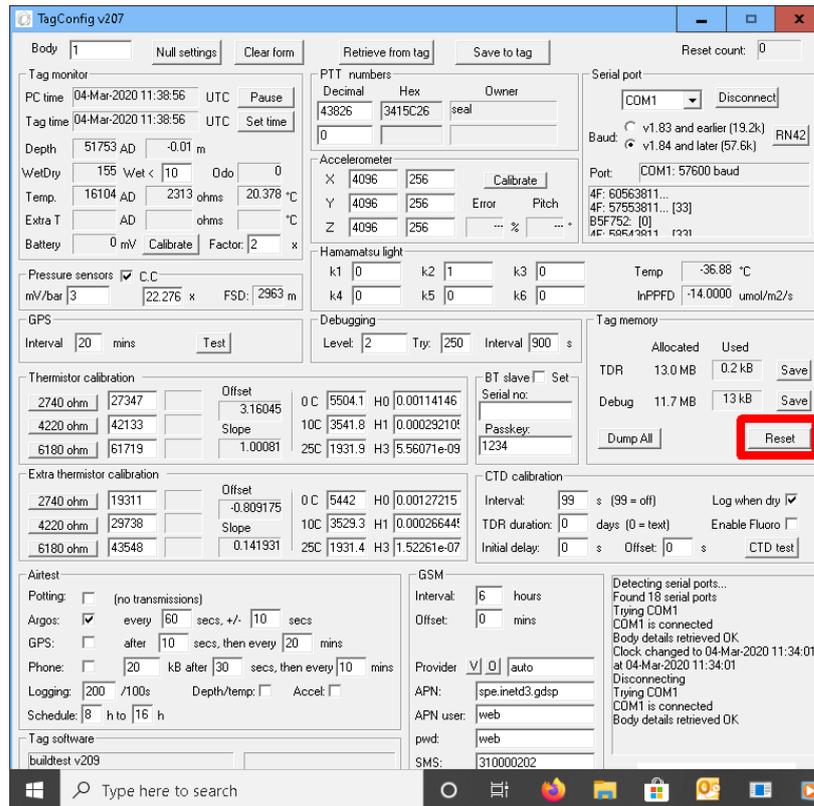
As with other types of download, for convenience a default filename and type is automatically selected.



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.



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



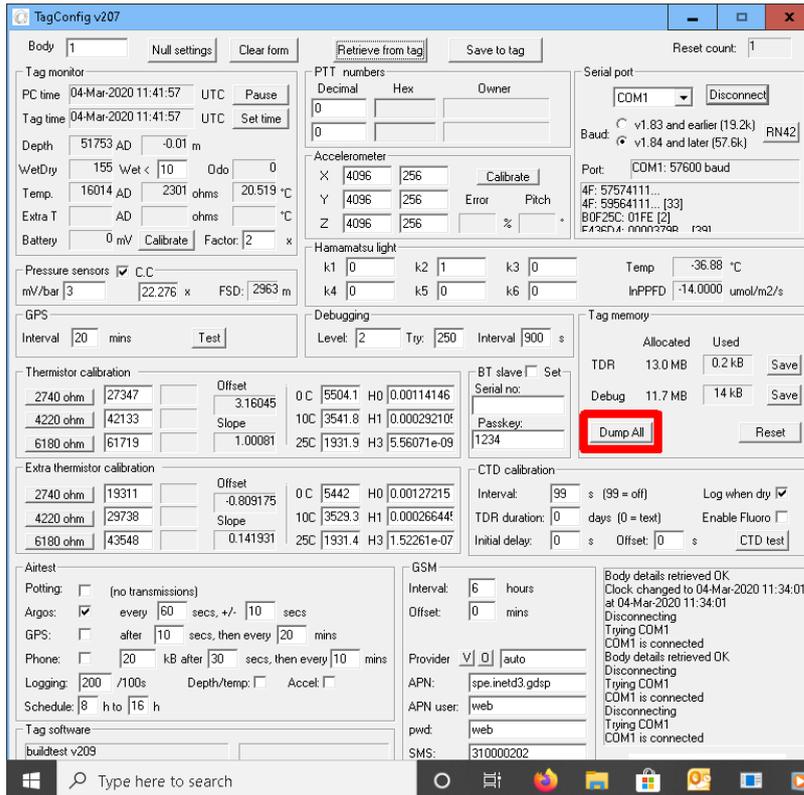
2.2.2.3 Downloading Compressed Data

Under exceptional circumstances 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.

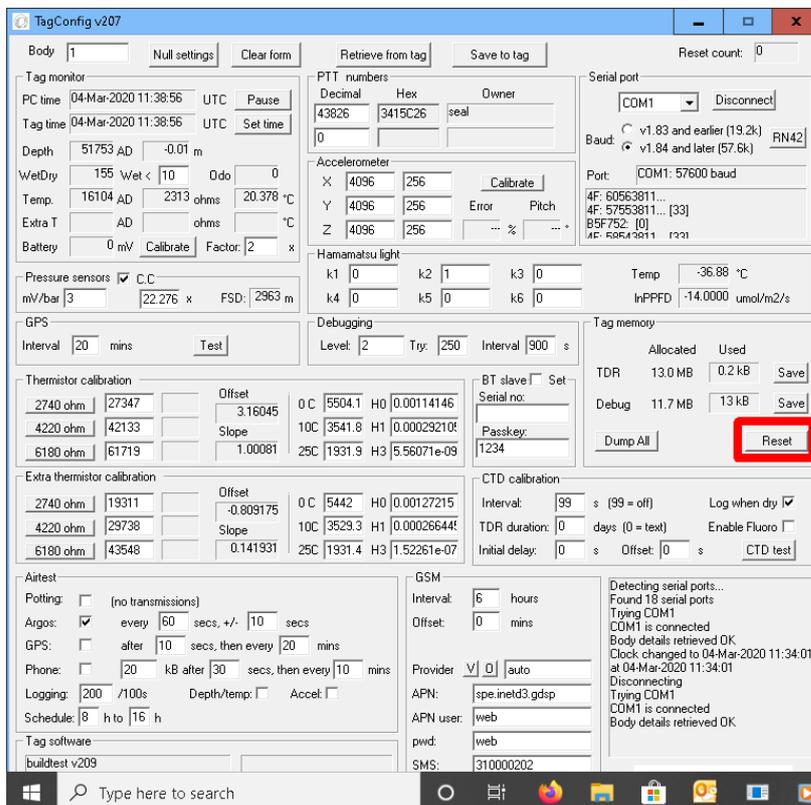
This method of data download should only be undertaken on request of SMRU.

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



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.

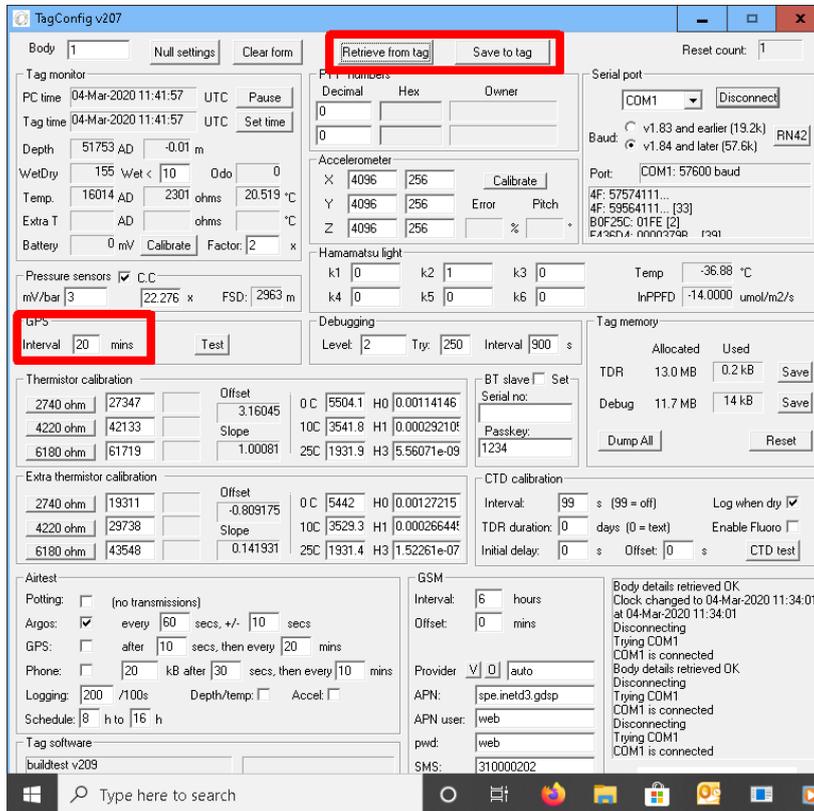
Once downloaded, the data may be erased from FLASH memory by pressing the "Reset" button.



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).

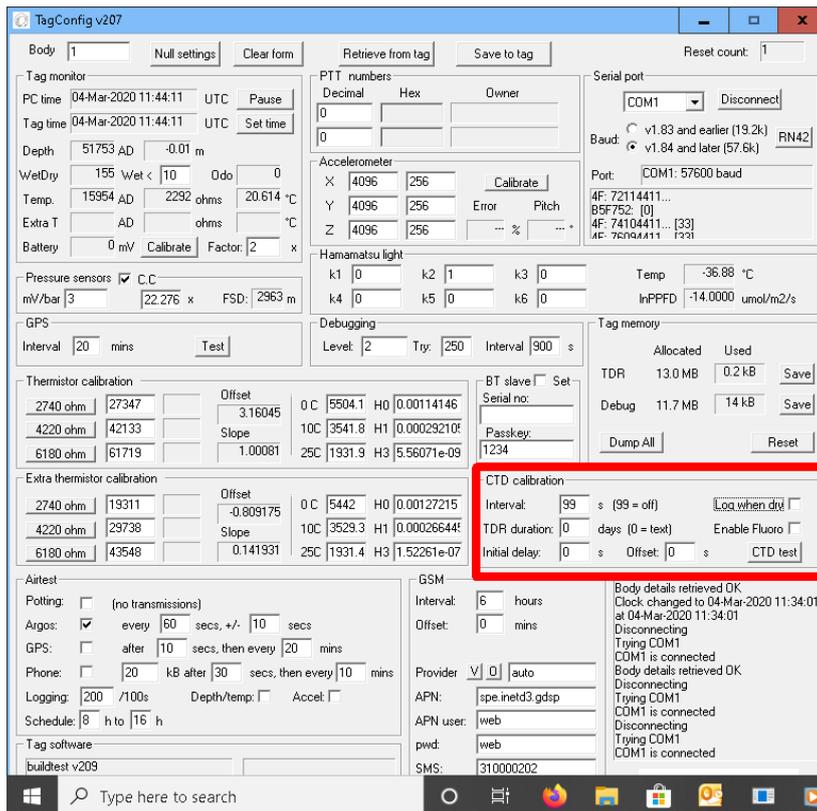


Once the correct value has been entered, press the save to tag button, then the 'Retrieve from Tag' button. Once again check the value in the GPS text box is still the correct value required.

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:



- 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.
- 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.

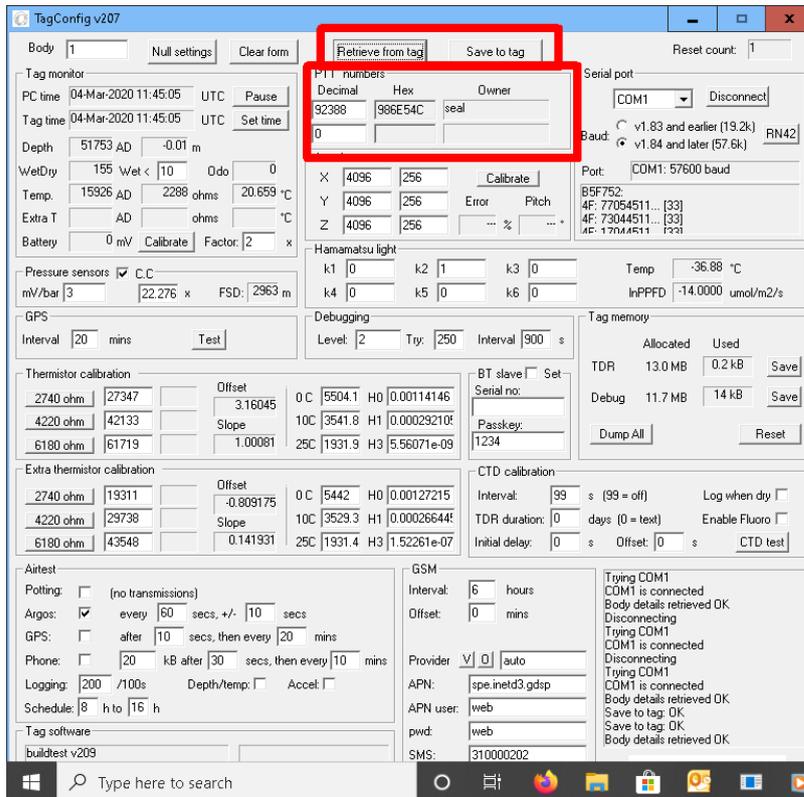
Following the tests, the data may be downloaded from the ‘TDR’ part of the flash (refer to Section 3.2.2).

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 re-confirm 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).



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.

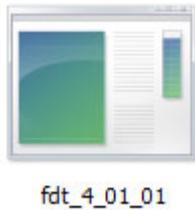
3 PROGRAMMING A TAG

3.1.1 Installing Renesas Software v4.09

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

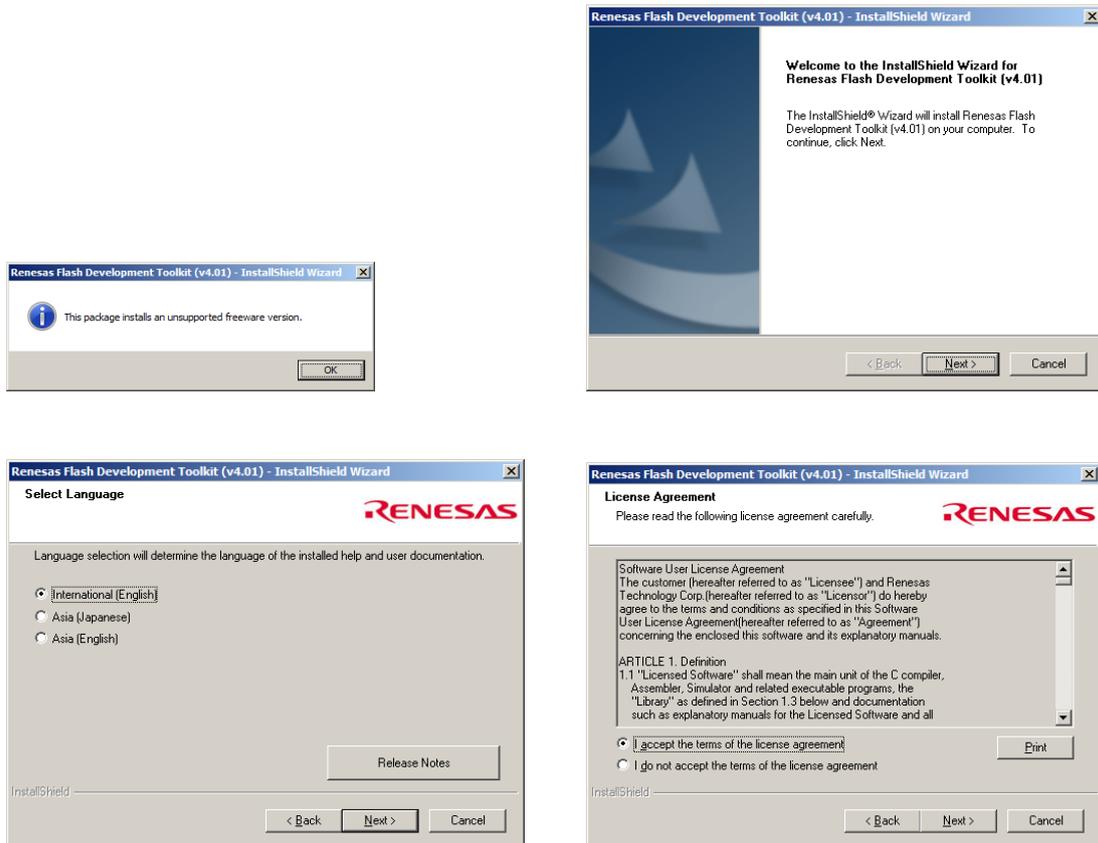
<http://www.smru.st-and.ac.uk/Instrumentation/Downloads/>

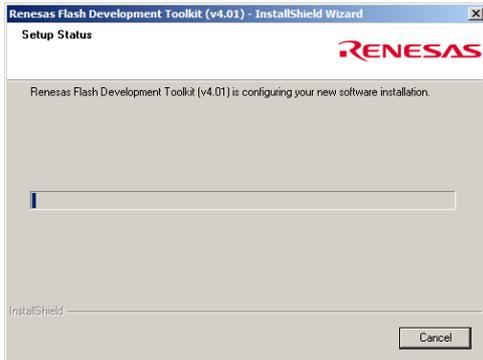
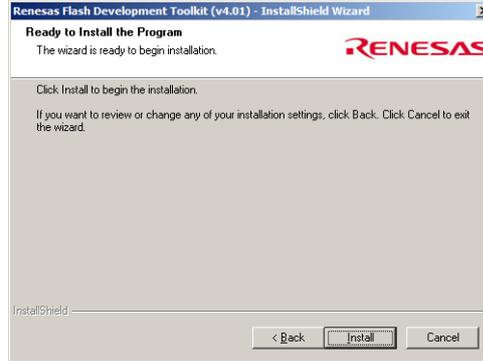
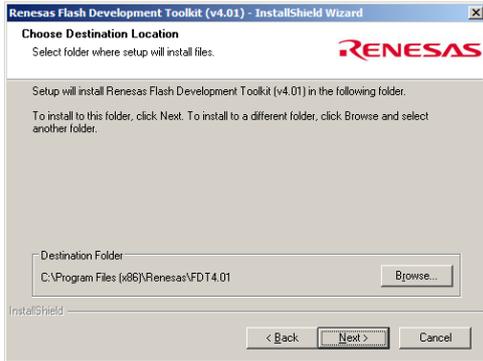
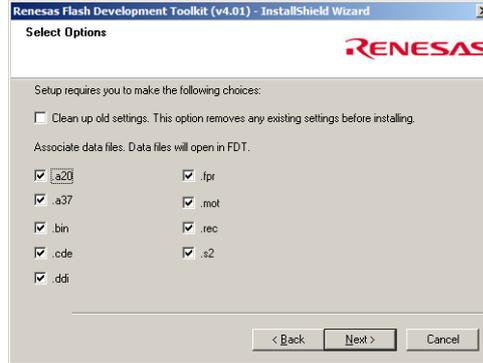
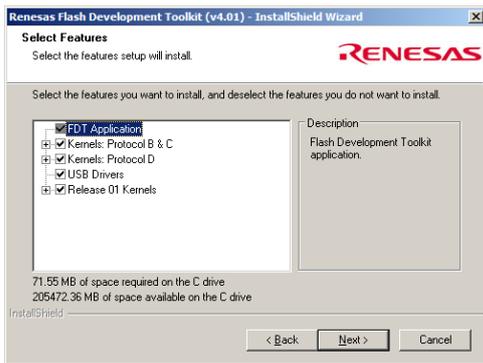
Copy the installation file on to the PC desktop and run the installer by using the mouse to double click on the icon.



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.

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

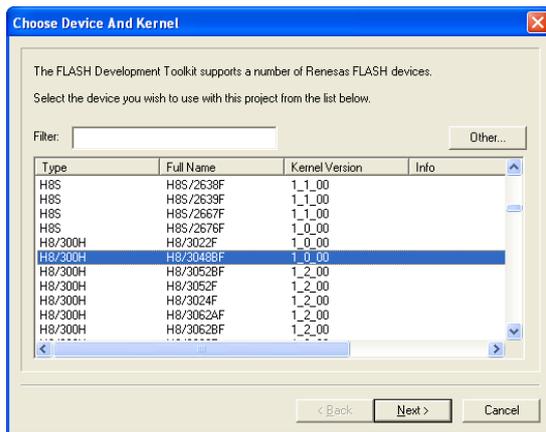
The following section details how to configure the Renesas software for programming a tag.

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.

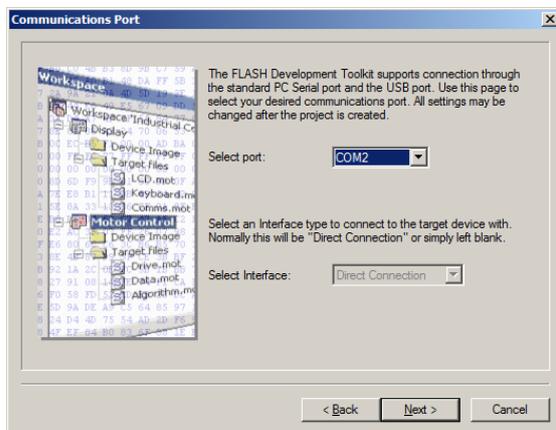
Start the 'Flash Development Toolkit 4.09 Basic' application from the start menu on the PC.



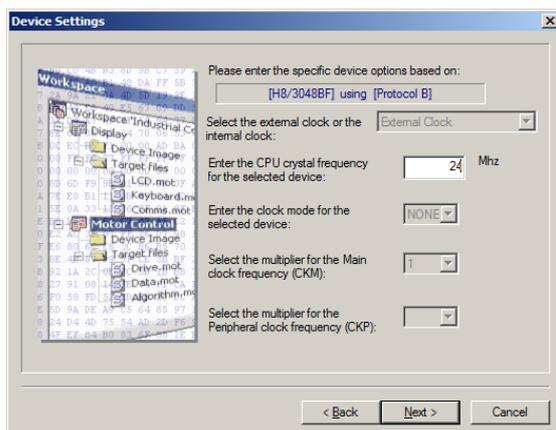
Scroll down the list and select the processor 'H8/3048BF'



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

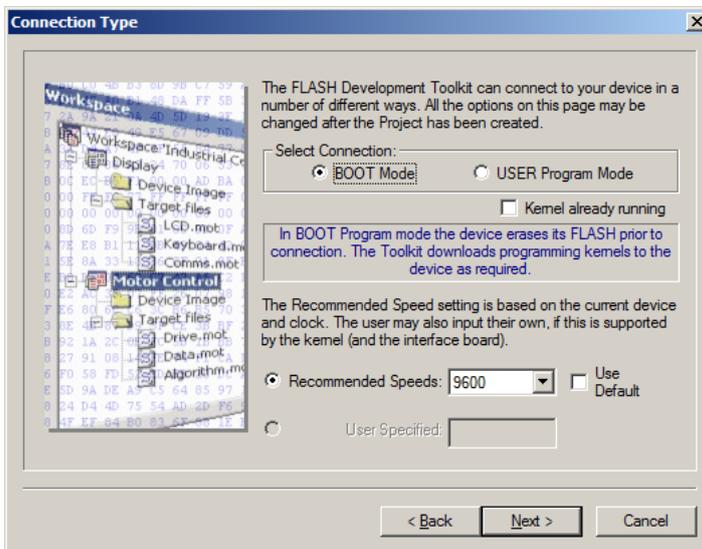
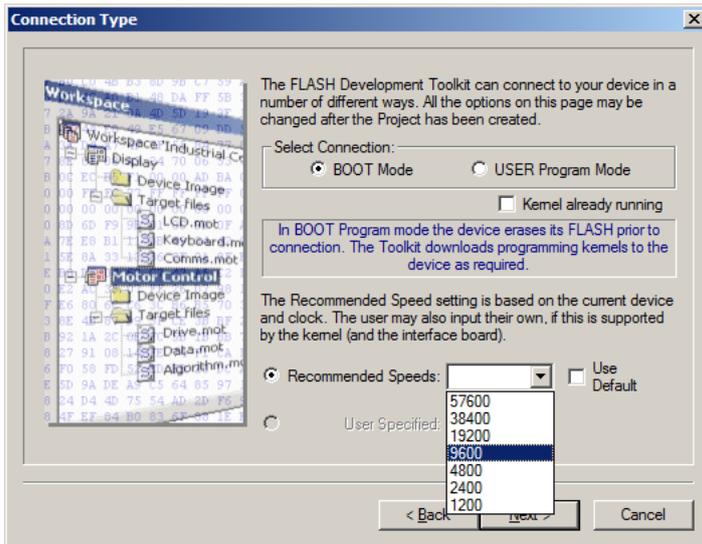


Set the clock frequency to 24MHz, then press 'next'

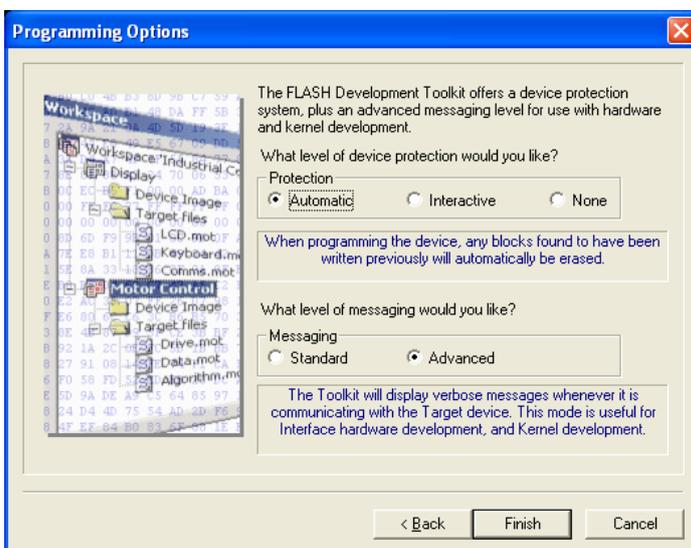


Set the connection type to 'Boot Mode'. Deselect the 'Use Default' and set the recommended speed to 9600 (for programming with Bluetooth from the drop-down list. Press 'next'

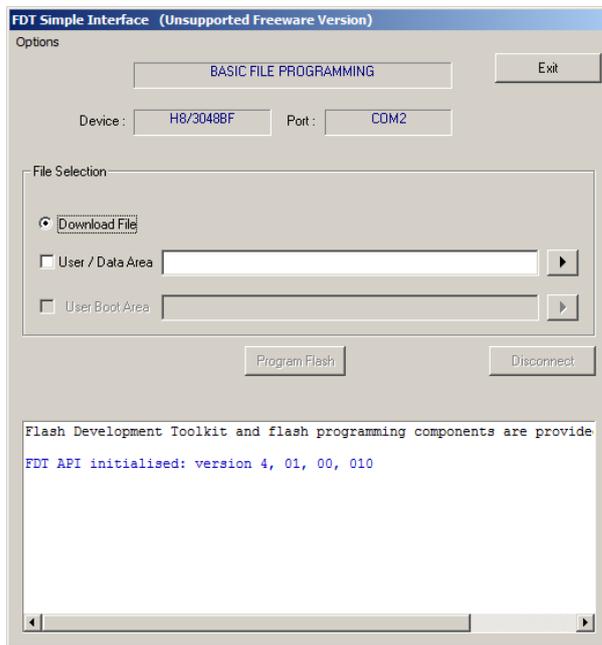
Note: For Bluetooth the default rate must be set to 9600.



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



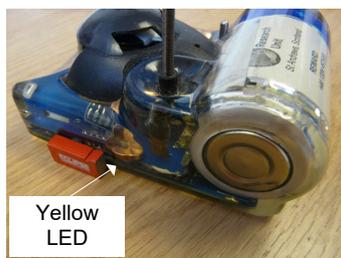
When the 'Finish' button is pressed, the main window used for programming a tag opens automatically.



3.1.3 Tag Programming with Renesas fdt v4.09 Basic Software

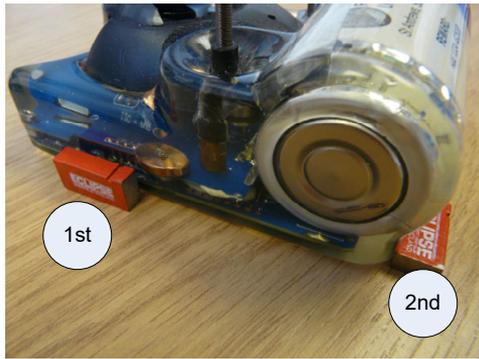
If the Renesas software is being used for the first time then follow the configuration instructions in the preceding section, else as follows:

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.



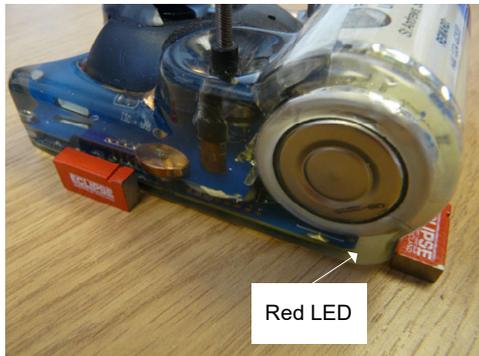
A rather faint **yellow** LED mounted along the edge of the PCB will flash approximately once every 4 seconds. If it doesn't flash, remove magnet and try again.

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.



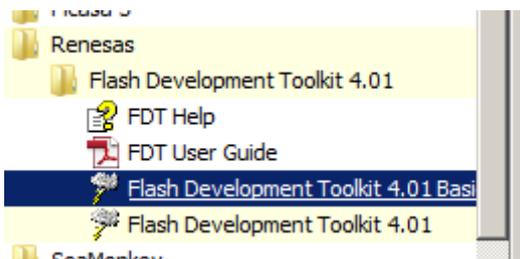
Note: The order in which the two magnets is positioned against the tag is important for programming. The magnet on the side of the tag **must** be positioned first, **then** the magnet to the rear of the tag.

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)

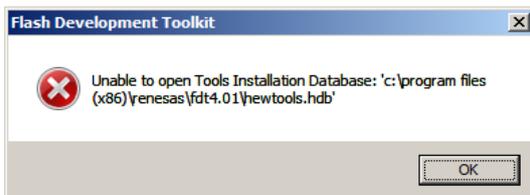


Establish a Bluetooth connection with the PC (but don't try to run TagConfig) – refer to Section 1. Make a note of the COM port established with the PC. If the Windows 10 driver is being used then this is the “Outgoing” Connection

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

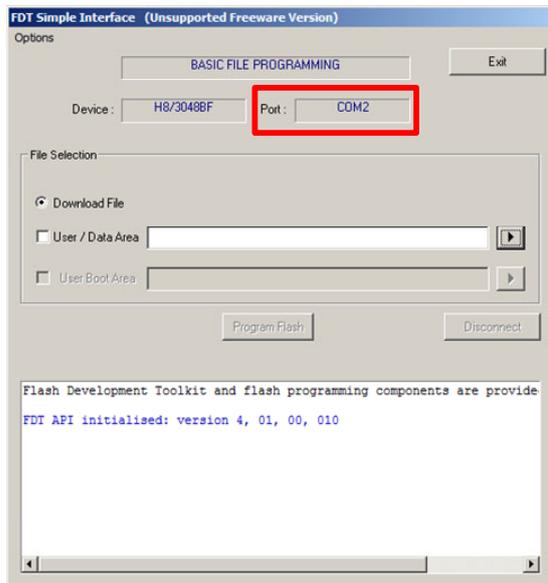


When the application opens, the following error may occur:

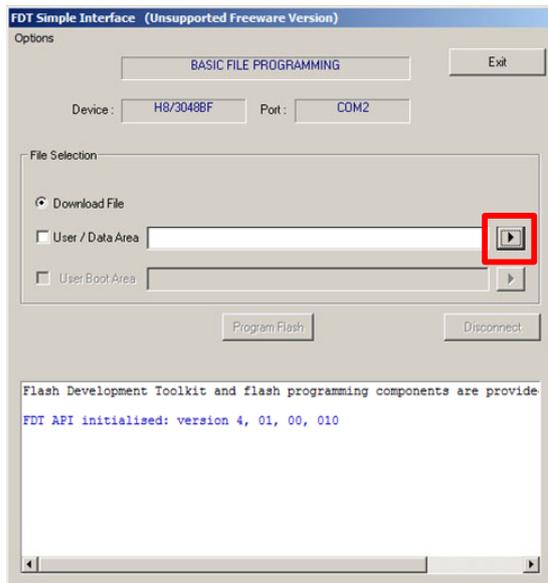


This is a windows error. The operation of the programming software will be unaffected – press OK and continue with the following procedure.

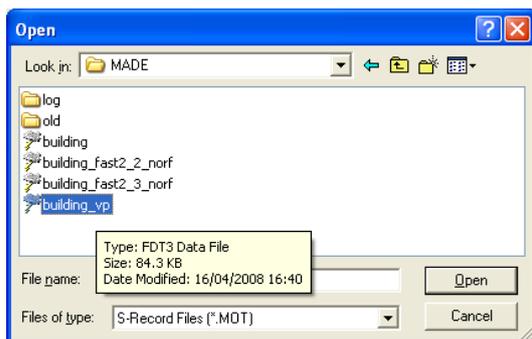
In the FDT Simple Interface window, confirm that the COM port setting identified in the window is the same as that for the established Bluetooth connection. If not then follow the procedure in Section 4.1.2 to set the COM port to be the same as that for the Bluetooth.



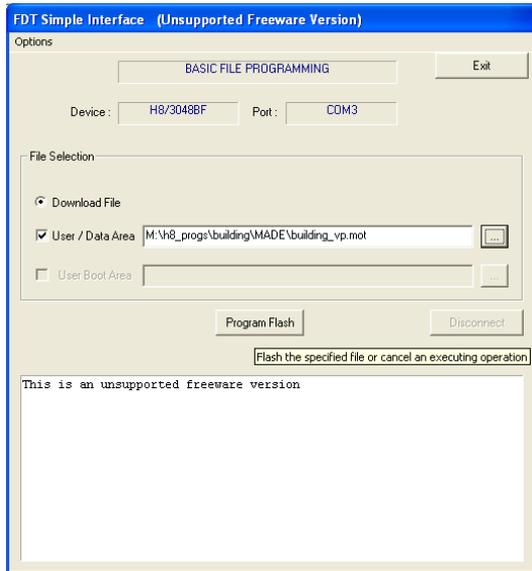
In the FDT Simple Interface window, press on the right-hand arrow button



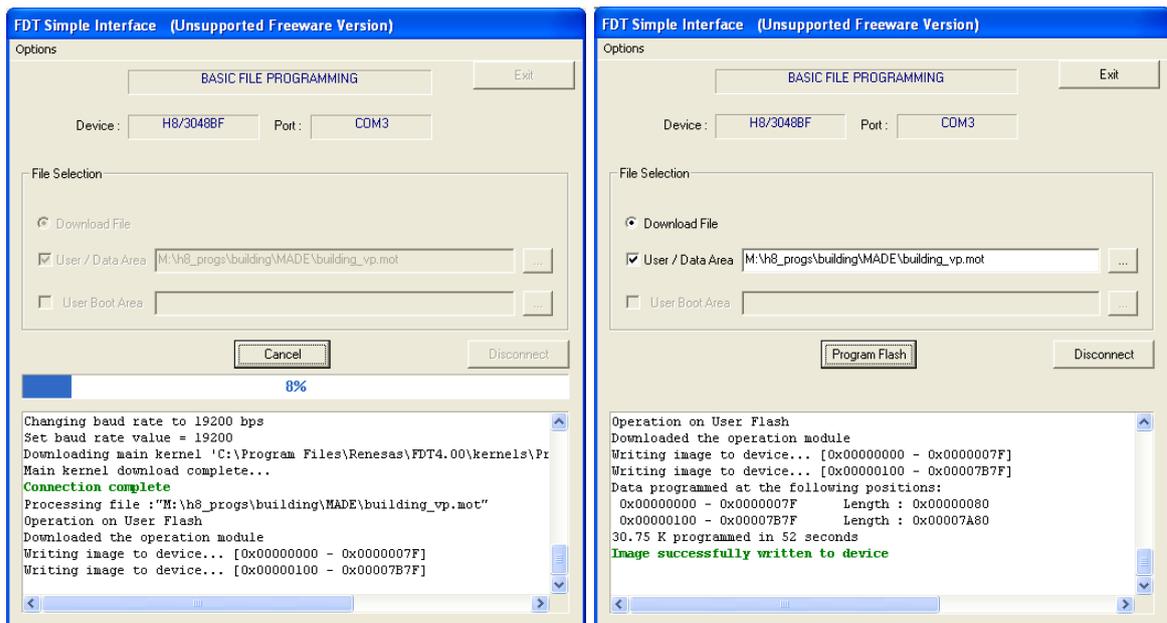
Navigate to the file to load on to the tag



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



Progress is reported in a status window, as follows:



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.

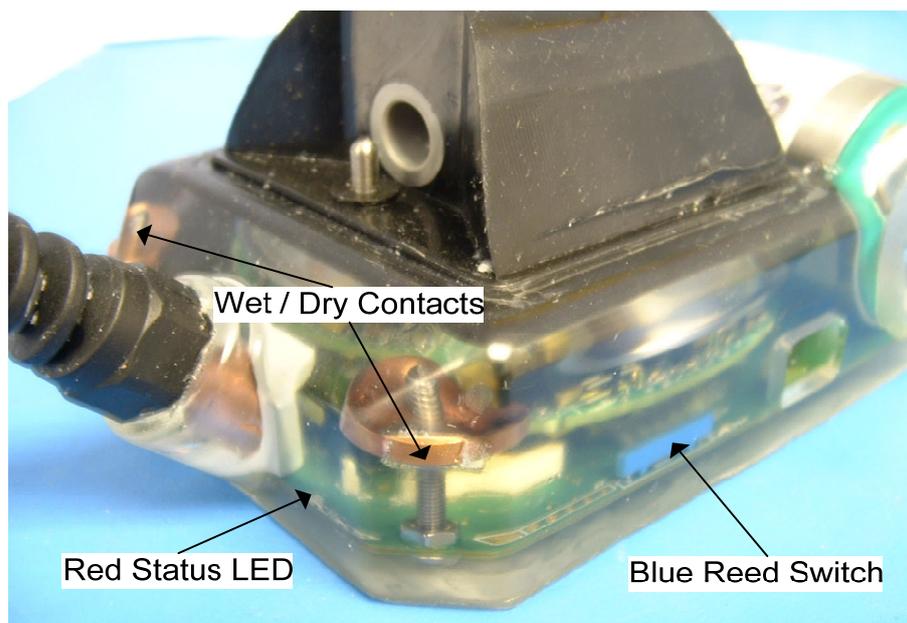
Note 2: The BlueSoleil Driver seems to be the most unreliable when it comes to re-programming, occasionally failing part way through. If this happens then the

magnets should be removed from the tag, the application shut-down and the re-connection/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

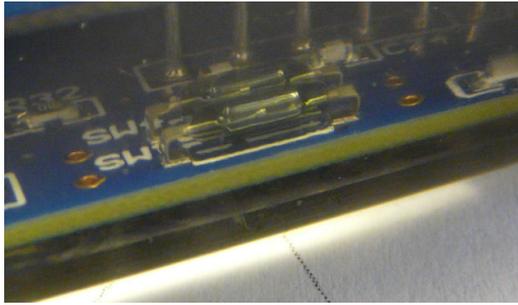
The tag activates automatically when it detects immersion in sea-water.

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.



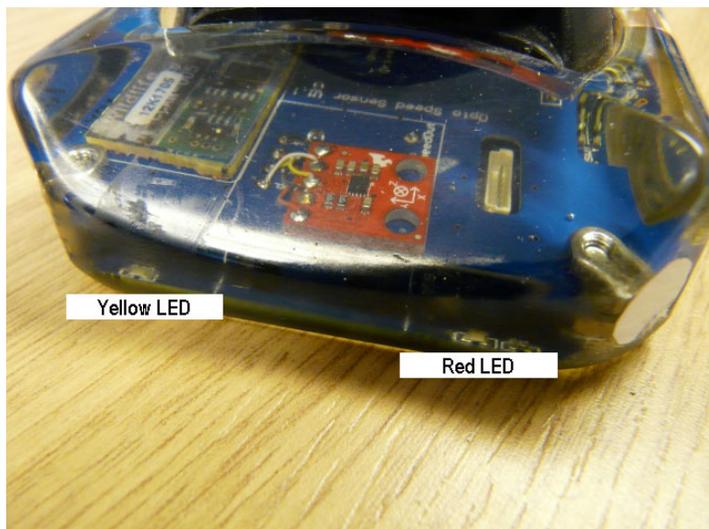
4.1.1 Tag Testing

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 <http://www.smru.st-and.ac.uk/protected/technical.html> .

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:



Text listings

- [Uplink summary](#)
- [Recent locations](#)
- [Recent SMS messages \(real-time link\)](#)
- [Diagnostic summary for all tags](#)

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/test/14135.00006a OK 10kB/0kB D T=56(2+18+6+5+18
2015-09-11 15:35:31	2015/09/11 14:29:36 12 3 3 4 7b5 8 1c83 22 64f 19 4108 11 4d47 27 79
2015-09-11 14:36:37	FTP 138.251.190.100/test/14135.00005a OK 10kB/0kB D T=91(2+13+12+37+
2015-09-11 14:35:32	2015/09/11 13:29:36 12 3 3 27 4c78 8 11b6 22 6190 19 2438 18 5eb5 4
2015-09-11 13:36:04	FTP 138.251.190.100/test/14135.00004a OK 10kB/0kB D T=58(2+14+8+10+1
2015-09-11 13:35:29	2015/09/11 12:29:36 12 3 3 16 cb7 27 70af 22 1971 19 777d 18 4f7c 8
2015-09-11 12:36:01	FTP 138.251.190.100/test/14135.00003a OK 10kB/0kB D T=55(2+19+6+5+19
2015-09-11 12:35:30	2015/09/11 11:29:36 11 3 3 27 a26 26 5218 16 3701 21 71d2 7 26a2 18
2015-09-11 11:36:01	FTP 138.251.190.100/test/14135.00002a OK 10kB/0kB D T=56(2+11+5+11+1
2015-09-11 11:35:26	2015/09/11 09:43:07 6 3 3 31 44a5 26 9e3 27 4975 23 978 16 a83 21 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

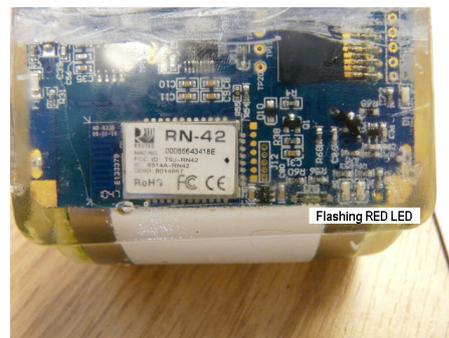
4.3 Synchronising two SMRU tags via Bluetooth

Activate the slave tag (i.e. the tag which will not 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 will 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.

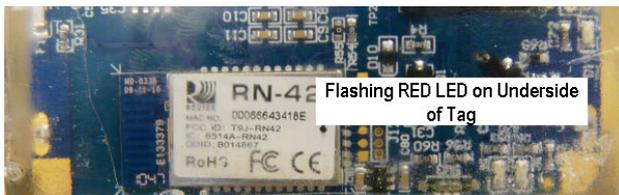


Whilst the **red** led on the VMT is flashing once per second, remove the magnet from the side of the VMT.

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 must be removed before the 10th flash.

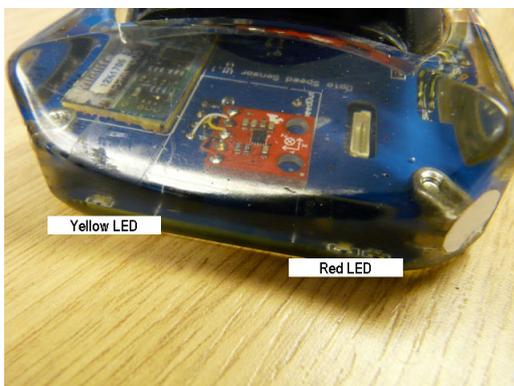
Once the VMT has been activated then activate the SMRU tag by following the procedure detailed in Section 5.1.1. The two tags need to be within approximately 1 metre of each other.

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 only commence flashing once the GSM has completed it's test transmission following activation – the test transmission could take up to 5 minutes to complete.