



# DST Host User Manual

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Cefas Technology Limited

# DST Host User Manual

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# DST Host User Manual

## ABOUT THIS MANUAL

This User Manual includes the information you need to get started with the Cefas Technology Limited Data Storage Tag (DST) range. You should have a basic knowledge of the Windows operating system before attempting to install and use the DST Host software.

This manual is divided into six main sections:

1. Getting Started: How to install and run the Host software, including any required peripherals
2. Basics of the DST Host Software: Communicating with the DSTs & testing sensors
3. Deploying DSTs & Logging Features: Basics of deployment regimes & deploying DSTs
4. The Dive Logging Feature & Fast Log
5. Downloading DSTs & Data Analysis: An overview of retrieving data & data analysis tools
6. An appendix containing further useful information

## CONVENTIONS USED IN THIS MANUAL

The following conventions are used in this manual:

- [ ] Square brackets enclose optional items – for example, [response].
- < > Angle brackets enclose the name of a key on the keyboard – for example, <shift>.
- A hyphen between two or more key names enclosed in angle brackets denotes that you should simultaneously press the named keys – for example, <Control-Alt-Delete>.
- » The » symbol leads you through nested menu items and dialog box options to a final action. The sequence Deploy » Set Clock directs you to pull down the Deploy menu and select the Set Clock item.
- bold** Bold text denotes the names of menus, menu items, parameters, dialog boxes, dialog box buttons or options, icons, windows and tabs.

Many of the features of the G5 DST are also in the G6a+ DST & pDST. The G6a+ has additional memory, battery capacity and additional sensors which give it additional functionality. Furthermore, the pDST includes a pop-off release mechanism which requires a more detailed deployment process. This guide has been designed to make it clear in differentiating DST features and to make all processes as straightforward to follow as possible.

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## GETTING STARTED

To set up a DST for deployment, you will need the following:

- A Data Storage Tag
- The relevant Data Storage Tag Interface, USB-to-serial converter and USB cable
- A copy of the Host software (provided free of charge with all orders)
- A computer running Windows 7 and upwards



The Host software has been tested on the versions of Windows listed above. However, if you are using a 64-bit version of Windows, you will need to download the latest driver for the USB-to-serial converter. This can be found at: <http://www.ftdichip.com/Drivers/VCP.htm>

## INSTALLING THE HOST SOFTWARE

To install the Host onto your computer you will need administrator privileges. Switch on your computer and ensure that no other programs are running. Then insert the USB stick provided with your tags into a USB port on your computer. Once the computer has detected the USB stick, you can run the **Set-up** file by double-clicking on it from the Explorer window.

The installation will now start. Please follow the on-screen instructions to complete the installation.

## INSTALLING UPGRADES TO HOST

Occasionally, as new features are developed for the DSTs or Host software, we will issue a new version of Host. Before installing a new version, we recommend that you uninstall your old version. This is done by selecting & uninstalling the **G5 Host** from **Control Panel » Add/Remove Programs**.



Please familiarise yourself with the version number of the Host software you are currently running. To do this, select **Help » About** from the menu bar (see Fig.1)

Fig 1



To get the latest version of Host, please visit the **Downloads** section of our website:

<https://www.cefastechnology.co.uk/downloads/>

## USING THE SERIAL-TO-USB CONVERTER

All interfaces are shipped with USB-to-serial converters as standard.



We recommend that you use the peripherals provided with the interface as they have been fully tested by Cefas Technology Ltd.

Before using the interface to establish communication with a DST, you must first correctly configure the USB-to-serial converter by following these instructions:

1. Install the correct USB-to-serial converter driver either from the USB stick provided, or via the driver website: <http://www.ftdichip.com/Drivers/VCP.htm>
2. Connect the USB-to serial converter to your computer using the USB cable also provided.
3. Right-click **Computer** and select **Manage**. From the **Manage** window, select **Device Manager**. Under **Ports (COM & LPT)**, right click on the USB-to-Serial converter (see Fig.2 below)

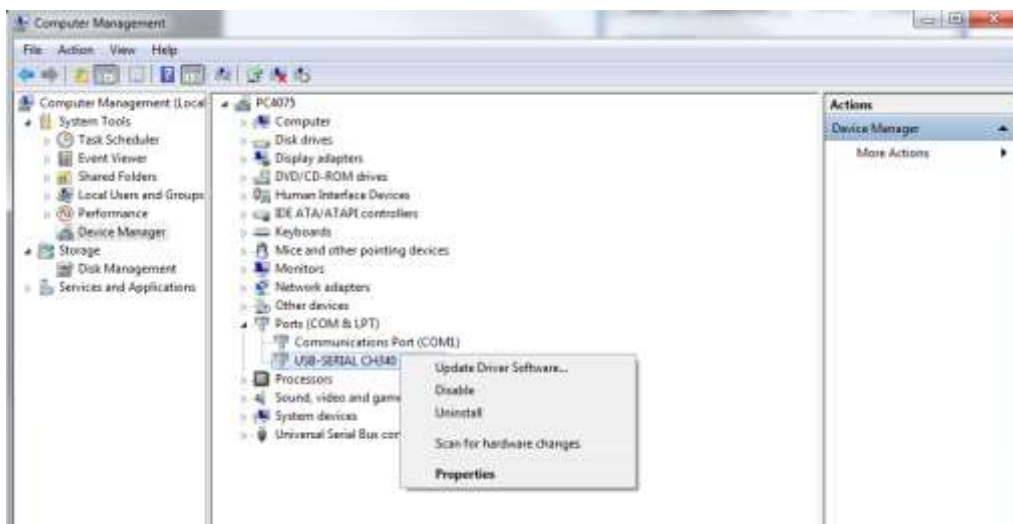


Fig.2

4. Select **Properties** » **Port Settings** » **Advanced** as per Fig.3

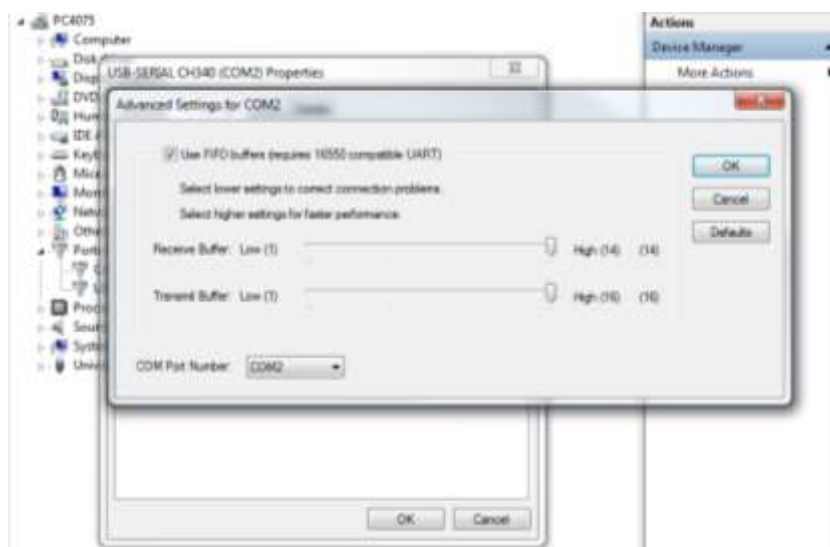


Fig.3

5. Use the **COM Port Number** *drop-down box* to select **COM1** as per Fig.4. Select **OK** to confirm these settings and then exit the **Device Manager**.

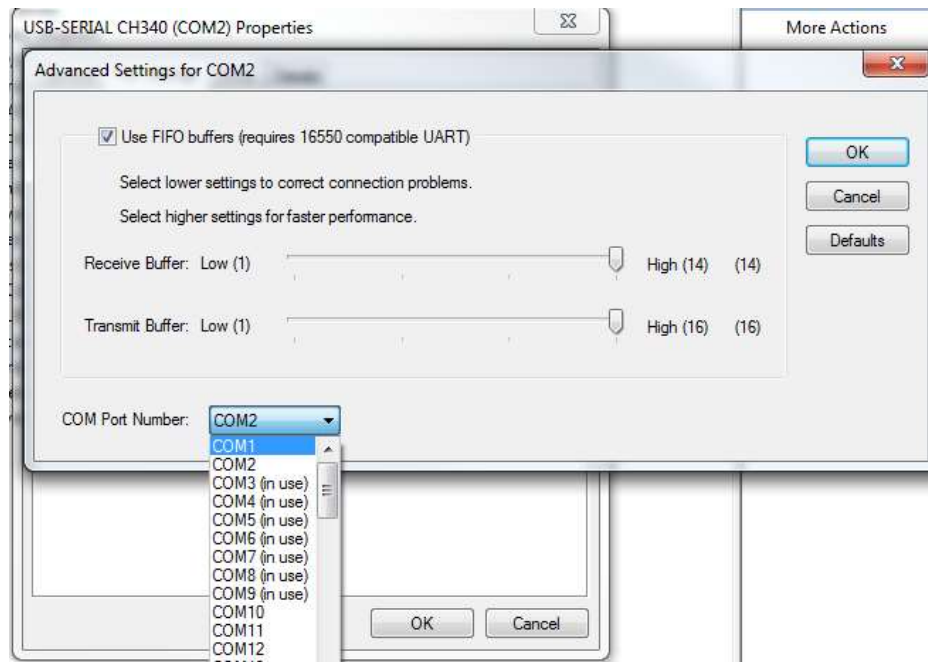


Fig.4

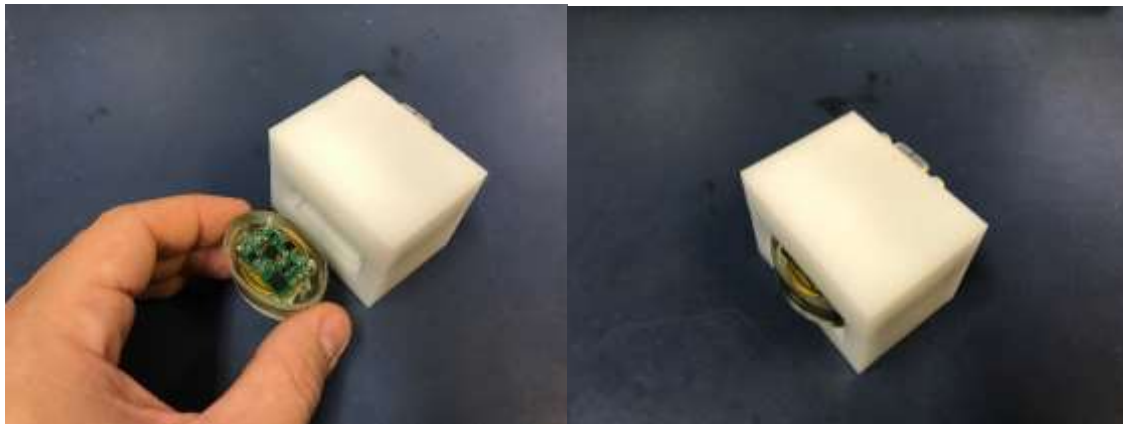
## FITTING A G5 DST INTO AN INTERFACE

There are 2 circular contacts at one end of the G5 tag. These should be mated to the 2 spring-loaded pins in the interface (see Fig.5). The contacts & pins will only mate when the tag is in one orientation, so to avoid damage to either unit, take care not to incorrectly insert the tags.



## FITTING A G6A+ DST INTO AN INTERFACE

The communications pins are located on the top of the G6a+ tag on the opposite side to the label. Ensure these pins are facing upwards and lead first into the interface (see Fig.6). Push the tag fully into the interface slot to ensure a good connection is made.



Whilst DSTs are in an interface, it will use a small amount of power from its battery. This power drain, although small, can affect the usable life of the tag if it is left in the reader for an extended period of time. Only leave a tag in an interface whilst you are communicating with it (whether deploying or downloading).

## RUNNING THE HOST SOFTWARE

Once the software has been successfully installed you can run Host by double-clicking the Host icon on your desktop, or by selecting **Start » All Programs » Cefas » G5\_Host » G5\_Host**. The Host start-up screen will then be displayed (Fig.7).

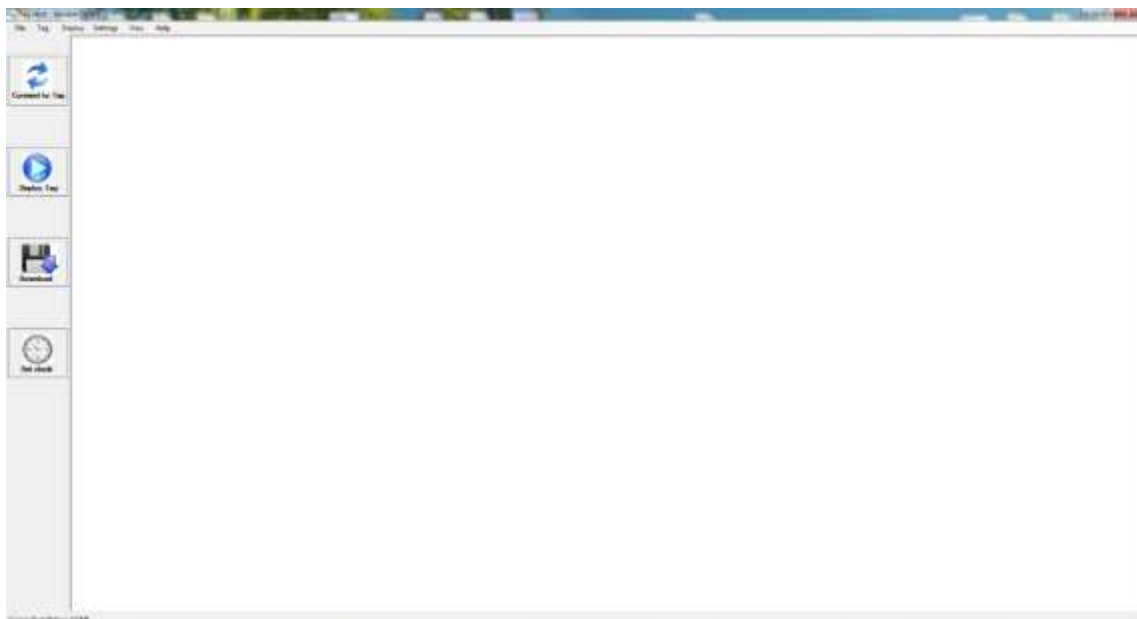


Fig.7

## BASICS OF THE DST HOST SOFTWARE

The aim of this section is to introduce you to the most frequently used features of Host that will enable you to prepare a DST for deployment and download and analyse the subsequent logged data.

### CONNECTING TO A DST

Now that you have a DST inserted in the interface and the DST Host software running, you will need to *connect* to establish communication (comms) with the tag. Either select **Tag » Connect to Tag** from the menu bar (Fig.8) at the top of the screen or click the **Connect to Tag** button (Fig.9)



Fig.8



Fig.9



Depending on the status of the DST when initiating comms, the software may take several attempts to connect which can take a few seconds. The connection status is shown in a panel at the bottom of the window

Once the software has established comms with the DST, a **Tag Summary** window is displayed (Fig.10). This window displays key information about the tag:

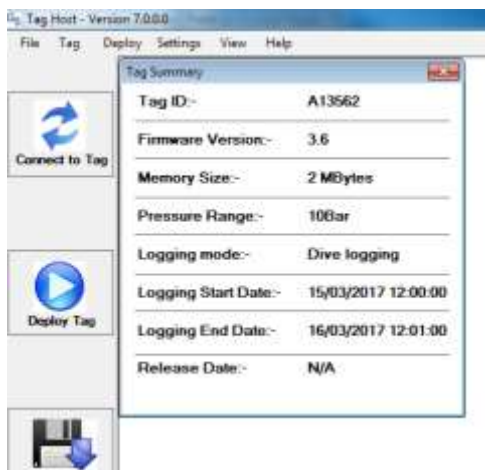


Fig.10

- **Tag ID** – this is the DST’s unique serial number
- **Firmware Version** – this is the DST’s own operating software
- **Memory Size** – this is the memory size of the DST
- **Pressure Range** – this is the pressure sensor range of the DST
- **Logging Mode** – this is whether the tag includes the **Dive Logging** feature
- **Logging Start Date** – this is the start date of the logging regime currently loaded in the DST’s memory
- **Logging End Date** – this is the end date of the logging regime currently loaded in the DST’s memory
- **Release Date** – this is the pop-off release date for the pDST, so is *N/A* for G5 & G6a+ DSTs



Should you mistakenly close the **Tag Summary** window, it can be displayed at any time by selecting **Tag » View Tag Summary**.



## VIEWING AND SETTING THE DST CLOCK



A DST uses its real-time clock to determine when to take readings from its sensors. To make temporally accurate readings you must ensure that the clock time is correctly set. When setting the clock, ensure your time reference is accurate and is set to the correct time zone and take into account any daylight saving adjustment.

To view the current clock setting select **Tag » View Clock** (Fig.11). This will display the clock set-up window showing the current DST time and the current time setting on your computer. If you wish, you can select the **Cancel auto form closure** option to remain on the **View Tag Clock** window.

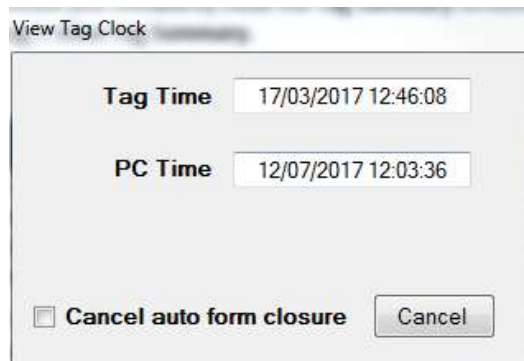


Fig.11



With the View Tag Clock window open you will notice that the times are constantly updating. This is because the Host software is continually communicating with the tag, consequently using valuable battery power from the DST's batteries. To minimise this battery usage, the window will automatically close after 10 seconds.

The option to set the clock is a process during the deployment procedure; but if you'd like to adjust the clock at any time on a DST, click on the **Set Clock** button (Fig.12) or select **Deploy » Set Tag Clock**, both of which will open the Set Tag Clock window (Fig.13).



Fig.12

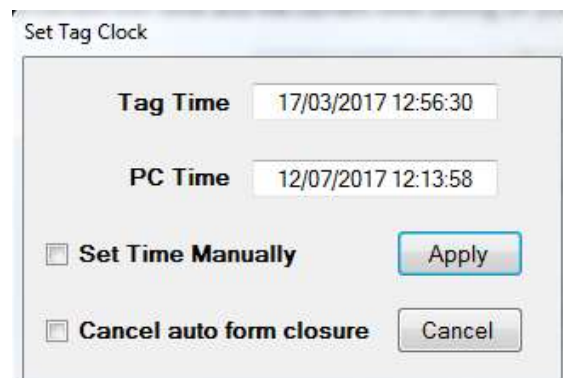


Fig.13

To change the DST time, you can either:

- Synchronise it with your computer time by selecting **Apply**  
*or*
- Enter a value manually by selecting the **Set Time Manually** box; which will replace the **PC Time** display with blank text boxes where you can enter the DD:MM:YYYY, hour and minute. Select **Apply** to set the time.

## CHECKING THE DST SENSORS AND BATTERY

To ensure that the tag sensors are working correctly you can view real-time data from them. Select **Tag » View Sensors** to access the *Live Sensors* window (Fig.14).



G5 *Live Sensors* window



G6a+ *Live Sensors* window

Fig.14

The *Live Sensors* window shows a digital readout for each sensor. This data is calibrated so is displayed in real units (i.e. depth in meters, temperature in °C). Although the battery is not a sensor, the voltage is displayed so that you can check its status before deployment. A healthy battery will measure  $\geq 2.80V$  at 22°C. If the battery measures less than this the DST may not be suitable for use in long-term deployment.



The sensor values will update every minute unless the tag is logging; in which case it will update at the set logging rate.



The operation of the temperature sensor can be tested by briefly applying gentle heat to the DST whilst in the interface.

We strongly recommend that you do not apply any pressure to the pressure sensor as this can damage the sensor.

The best way to see the sensor values change is to set up a short, high frequency logging regime ( $\leq 1$  second) to start immediately, then return to the **View Sensors** feature to see the values changing.

Now that the tag time is correct, the sensors are functioning correctly and the battery is in a healthy condition; it is time to set up a sample regime.

## DEPLOYING DSTs & LOGGING FEATURES

The aim of this section is to provide guidance on the structure of logging regimes within the DST Host, and to demonstrate the logging flexibility available to customers. This section is the longest within the User Manual, but provides details on all sensor set-ups, including the G5, G6a+ and pDST products.

### BLOCKS

In the DSTs, a sample regime is composed of blocks, which breaks the logging regime into sections. Each block is an independent “mini-regime” where you can set:

- Which sensors you want sampled...
- ... at what resolution (number of bits per sample)
- ... at what time base (interval between consecutive samples)
- ... when and for how long.

Blocks are used to enable you to set varying sample rates for different sensors throughout a single deployment of the DST. If you want to set just one rate for one or all of the sensors, you only need to use one block. Blocks can also overlap each other provided that you do not overlap the usage of a sensor.

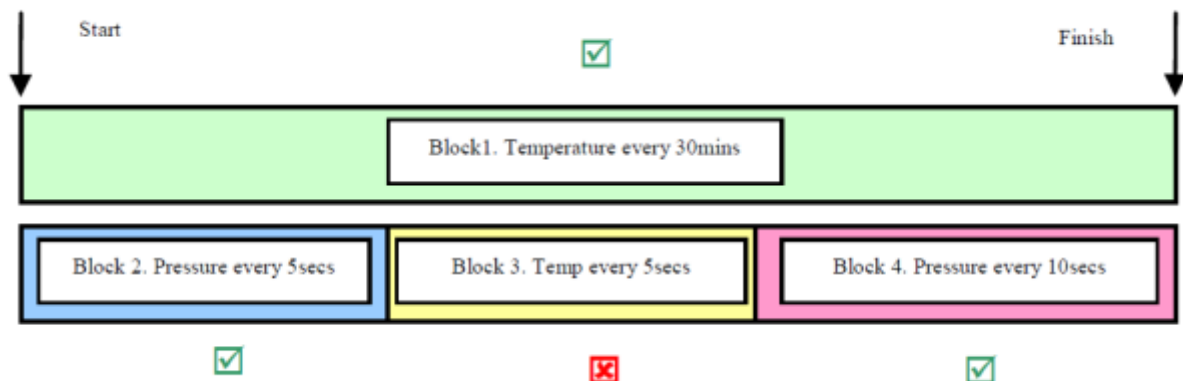


Fig.15

In Fig.15 above, block 1 runs for the full deployment with a slow sampling rate of just the temperature sensor. Blocks 2 and 4 run concurrently with block 1, sampling the pressure sensor at a faster rate. This sampling regime is accepted by the DST Host as sensor usage is not overlapped. However, when block 3 is added – sampling the temperature sensor at the same time as block 1 – then a sensor overlap occurs and as a result the DST Host will reject the regime.



- Although blocks are numbered sequentially, they do not have to follow each other as a time sequence, for example the start time for block 3 can be before the start time for block 1.
- Note that fast logging blocks cannot be over-lapped
- DSTs allow you to set up to 10 blocks
- Note that regime blocks are not the same as data blocks, which are mentioned later in this manual under the ‘Downloading DSTs & Data Analysis’ section.

## CREATING A NEW REGIME

When creating a DST sample regime, you have two options:

- Set up a brand new regime customised by your exact requirements
- Upload an existing saved regime. This option is useful when you need to set up multiple tags with the same regime

To set up a brand new regime, either select **Deploy » Start New Regime** (Fig.16) or click on the **Deploy Tag** (Fig.17) button.



Fig.16



Fig.17

This will open the **Setup Wizard** (Fig.18) which will guide you through the steps required to build your logging regime. Select **Start a new Regime**, followed by **Next** to continue.

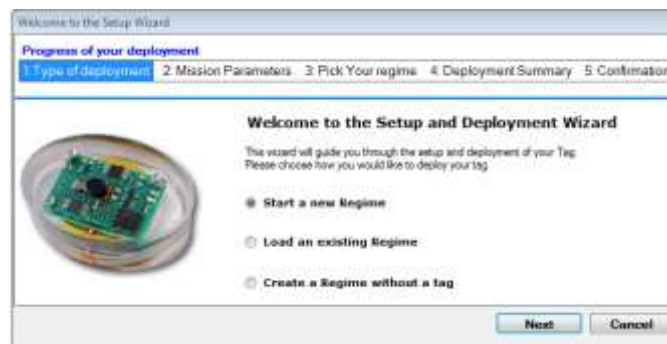


Fig.18

This will open up the **Mission Parameters** window (Fig.19), which is the main regime editing space. Here you can add, delete and verify logging blocks and set up the various parameters associated with each block such as *Start Time, Stop Time, Sample Rate* etc...

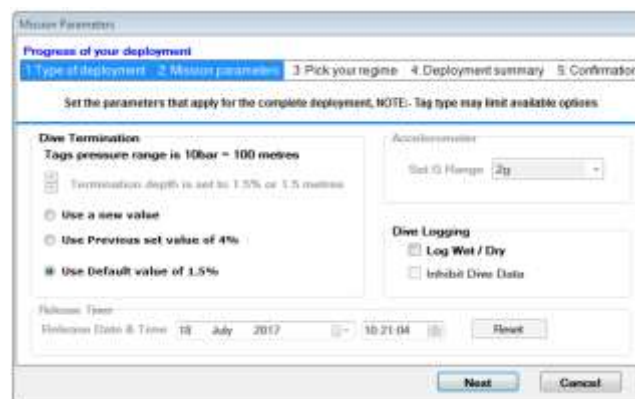


Fig.19

Selecting **Next** takes the user through to the **Deployment Regime Setup** window (Fig.20).

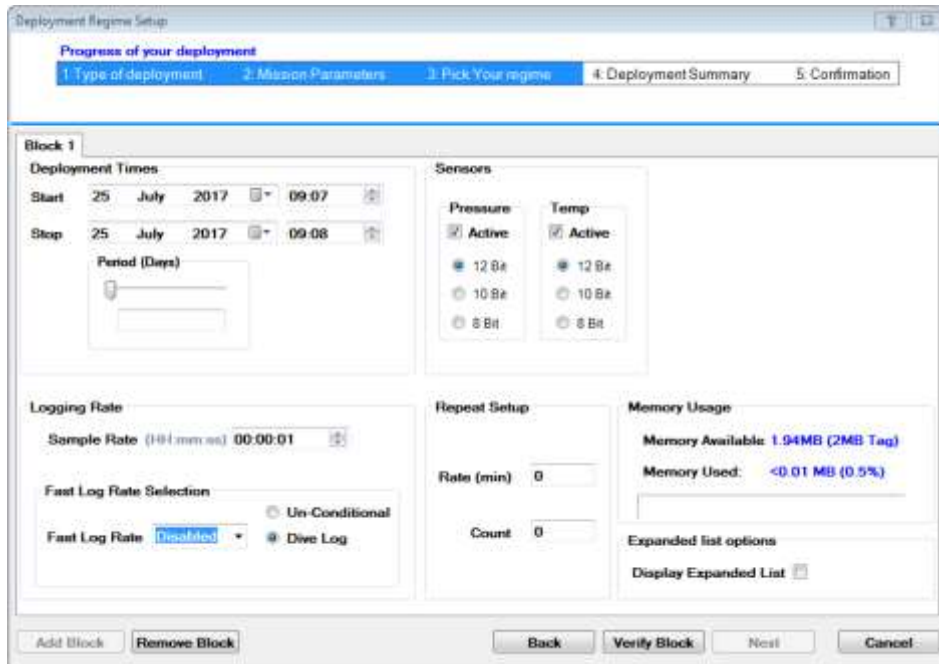


Fig.20

The **Deployment Regime Setup** window begins in **Block 1**, the first set block of any deployment.

In the **Deployment Regime Setup** window, user can input all the deployment details, including:

### Deployment Times

- Start** The start date & time for the deployment using a calendar date and a 24-hour clock
- Stop** The end date & time for the deployment using a calendar date and a 24-hour clock
- Period (Days)** A slider tool which can be used to input a select number of days without requiring the 'Stop' date to be manually entered

### Sensors

- Pressure** A tick box feature enable the user to enable (tick) or disable (untick) the pressure sensor
- Temp** A tick box feature enable the user to enable (tick) or disable (untick) the temperature sensor

Users can also select sensor resolution in this section (8-, 10-, or 12-bit). The 12-bit setting will give you the maximum resolution but will take up more memory space per sample. This memory usage will be referred to later in this manual.

### Logging Rate

- Sample Rate** The sample rate is the rate at which your selected sensors will record readings. The fastest sample rate is 1 second; the slowest is 18 hours. When you select a sample rate greater than 1 hour, you lose the option to set the seconds.



DSTs will not take a sample rate at the stop time. Also, DSTs buffer sampled data in packets of 4 samples. If there are less than 4 samples of data in the buffer when the tag reaches the end of the sample regime that data is lost. For a regime with a short sample rate this may not be important, but for a regime with a long sample rate e.g. 8 hours, this can equate to up to 24 hours' worth of data being lost.

## Repeat Setup

The **Repeat Setup** feature allows you to easily repeat the logging parameters of a block for multiple instances without the need to use multiple blocks. For this example, we have set **Block 1** to start logging on 25/07/2017 at 12:00 and stop logging at midnight, 00:00 on 26/07/2017. The sample rate has been set at a rate of 1 sample every 1 minute (00:01:00). Using the **Repeat Setup** feature we have created 5 instances (using the **Count** box) of this logging regime occurring at an interval of 1 day (1440 minutes using the **Rate (min)** box). This can be displayed by selecting the **Display Extended List** tick box under **Expanded list options** section, and then selecting **Verify Block** (Fig.21).

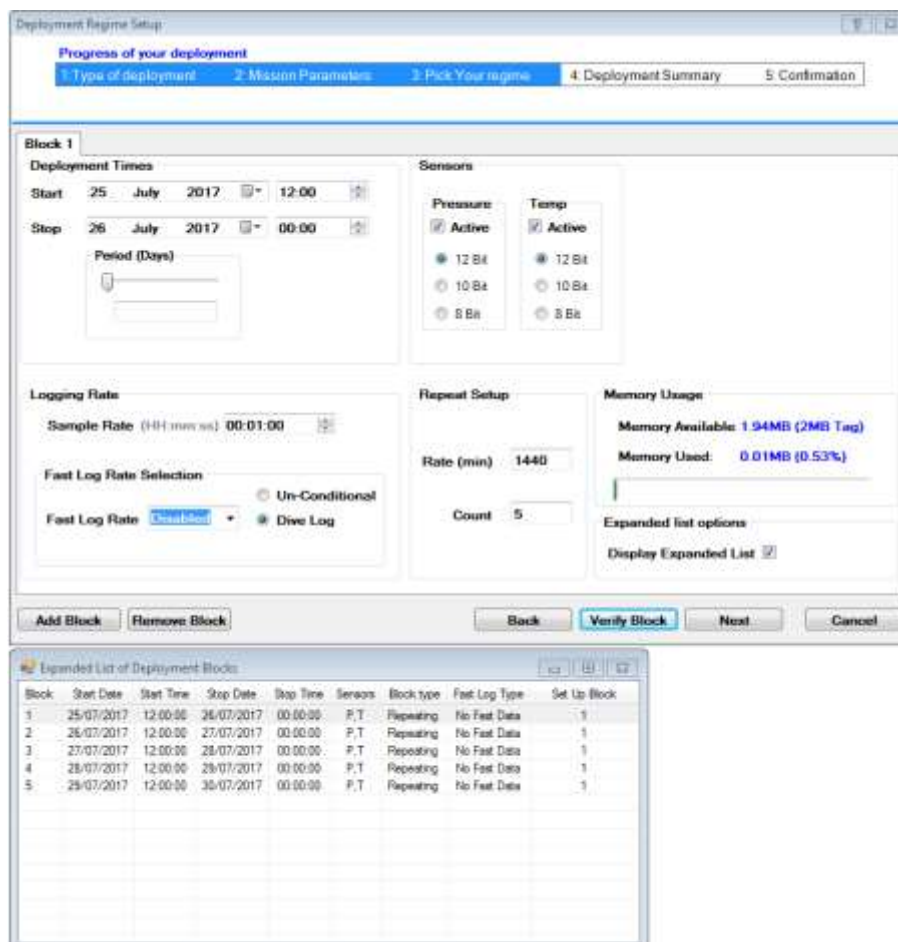


Fig.21

To use **Repeat Setup** in your logging regime:

1. First set up your start and stop times for the block in the conventional way (using the **Start** and **Stop** selection boxes or the **Start** and **Period** selection boxes).
2. Set up your desired **Sample Rate**.

3. In the **Repeat Setup** section, enter the repeat rate in minutes. This is the rate at which you want the block parameters repeated.



This rate must be of a longer duration than the initial start and stop time of the block or an overlap of sensor usage will occur which cannot be handled by a DST. The Host will issue an error message and highlight the overlapping repeats in red in the **Expanded List of Deployment Blocks** window. This can be fixed by increasing the repeat rate to greater than the duration of the deployment (length of time between **Start** and **Stop**).

4. In the **Repeat Setup** section enter the number of instances you want to repeat the regime for this block in the **Count** field, this is limited to 1000 per block.
5. Click on **Verify Block** to update the information you have added

If you do not need to use the **Repeat Setup** feature, simply ensure that the **Rate** and **Count** fields are blank or set to zero.

### CREATING MORE THAN ONE REGIME

The DSTs will always run only the last regime you uploaded into it.

For example, suppose you set up your tag to start logging in 1 months' time from today and then deploy it. Subsequently you decide to set up another regime to start tomorrow and to run for 1 day and then deploy it; the tag will only run the regime that starts tomorrow. The first regime you uploaded (starting in 1 month) will be overwritten in the tag by the second regime even though they are separate in time from each other.

If you want to accomplish this type of regime, you need to setup up 1 regime with 2 blocks; 1 with a start time of tomorrow to run for 1 day, and the second block to start in a month's time.

### SETTING A DEPLOYMENT REGIME FOR A G6A+

Setting a deployment regime for a G6a+ is essentially the same as that for a G5, but with the addition of the 3-axis accelerometer sensor. This sensor gives a linear measurement of acceleration in x, y, and z axis at 8-, 10- or 12-bit resolution.

The variable range accelerometer sensor can be set to  $\pm 2$ ,  $\pm 4$ ,  $\pm 8$  or  $\pm 16g$ . As with all deployment settings, this range – once set – applies to the whole deployment. To set the desired range, simply click on the down arrow of the **Set G Range** option in the **Mission Parameters** menu (Fig.23). Note that the resolution decreases as the G-range is increased.

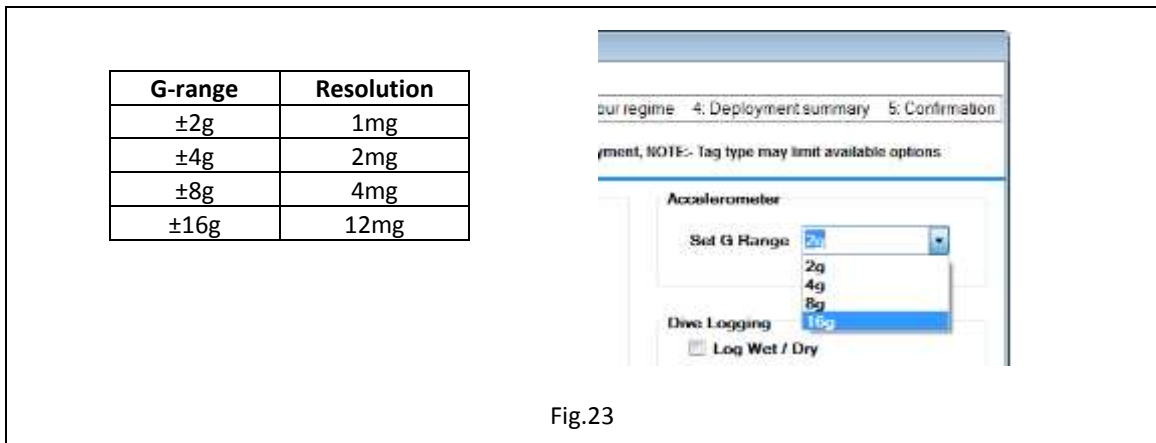


Fig.23

Once you have selected the G-range, you can proceed as with the G5 through to the **Deployment Regime Setup** window (Fig.24). Here, you will notice the addition of the x, y and z axis under the **Sensors** section. In general, accelerometer data needs to be logged at a fast rate to enable meaningful analysis of the data. This is enabled through using the Fast-log feature (covered in the next section).

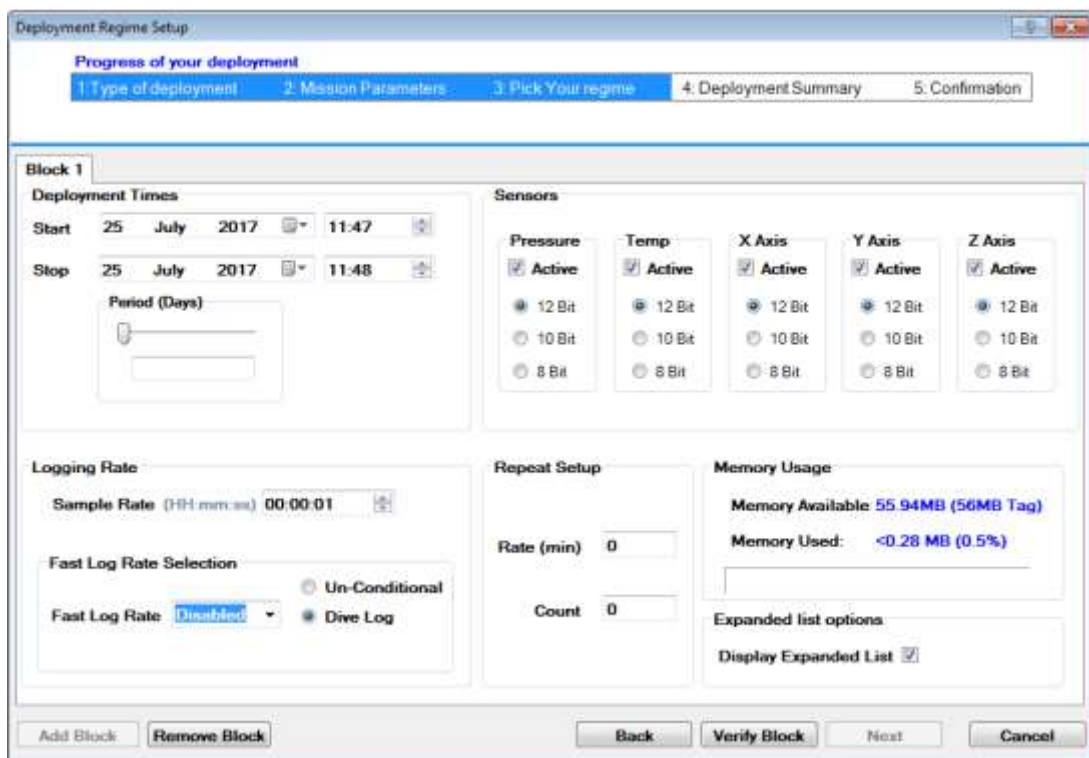


Fig.24



## THE DIVE-LOGGING FEATURE & FAST LOG

The Dive Logging feature is a feature of the DSTs that allow it to perform periods of data logging at a much faster rate than possible through the standard **Sample Rate**.



All G6a+ DSTs come with Dive Logging as standard. Please note that for G5 DSTs, Dive Logging is optional and so must be specified as an option when ordering the tags. A G5 does not come with Dive Logging as standard. The Host software automatically detects if DSTs have Dive Logging enabled, and will therefore 'grey-out' selection boxes if the feature is not enabled.

### WHAT IS FAST LOG?

**Fast Log** is a fast logging mode that allows the DST to record data at 1Hz or faster. For some applications, a faster logging rate is required (e.g. when logging accelerometer data with a G6a+ or recording dive data from a diving bird with a G5). For these situations, **Fast Log** can be used to log data up to:

- 10Hz for a G5
- 30Hz for a G6a+

### HOW FAST LOG IS ACTIVATED

At the beginning of the tag deployment (in the **Mission Parameters** window), users can optionally select 2 options for **Dive Logging** (see fig.26). Those options are as follows:

- **Log Wet/Dry** - When **Dive Logging** data is recorded there is a time stamp of when the tag enters the water and also when the tag exits the water. By selecting this option, a section will be added to the end of the downloaded .CSV file listing the wet and dry times block-by-block. This is not a default option and must be selected by the user. **A fast logging rate MUST BE SELECTED to log wet/dry.**



The entry to water time stamp is resolved to the nearest tenth of a second. The exit from water time stamp is resolved to the nearest second. Where the entry and exit times do not cross a 1 second boundary (caused by a splash of water or similar), the tag will record the entry and exit as being the same time, indicated by an asterisk (\*) at the end of the dry time.

- **Inhibit Dive Data** - If you intend to use only the wet switch to obtain wet/dry times, and not to log fast logging data, you can select the **Inhibit Dive Data** option. This feature can be used to save memory but it must be remembered that only the entry & exit times will be recorded. This is not a default option and must be selected by the user.

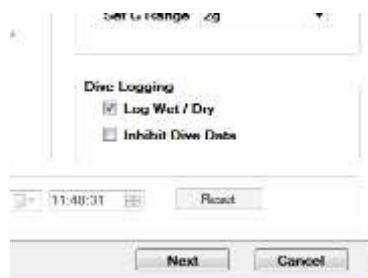


Fig.26

## SETTING UP FAST LOG

To enable the **Fast Log** feature, simply select the Fast Log sampling rate from the **Fast Log Rate Selection** section of the **Deployment Regime Setup**. For each block, this will specify the rate as which **Fast Log** data is recorded.



You cannot overlap **Fast Log** (or **Dive-Log**) blocks even if you are using different sensors for different blocks. This is different to non-**Fast Log** blocks where you can overlap blocks as long as they are using different sensors.

At the **Deployment Regime Setup** window, fast logging can be activated in two different ways:

1. **Unconditional** Fast logging is recording data continually between the block's start and stop times
2. **Dive Log** Where fast logging is activated by a wet switch



**Fast Log in Unconditional** mode means the Host software can calculate the amount of data to be logged, and therefore the memory required to store the data. This allows users to analyse memory allocation for their deployment in advance of deploying the DSTs.

**Fast Log in Dive Log** mode means the logging of data is dependent on whether the tag is immersed in water. The wet switch is set to activate the fast-logging rate and therefore calculating the memory usage in advance of the deployment is not possible. In this case, the Host will instead only display memory allocation for the **Sample Rate** data, and not consider the memory usage of the **Dive Log** data.

Fig.25 shows how the Fast Log data is stored in the memory. If there is more Fast Log data than remaining memory space, the Fast Log data will fill that remaining space and stop when that space is full. All of the Sample Rate data will continue to log for the duration of the deployment as this memory allocation was configured upon deployment of the tag.

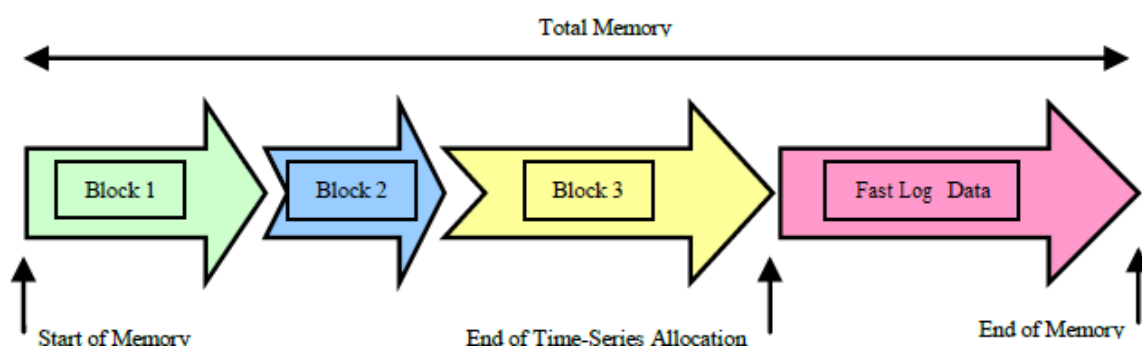


Fig.25



Remember that the more intensive Sample Rate is and the more blocks you add to the deployment; the less space you will have available for Fast Log data.

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The DSTs vary slightly in the Fast Log rates at which they can operate. This is due to the relative memory sizes and battery capacities of the different tags.

G5 Fast Log Rates	G6a+ Fast Log Rates
-	30Hz
-	25Hz
-	20Hz
-	15Hz
10Hz	10Hz
7Hz	7Hz
5Hz	5Hz
4Hz	4Hz
2Hz	2Hz
1Hz	1Hz

## WHAT IS DIVE-LOGGING?

The Dive-Logging feature (using the **Dive Log** option in **Fast Log Rate Selection**) uses immersion in water to activate a period of fast logging. This is a useful memory-saving feature as it means that Fast Log data is only logged when the tag is wet (and meets the conditions for fast logging, see DIVE-LOGGING RULES below).

Dive-Logging can also be used to trigger a fast logging sequence where data is logged at an accelerated rate to give higher temporal resolution data for animals such as diving birds. The 2 communication pin contacts on the DST are the contact points for the wet switch. During the beginning of deployment, in the **Mission Parameters** window, users can select a **Dive Termination** value. This value is used to enable users who wish to capture dive data to restrict the DST from fast logging when dives are below the threshold set. The default value is 1.5% of full scale, so for a 10bar DST, this would be 1.5m depth. Users can use the options available in the Host to adjust this if required, anywhere from -5% to 100% of full scale.

When resistance is detected across these contacts (such as water or physical contact such as a finger across the pins); the tag takes 4 samples at the rate set in the **Fast Log Rate Selection** box. If the tag does not exceed the pre-set **Dive Termination** value; then the tag will take no further samples. If, however, the tag exceeds the **Dive Termination** value, it will continue logging at the set Fast Log rate until its depth is shallower than the **Dive Termination** value for 4 consecutive readings. Similarly, the Dive Log data is terminated if the wet switch is deactivated, or in other words, there is no resistance across the pins and therefore 'dry'.

## SETTING A NEGATIVE DIVE TERMINATION VALUE

As well as setting **Dive Termination** as positive values; you can in fact set them as negative values, too. Setting the **Dive Termination** to a negative value effectively means that the tag will begin fast logging immediately as it gets wet. The reason for setting a negative value, is that this takes into account the sensor tolerance, which is  $\pm 1\%$  of full sensor scale, and also any variations in atmospheric pressure that – if set to 0% **Dive Termination** – could prevent it triggering **Fast Log**.

In this case, the sensor will continue fast logging until the sensor is no longer wet (there is no resistance between the contact pins).

## FAST LOG & DIVE-LOGGING RULES

The rules for a **Dive-Logging** event to activate and deactivate are as follows:

- A **Dive-Logging** event is initially activated by a tag entering the water (fresh water or salt water), or more specifically, when there is a path of resistance between the 2 exposed contacts at the end of the tag; which is most likely to be water. The **Dive-Logging** event will start within the time specified in the **Fast Log Rate Selection** option during deployment.
- Termination of a **Dive-Logging** event will occur when the tag leaves the water, or more specifically, when water no longer bridges the 2 tag contacts.
- Termination of a **Dive-Logging** event will also occur if the tag is above the **Dive Termination** level for 5 consecutive readings – as only 4 readings are recorded and the 5<sup>th</sup> reading triggers the termination. (this is the same as when a tag is submerged but does not exceed the pre-set **Dive Termination** value). This feature was designed to save memory if the tag is at the waters' surface, although still submerged.
- If the tag contacts are still wet, a new **Dive-Logging** event will occur if the tag dives below the **Dive Termination** threshold. However, it will not start at the **Fast Log Rate Selection** setting, but rather on the next 1 second boundary.
- Once a **Dive-Logging** event has been activated the rate of logging continues at the rate set in the **Fast Log Rate Selection** option as set at deployment.
- You cannot overlap **Fast Log** blocks (same sensor or different sensors)
- The **Fast Log** feature can be used to measure temperature, pressure and accelerometry at the pre-selected fast logging rate.

## DIVE-LOGGING EXAMPLES

Please see below a list of **Dive-Logging** examples:

Fig.27 demonstrates a simple dive where 1 data block is recorded for the duration of the dive. The number of samples recorded is dependent on the Fast Log Rate Selection value and the period that the tag is wet for.

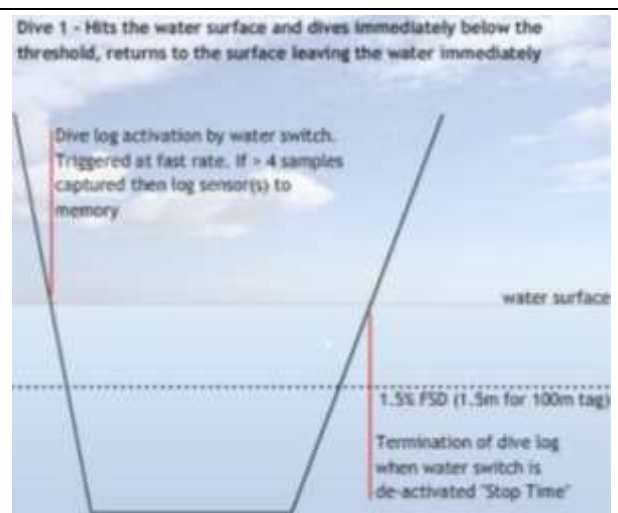


Fig.27

Fig.28 shows the tag experiences a dive the same as Fig.27, but the termination of the logging is different.

The tag sits at the surface for a period of time (above the **Dive Termination** value) but still wet. In this case, the tag senses these parameters and terminates logging after the next 5 data samples (recording 4 samples and terminating on the 5<sup>th</sup>)

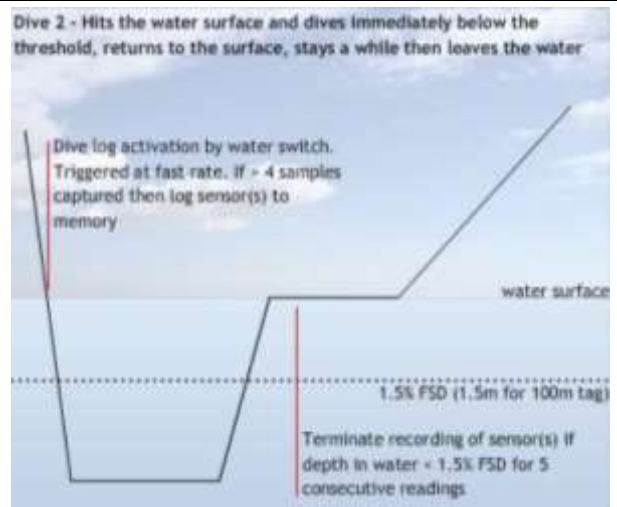


Fig.28

In Fig.29, the **Dive Log** rate is activated because the tag is wet, but only continues for 5 samples because the depth does not exceed the **Dive Termination** level. When the tag eventually exceeds the **Dive Termination** level, a **Dive-Logging** event is activated at the next 1 second boundary, and continues at the pre-set **Dive Log** rate.

Termination of the dive is the same as Fig.27

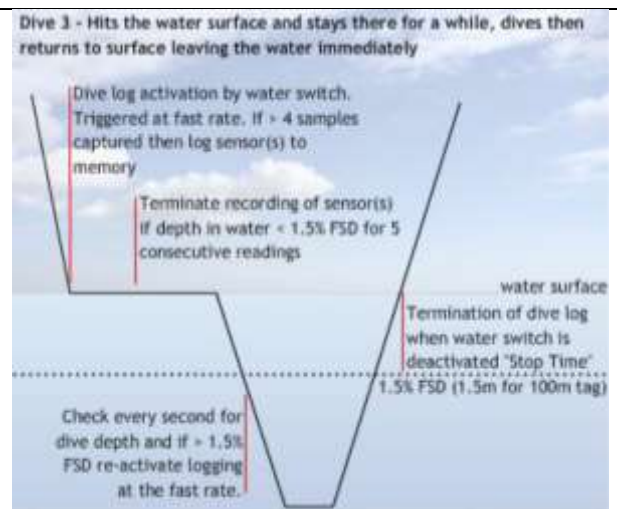


Fig.29

In Fig.30, a **Dive-Logging** event is activated because the tag gets wet. 5 samples are taken because the tag does not exceed the **Dive Termination** value (4 samples are recorded as the 5<sup>th</sup> is the termination event).

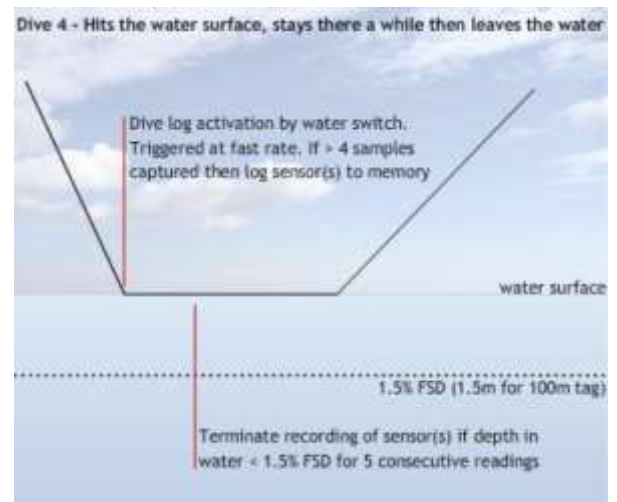


Fig.30

Fig.31 demonstrates a more complex dive. **Fast Log** is activated and terminated as in Fig.27. During the next period the tag experiences multiple shallow dives that do not exceed the **Dive Termination** value so no fast logging data is recorded. When eventually the tag does experience a dive beyond the **Dive Termination** value, logging is re-initiated as in Fig.29 before being terminated normally when it leaves the water.

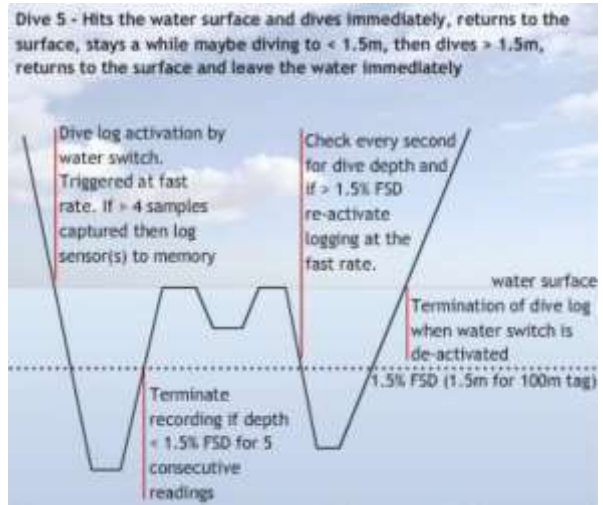


Fig.31

## FINALISING THE DEPLOYMENT

### USING A SAVED REGIME

To use a saved logging regime, select **Deploy » Open Existing Regime** from the Host menu bar. This will display the standard search window where you can navigate around your computer's directory structure to locate a saved logging regime.



Logging regimes are saved with a **.dpl** extension. The default location for logging files is your computer's **Desktop**.

Select your required logging regime and click **Open**. This will load the logging regime into the Host software and display the Deployment Summary window. If you want to review the parameters of the logging regime you can simply scroll through it block-by-block.

You are now ready to upload your logging regime into your DST.



Ensure that any tags you program with a saved regime are the same specification as the original tag the regime was created with. For example, you cannot program a G6a+ with a regime created for a G5. This applies to all features of the tag such as **Fast Log** enabled, memory size and tag firmware version.

### CHECKING YOUR REGIME PARAMETERS

Once you have verified each of your blocks (**Verify Block** in the **Deployment Regime Setup**) – provided the Host software has not identified any errors – you are ready to upload your regime into the DST. To do this, select **Next** in the **Deployment Regime Setup** window. This will take you through to the **Deployment Summary** window (fig.32), which confirms your logging parameters.

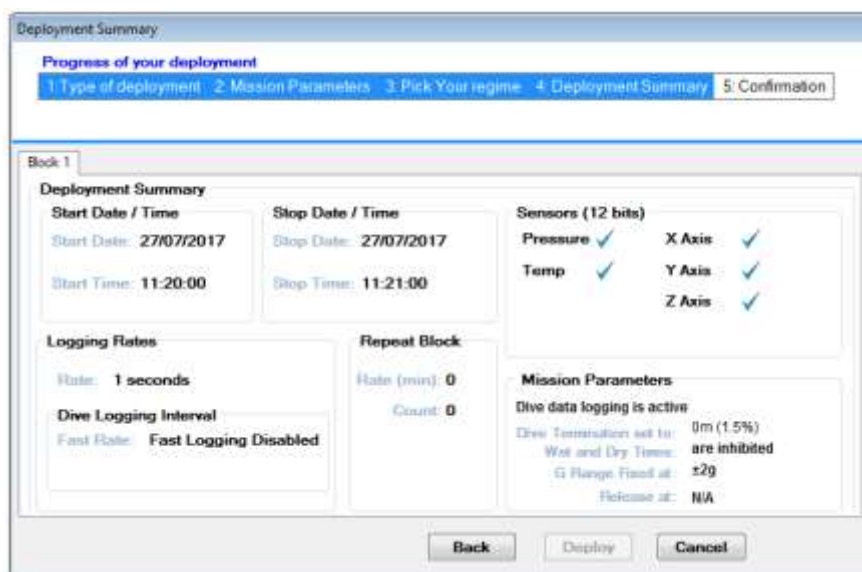


Fig.32

## DST Host User Manual

All of the options you selected earlier in the **Deployment Regime Setup** window is included in the **Deployment Summary** window. You can navigate between blocks using the tabs at the top of the window. This is the final stage before uploading the regime into the DSTs, and so you should take extra care at this stage to confirm that the parameters are correct.



If you are re-deploying a tag; ensure that you have downloaded the logged data from the previous deployment before re-deploying. The act of re-deploying a tag will wipe the logged data to free up space for the new deployment, and this data cannot be retrieved once re-deployed.



Please note that if you create only one block but with 2 sensors logging at different resolutions, the Host software will create an additional block to handle the second resolution.

In the unlikely event that you use all 10 available blocks in your regime, the Host software will issue an error message confirming this; which will require you to either remove one of your blocks, or equalise the resolutions in a multi-resolution block (where 2 sensors are logging with different resolutions).



If your deployment **Start** date/time has already passed by this stage, the Host software will ask you to enter a new **Start** date/time. **Start** times must be no less than 3 minutes ahead of the current time.

### DEPLOYING (& SAVING) YOUR REGIME

When you are happy with your regime, click on the **Deploy** button in the **Deployment Summary** window to upload it to the DST. You will be prompted the either **Save** this regime, or to program another DST with this regime. Select whichever option suits you and then click on **Finish** to conclude this session.

This DST is now in *logging mode* and can be removed from the interface for deployment.



Once a G6a+ tag has been deployed the tag performs a memory erase cycle to clear its memory contents in preparation for the new regime data. During this time it is not possible to connect to the tag and may take up to 15 minutes. For this reason, G6a+ DSTs should not be programmed to start logging before this 15-minute window.



# DOWNLOADING YOUR DST

When you receive a DST back from its deployment, you'll need to download the tag's saved data. To download logged data from a DST, place it in the interface and select the Download icon on the Host software (fig.33).



Fig.33

This will display a standard Windows file save window. The DSTs output 2 files; a .bin (binary) file, and a .csv (Microsoft Excel) file.

Once you have selected a location into which to save the data; the Host will give you the option of entering a comment to be attached at the beginning of the file. You can use this feature to describe or identify the data in any way you find useful.

Once you have entered a comment- or chosen to leave it blank- click on **Ok** and the download process will begin. The download process can take anything from a minute or two up to a couple of hours depending on the amount of logged data (for example, a G5 with 2MB worth of data will download much quicker than a G6a+ with 56MB of data).



If the tag is still in logging mode and recording data, you may or may not want to continue logging. At this point, you will be prompted to either let the tag continue logging (perhaps for re-attachment if the tag has been recovered mid-deployment), or to put the tag into **Deep Sleep** to conserve battery life.

Once the tag has finished downloading (setting in **Deep Sleep** or continuing logging), you can remove it from the interface.

## MANUALLY CONVERTING THE .BIN (BINARY) FILE

The binary file is an important file because it is a direct copy of the tag's memory for the deployment that you are downloading. It cannot be opened by any other software. If, during your analysis of the .csv file, you corrupt or alter it in any way, the original binary file can be used to create another .csv file from your original downloaded data.

To manually convert a binary file to a .csv file, select **File » Convert Binary File**. This will open a standard Windows file open window where you can select the location of your .bin file. Click on **Open** and Host will create a .csv file from your original .bin file.

## REMOVAL OF FAST LOG BLOCKS

If your DST has been operating in Dive-Logging mode, it is possible that it has recorded a large amount of data consisting of short duration data blocks (consisting of 4 samples or less) such as those depicted in fig.29 & fig.30.



A data block is a logged data event such as a single dive event (in a Dive-Logging enabled DST). As shown in figures 27 to 31, these events can consist of:

- A large number of samples from a diving event recorded at an accelerated sample rate.
- 4 samples where Dive-Logging has been triggered due to the water detection but the log has been terminated due to the measured depth not exceeding the **Dive Termination** value.
- 0 samples where the water switch was activated by a momentary splash

If these short duration blocks are of no interest to you, Host has a filter which can remove them at the time of download called **Removal of Fast Log Blocks**. During the download process, Host detects the presence of these short blocks and displays a filter window. If you wish to filter data blocks of a particular number of samples, select **Yes** to activate the filter, and then adjust the slider to set the size of the block you want to remove.

Click **Ok** to continue the downloading process using the filter.



The post-filtered blocks will still be indexed with their original number so that you can see where the blocks have been filtered out of the data set.



If the tag is still in Dive-Logging or Fast Log mode when it is placed into the interface, the contact made between the pins may cause further data blocks to be recorded. These can easily be discarded by examining their time stamp in the data.

## DEEP SLEEP MODE

If you intend to re-use your DST at a later date, it would be a good idea to put the tag into **Deep Sleep** mode. This will maximise any remaining battery life.

To enable **Deep Sleep** mode, select **Tag » Deep Sleep**.



When a DST is in **Deep Sleep** mode, most of its vital systems are shut down to save battery power, including its on-board clock. A warning message will be displayed to notify you of this and give you the option to cancel the operation or proceed.

Once in **Deep Sleep**, the tag will periodically check its communication port to see if you are trying to communicate with it. It could, therefore, take several seconds to wake a tag from **Deep Sleep**.



Whenever communication with a DST is achieved, **Deep Sleep** mode will be disabled. Also, after any insertion into an interface, tags should be removed within a few seconds as leaving tags in an interface can drain battery power, and also **Deep Sleep** activation cannot be guaranteed.