SPLASH
User Guide

Wildlife Computers

Innovative Tags for Innovative Research

3 April 2008

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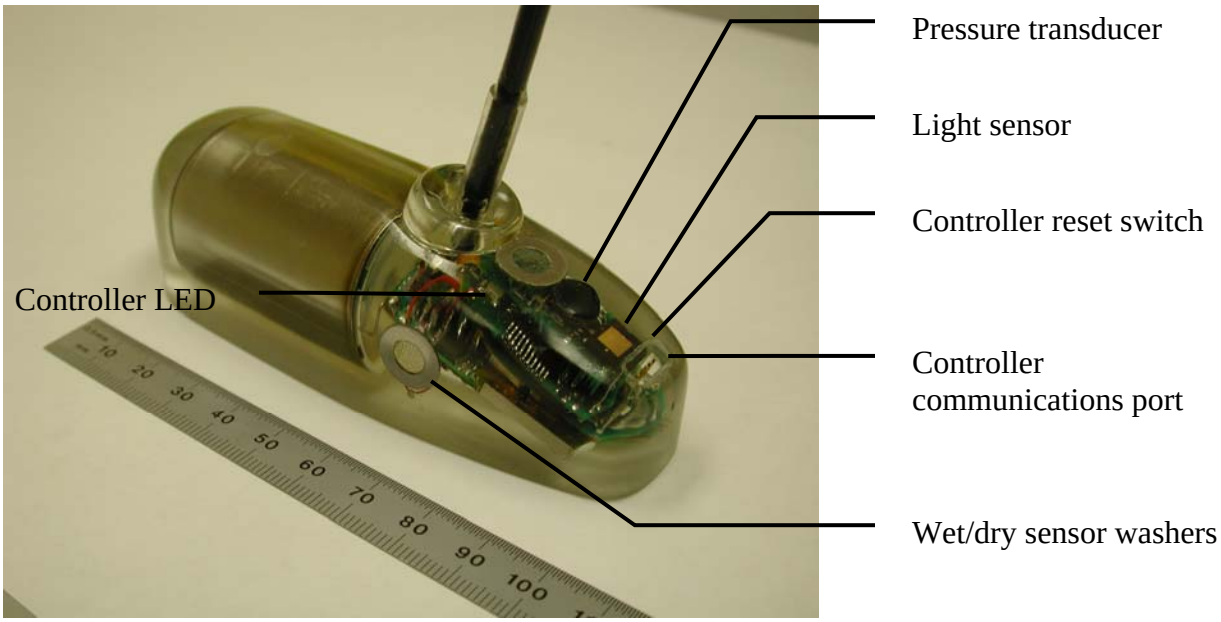
Overview of the SPLASH tag- a data-collecting Argos satellite tag

The SPLASH tag combines the sampling and detailed data storage functions of an archival tag with an Argos transmitter. It includes sensors to measure depth, temperature, light level, and wet/dry periods. During the deployment, depth and temperature data are collected, analyzed, summarized, and compressed for transmission through the Argos satellites. Data throughput is maximized by flexible, user-programmable transmission regimes. The SPLASH tag's data archival capabilities are very similar to that of our Mk9 archival tag. Approximately 14 Mbytes of non-volatile memory are available for the archived data. The SPLASH tag must be recovered in order to retrieve the archival data.

SPLASH tag Diagram



There are two main internal components to the SPLASH tag: the controller board and the transmitter. The two components will be oriented differently depending upon the configuration of the tag. That is, the controller board might be stacked on top of the transmitter, or the two might be alongside each other. The important points of reference are:

- *Controller communications (comm) port*. This is where you would plug in the communications cable.
- *Pressure transducer*. This is the black disk, generally on the top face of the tag.
- *Controller reset switch*. Positioned between the light sensor and the comm port.
- *Controller LED*. Positioned on the side of the controller board. If you look at the tag such that the comm port is closer to you than the pressure transducer, the controller LED will be on the left side of the controller board.

Main features of the SPLASH tags

Tag activation. The SPLASH tag can also be set into a *stand-by* mode so that the tag can be deployed without requiring communications, or immediately *deployed*. A magnet is used to toggle between stand-by and deploy mode. An LED flash sequence indicates whether the tag is in stand-by or deployed mode.

Controller features. The operating code of the SPLASH can be upgraded. This means you can always have the most up-to-date version of on-board software, regardless of when the tag was purchased.

Transmitter. The SPLASH incorporates the Cricket, a specialized, Argos-certified transmitter developed by Wildlife Computers. When configured with one cell, it generates 0.5W of radiated power output, and operates at a high efficiency to allow the maximum number of transmissions from the battery. The high-power, high-efficiency characteristics of this transmitter maximize both the quantity and quality of received messages.

*Location accuracy***.** Service Argos provides the locations with an accuracy as good as ±350m.

User-defined parameters. All parameters are user-programmable. You are able to set the parameters that control how and when the SPLASH tag stores and transmits its data using your PC.

What data are collected

Data collection and summarization.

The SPLASH tag has two independent, user-defined sampling regimes. One is used for collecting archival data. The other regime is used to collect the data for summarization into histograms for transmitted messages.

A “histogram” is a set of accumulators (counters) called “bins.” You can program the range for each bin. Two to 14 bins can be specified for each histogram (or they can be completely disabled). Each histogram covers a user-defined period which can be from one to 24 hours. The start of the histogram periods is user-defined to allow each the capture of diurnal (e.g., morning, daytime, evening, nighttime) behavior.

The SPLASH tag also transforms depth readings into dives. A dive begins when the animal descends from the surface, passes a user-defined minimum depth, and ends when the animal returns to the surface.

Available message types for transmission.

You may select any or all of the below message types transmission.

- *Dive duration histograms*. Number of dives within the specified dive duration ranges.
- *Maximum dive depth histograms*. Number of dives whose maximum depth is within the specified depth ranges.

- *Time-at-depth histograms*. Time spent within the specified depth ranges.
- *Time-at-temperature histograms*. Time spent within the specified temperature range.
- *Percentage timelines*. What percentage of the hour the tag was above a threshold depth, or dry. This message is encoded identical to the SPOT's haulout statistic except that a depth threshold can be specified.
- *20-minute timelines*. Each 24 hour period is divided into 20-minute increments. Each increment is marked with whether it was generally deeper than a configurable depth, or was dry. This is offered for users who want data to compare with our older SDR tags.

Multiple messages are condensed into a single transmission whenever possible to increase data throughput. The transmitted message length can be configured to be generally limited to 11 bytes to conserve battery and increase the probability of uncorrupted transmissions for briefly surfacing animals. Otherwise the target transmitted message length is 31 bytes, which maximizes the amount of collected data transmitted.

Status messages

These messages contain diagnostics regarding the tag's performance (e.g., number of messages transmitted and battery voltage).

Archival data

The depth, temperature, light-level and wet-dry sensors can be independently sampled. Approximately seven million readings can be stored in the tag's archival memory. You must retrieve the tag to recover the archival data.

Decoding the data

Wildlife Computers provides several analysis programs- SATPAK2003, Instrument Helper, and HexDecode- that decode and display both the messages relayed by Argos and data downloaded from a recovered tag.

A word on version numbers

The tag's on-board software can be upgraded. You will generally need to send the SPLASH tag back to Wildlife Computers for the upgrade to the on-board software.

The communications program, SplashHost, will be upgraded in parallel. In order to keep the version of on-board software (SplashWare) and SplashHost working seamlessly together, please note the following:

- The SPLASHWare version numbers are in this format: ***x.yy***, where ***x*** is the major version and ***yy*** is the minor version.
- SplashHost has version numbers in this format ***a.bb.cccc***
- When attempting to communicate with a tag use the following rules:
    - ***a*** must be the same as ***x***
    - ***bb*** must be greater than or equal to ***yy***

- It is best to use highest ***cccc*** available – see our web site www.wildlifecomputers.com for the most up-to-date SplashHost

Special care must be taken when communicating with tags with different major versions of SPLASHWare. If you have tags with different major versions of SPLASHWare, you will need to use two versions of SplashHost. All versions of SplashHost will refuse to communicate with an inappropriate tag, and tell you why.

Communication with the SPLASH tag

User parameters are programmed into the tag via a Windows-based program provided by Wildlife Computers called SplashHost. SplashHost has been tested on Windows 2000 and Windows XP. Earlier versions of Windows may or may not work, depending on the configuration of your PC. We do not support other operating systems (e.g., UNIX) or Windows emulators.

Install SplashHost on your PC from the distribution CD or from our web site, http://www.wildlifecomputers.com, following the prompts.

SplashHost synchronizes communications with the tag's on-board software. It sends and receives commands to the tag. *Parameters are downloaded from the tag to your PC. SplashHost allows you to modify those parameters. Once the parameters are set, they can be uploaded to the tag.*

The tag is connected to your PC via a ***Cable Comm***, a communications interface supplied by Wildlife Computers. The ***Blue Box***, the communications interface used by older Wildlife Computers tags, also can be used. Both the Cable Comm and Blue Box connect to a serial port on your PC.

If your PC does not have a serial port, you will need to purchase an USB-to-Serial Port adaptor. Please note that these adaptors are not standardized, and some do not work with the Cable Comm or Blue Box. We have had problems with those made by Belkin. We recommend the Keyspan USA-19QW High Speed USB serial adapter. If you cannot get the Keyspan USA-19QW, the USA-19Q or USA-19HS should also work. Install the USB-to-Serial Port adaptor *before* connecting the Cable Comm/Blue Box.

Regardless of which Keyspan unit you use, if you follow the manufacturer instructions for installation, the adapter should function properly and communication with the tag will be possible.

Word of note: Make sure you install the driver before plugging in the adaptor. Otherwise it sometimes confuses the laptop in the serial port assignment.

For laptop users, we suggest you set everything up on your new laptop before heading out to the field. The configurations of the new laptops are more complex, and sometimes there are conflicts in establishing the COM port. *It is always advisable to make sure your PC and all connections function properly before you leave the lab.*

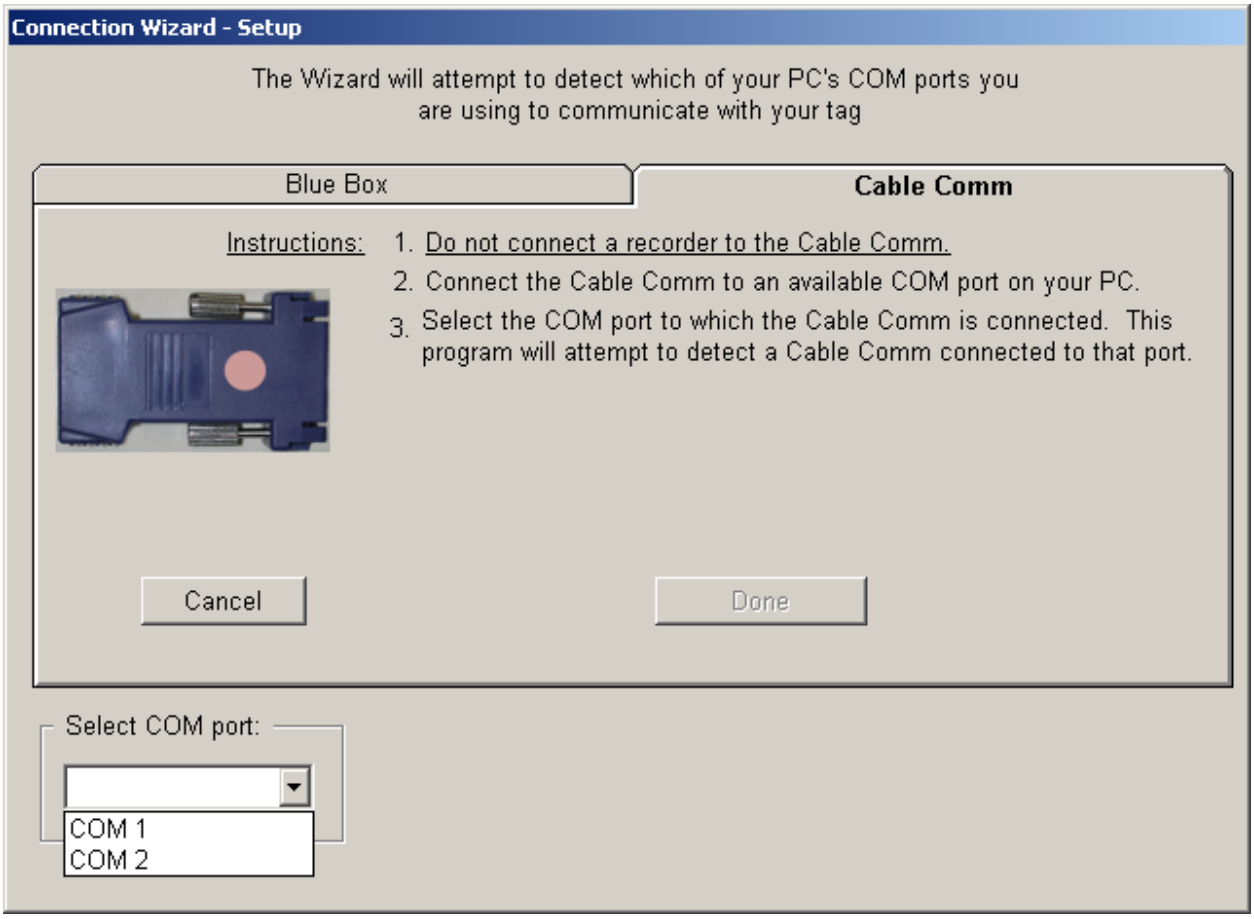
Configuring SplashHost to Your PC

The first time you run SplashHost, you will need to configure the program by telling it which COM port to use to communicate with the Cable Comm/Blue Box.

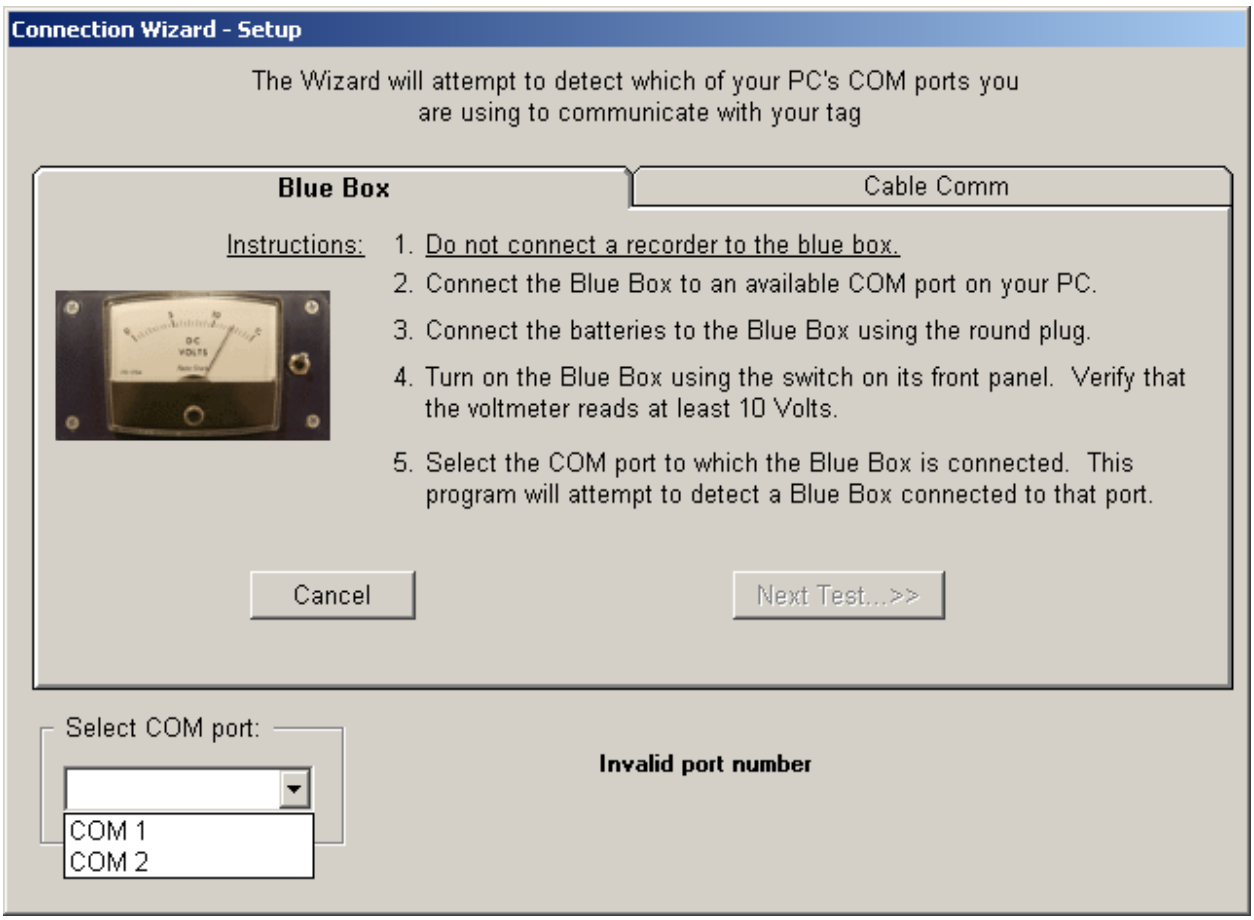
Click the ***Configure*** button on the Welcome screen to start the Connection Wizard.

If you are using a Cable Comm, follow the prompts on the ***Cable Comm*** tab. If you are using a Blue Box, follow the prompts on the ***Blue Box*** tab.

Cable Comm connection tab.



Blue Box connection tab.

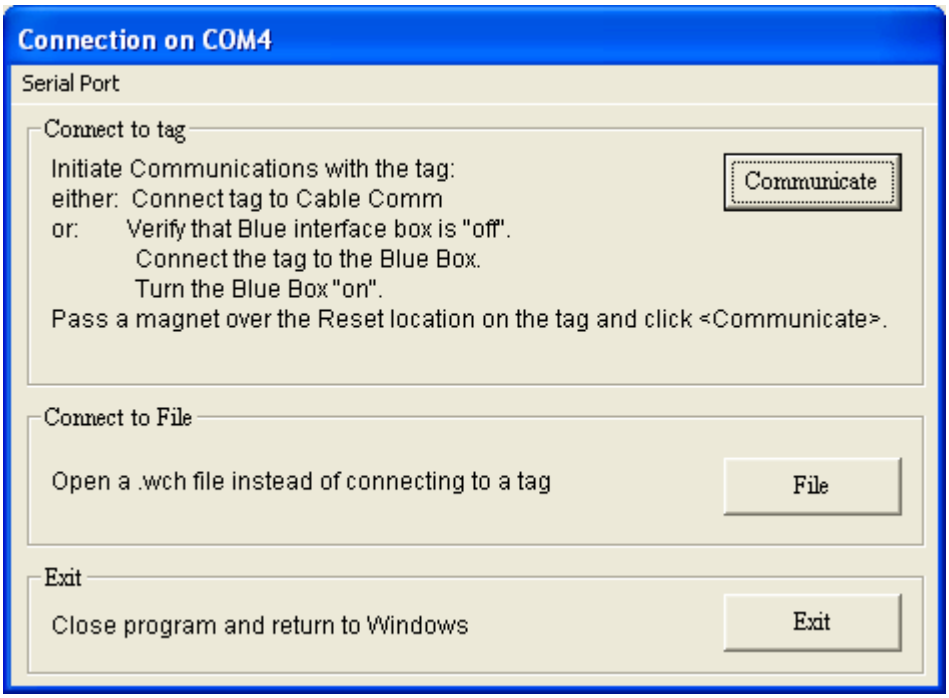


Connecting the SPLASH tag to your PC

Once SplashHost is properly configured, you will be returned to Welcome Screen.

Click the ***OK*** button.

Initiate Communications with the tag



Follow the instructions displayed in the ***Connect to tag*** box. Plug the communications cable into the comm port. Note that the socket of the communications cable must be correctly oriented to the pins of the comm port. *Be sure to align the single open socket of the cable with the single pin in the comm port.*

Pass a magnet over the controller reset switch (see SPLASH tag Diagram on page 7). The controller LED will glow. Click the ***Communicate*** button to initiate communications.

Note that the controller LED will glow if the cables between the PC, Cable Comm/Blue Box and tag are connected correctly. The LED must be glowing before clicking the ***Communicate*** button. SplashHost may display additional prompts if there are difficulties in establishing communications.

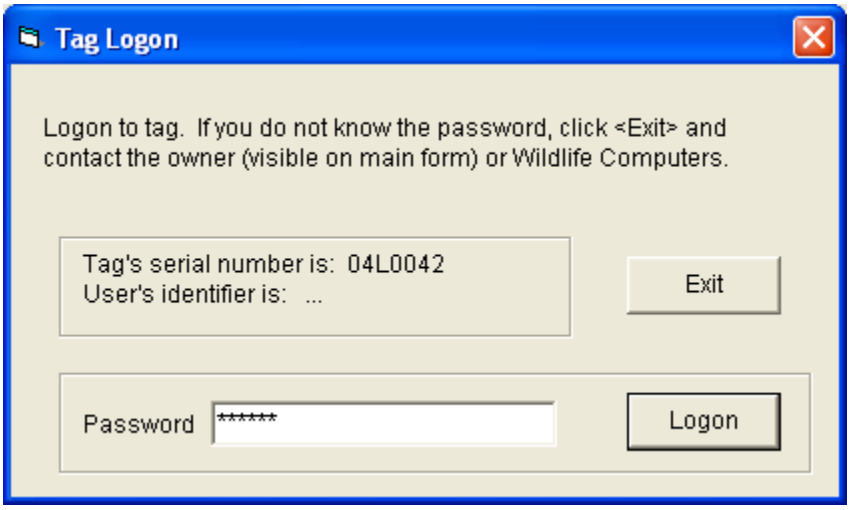
View parameters from a downloaded .wch file

This option allows you to view the parameters contained in the downloaded .wch file of a previously set-up SPLASH tag. You do not need to connect to a tag.

Click the ***File*** button, and you will be prompted for the .wch filename.

Log onto the tag

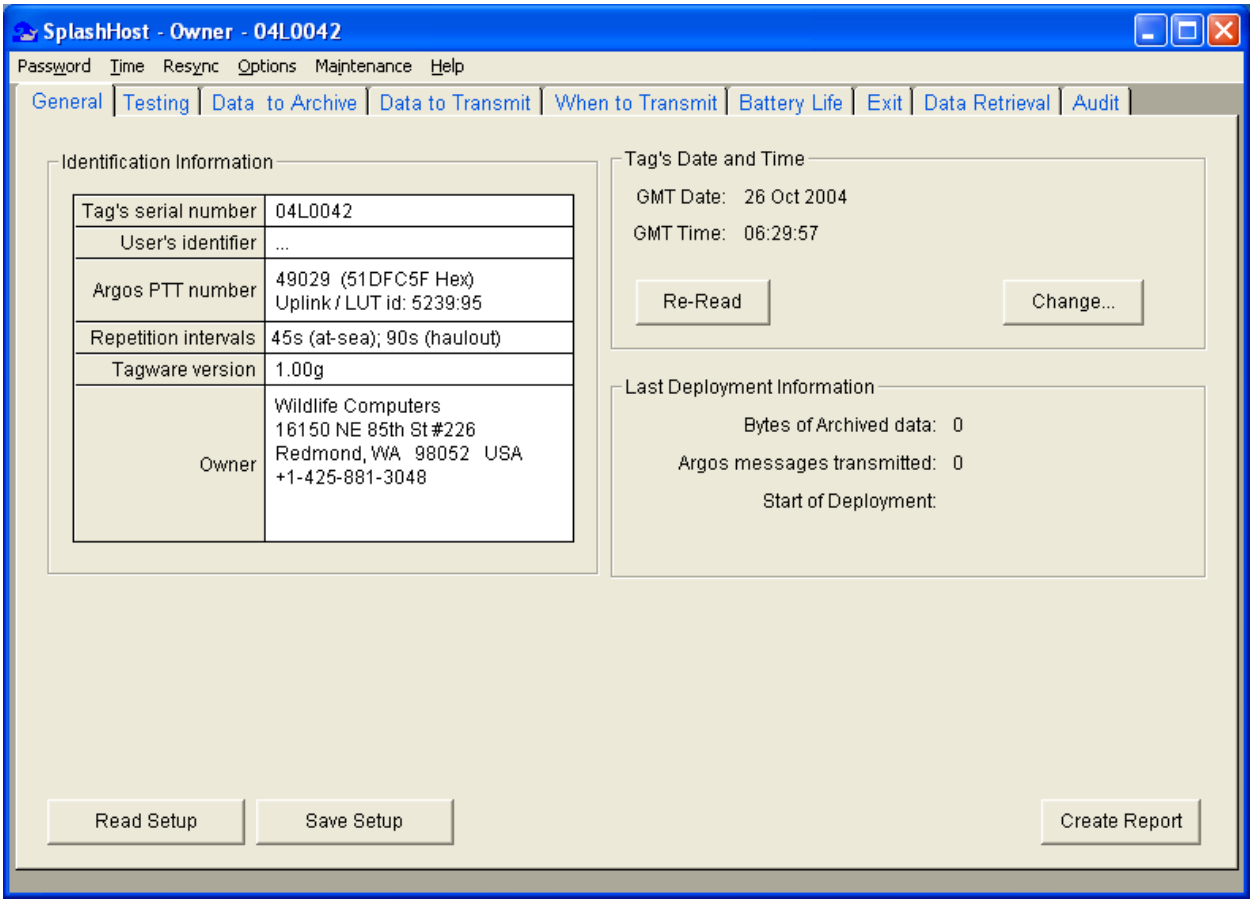
After initial communications are established, you need to logon to your tag. You must correctly enter your password, which will log you on as an "owner" in order to read and update information from the tag. *The default password for all SPLASH tags is **splash***. The password is not case sensitive.



You can change your password any time after you have logged on as an owner. Acceptable passwords include entries up to 31 characters. If you forget your password, you will have to return the tag to Wildlife Computers so we can reset it.

Navigating through the Tabs

General tab – Identification and status



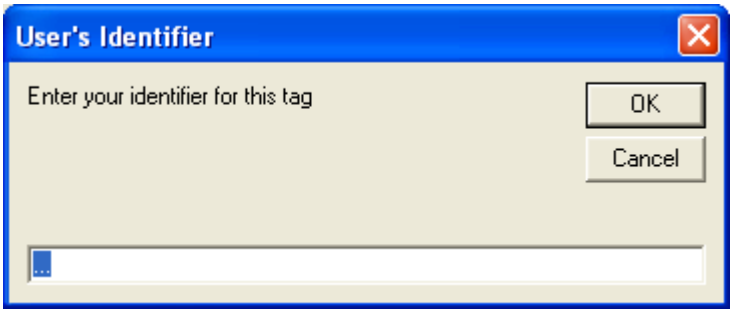
This screen displays basic information for the tag. It also allows you to change the *User's identifier* and *Tag's date and time*. You can also create a report to archive the tag's parameters, as well as save the parameters to be subsequently loaded into other tags.

Identification Information section

All of the identification information parameters except the *User's Identifier* are set by Wildlife Computers.

Set User's Identifier

The *User's Identifier* is for your own identification purposes only. This field displays in some of the Wildlife Computers analysis programs. Click on the white box that contains the current *User's Identifier* (**"…"** is the default). This brings up the ***User's Identifier*** window which allows you to change this parameter.



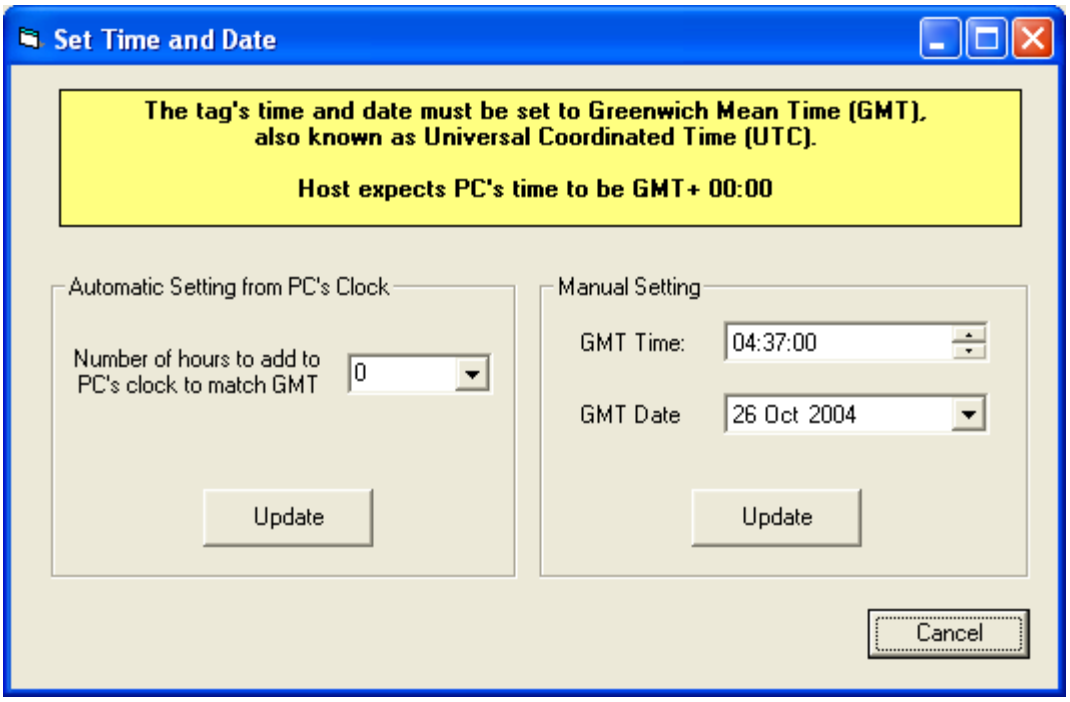
Acceptable identifiers include entries up to 31 characters. When finished click the ***OK*** button.

Set tag Time and Date

It is important to accurately set the tag time to GMT. Neglecting to do so will make subsequent data analysis more difficult. The time displayed on the ***General*** tab is from the tag's internal clock. This display can be refreshed (re-read from the tag) by clicking the ***Re-Read*** button.

There are two ways to set the tag's clock. The best and most accurate way is to use the clock on your PC. First ensure the clock on your PC is accurate.

Click the ***Change…*** button in the ***Tag's Date and Time*** section to bring up the ***Set Time and Date*** window to set the tag's clock.



Automatic Setting from PC's Clock parameter section

This is the easiest way to set the tag's clock. Ensure your PC's clock is accurate. Use the drop-down box to define the PC's offset from GMT. Note that this value is the number of hours you must *add* to the PC's clock to match GMT. Both positive and negative numbers will be displayed. This offset is re-displayed as number of hours to add to GMT to match the PC's time in the yellow section of the window.

Click the ***Update*** button to set the tag's time to the PC's time with the GMT offset.

Manual Setting section

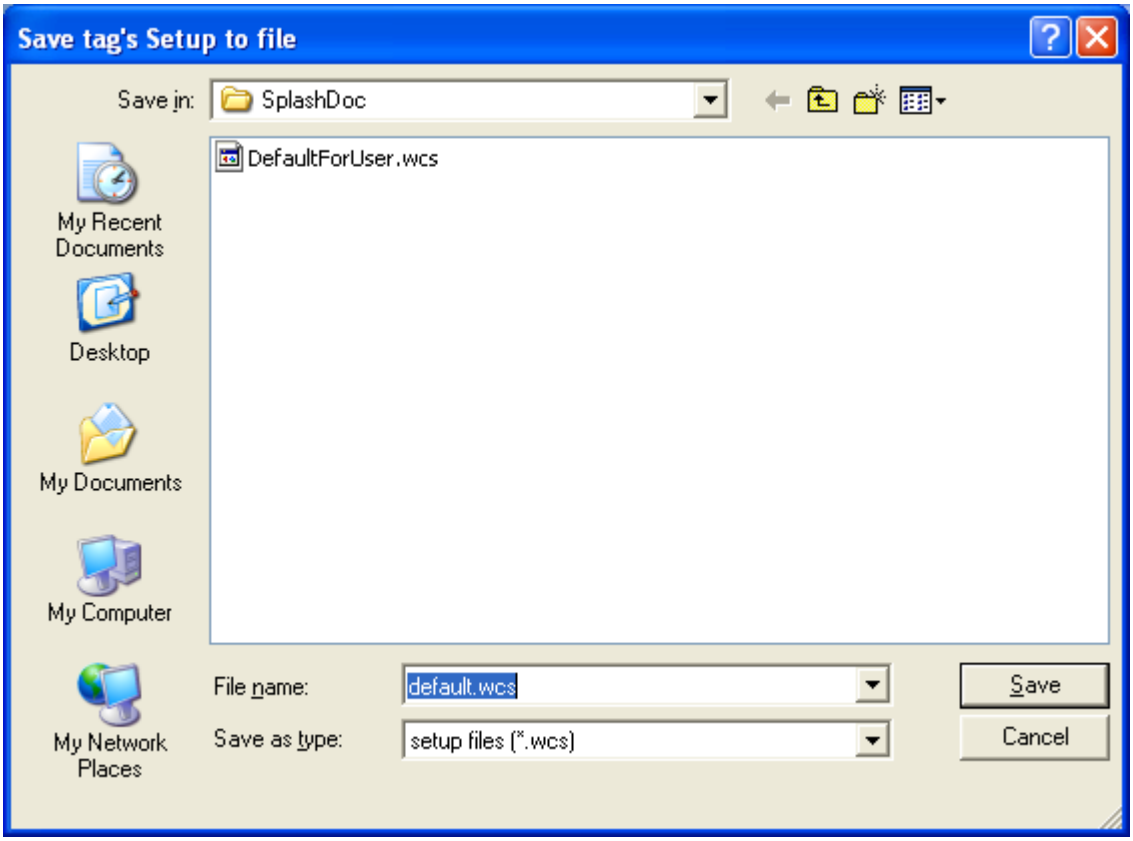
Alternately, you can manually set the date and time by entering the appropriate values where indicated. Click the ***Update*** button to set the tag's time to the entered values.

Last Deployment Information section

This displays the bytes of currently archived data, the lifetime number of Argos messages transmitted, and the start of deployment date of the archived data.

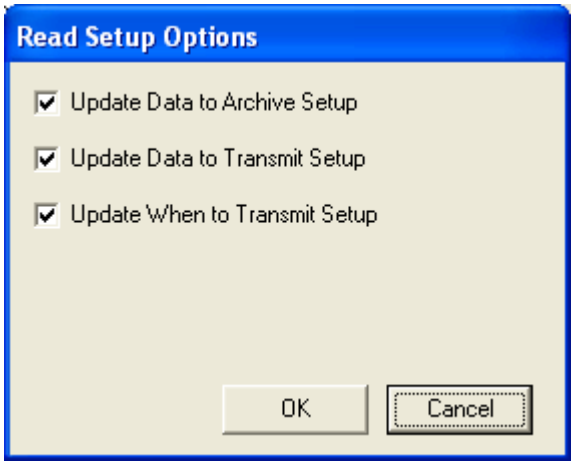
Read Setup / Save Setup Buttons

These buttons are very useful if you wish to set up a number of tags with the same parameters. Once you have programmed a tag with your desired parameters, select **"Update tag with parameters from this screen"** (found in the Maintenance drop-down menu), then click the ***Save Setup*** button to save the parameters to a file.



Click the ***Read Setup*** button to bring up the saved setup file for loading in subsequent tags.

Select the appropriate saved setup file. You will be prompted for which sections to load into SplashHost.

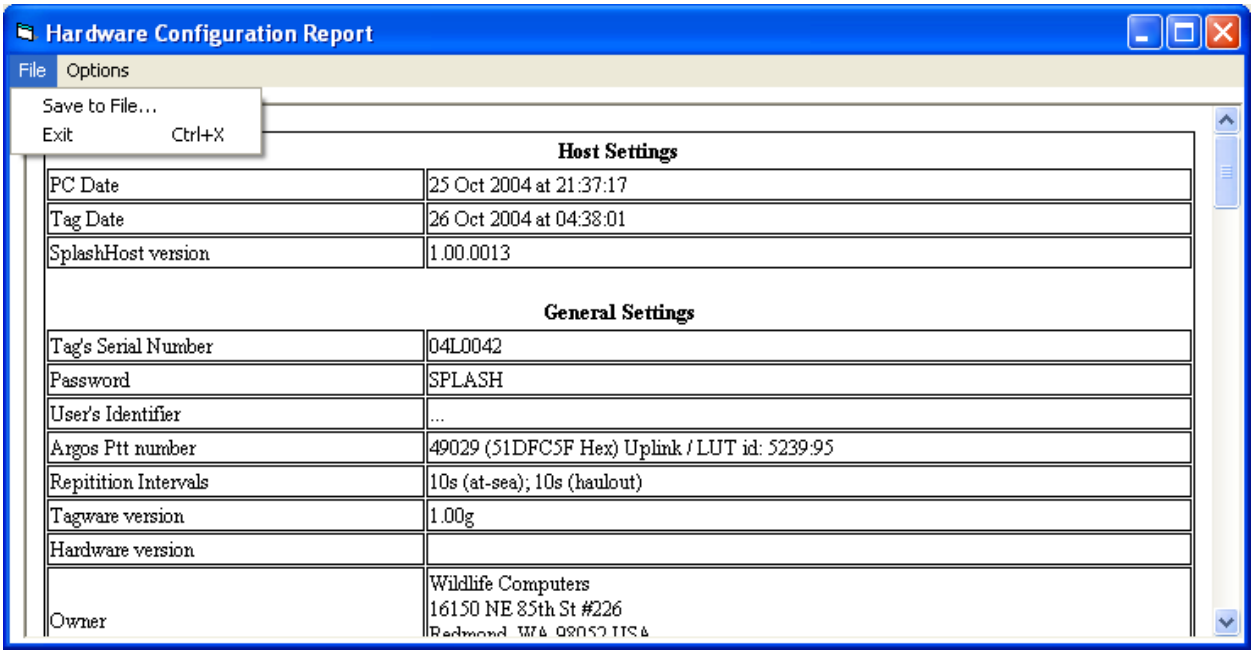


Remember, you will still need to update the tag with the SplashHost parameters.

Create Report Button

It is important to archive the configuration of the tag (versions, parameters) prior to deployment so that they can be used to correctly analyze the data. Click the *Create Report* button. The following *Hardware Configuration Report* window will display the configuration of the tag.

The ***File*** menu item allows you to save this report. Note that this report is in HTML, and can be later viewed or printed using your web browser. Click the red "X" on to close the report window.

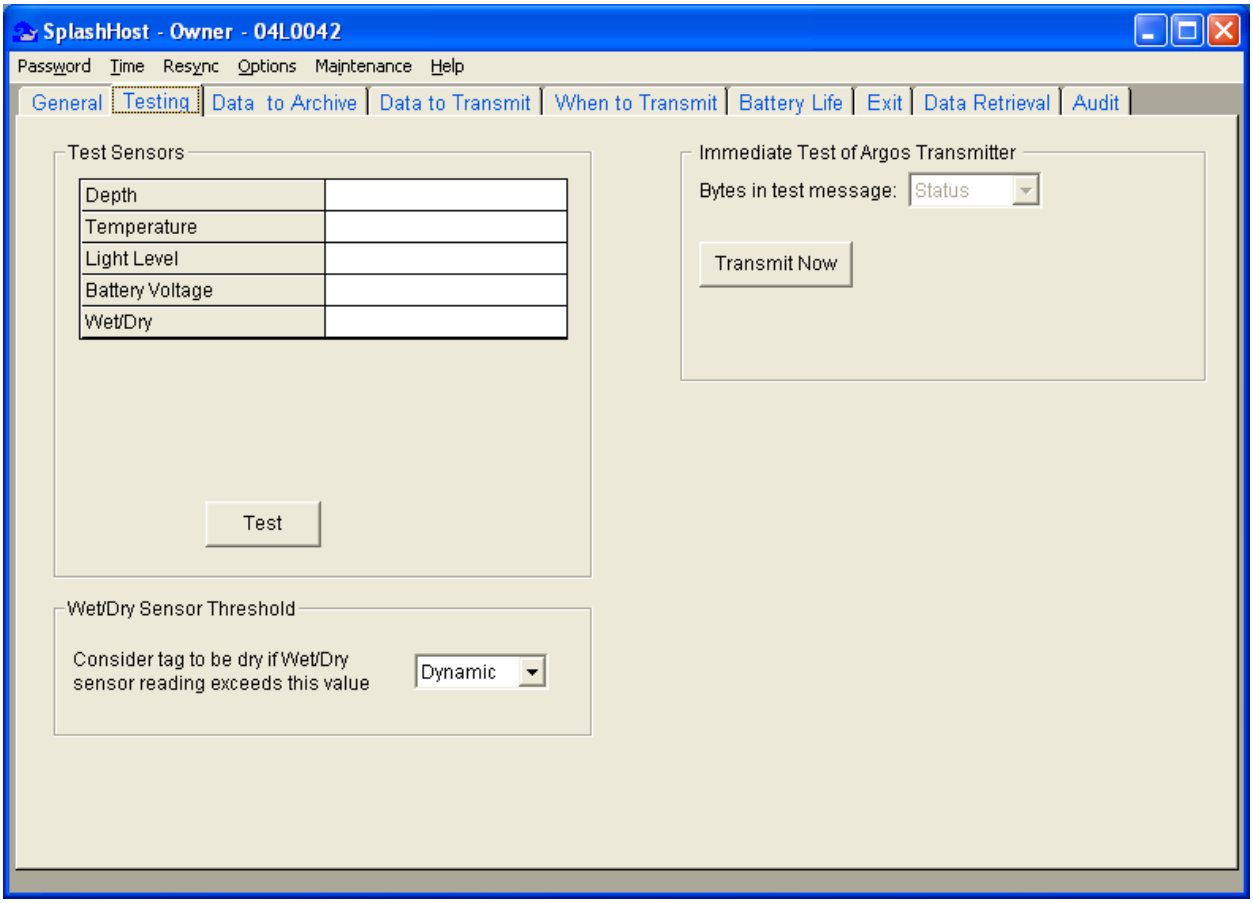


You should <u>always</u> save a copy of the report and review all parameters before deployment. The success of your experiment depends upon the correct setup of all parameters.

Note that selecting this configuration report function only displays the tag parameters stored on the PC, not necessarily on the tag, and does not perform any upload function. When running the report, the SplashHost will indicate if the report shows a change from what is on the tag. If so, be sure to save the changes when you terminate communications with the tag.

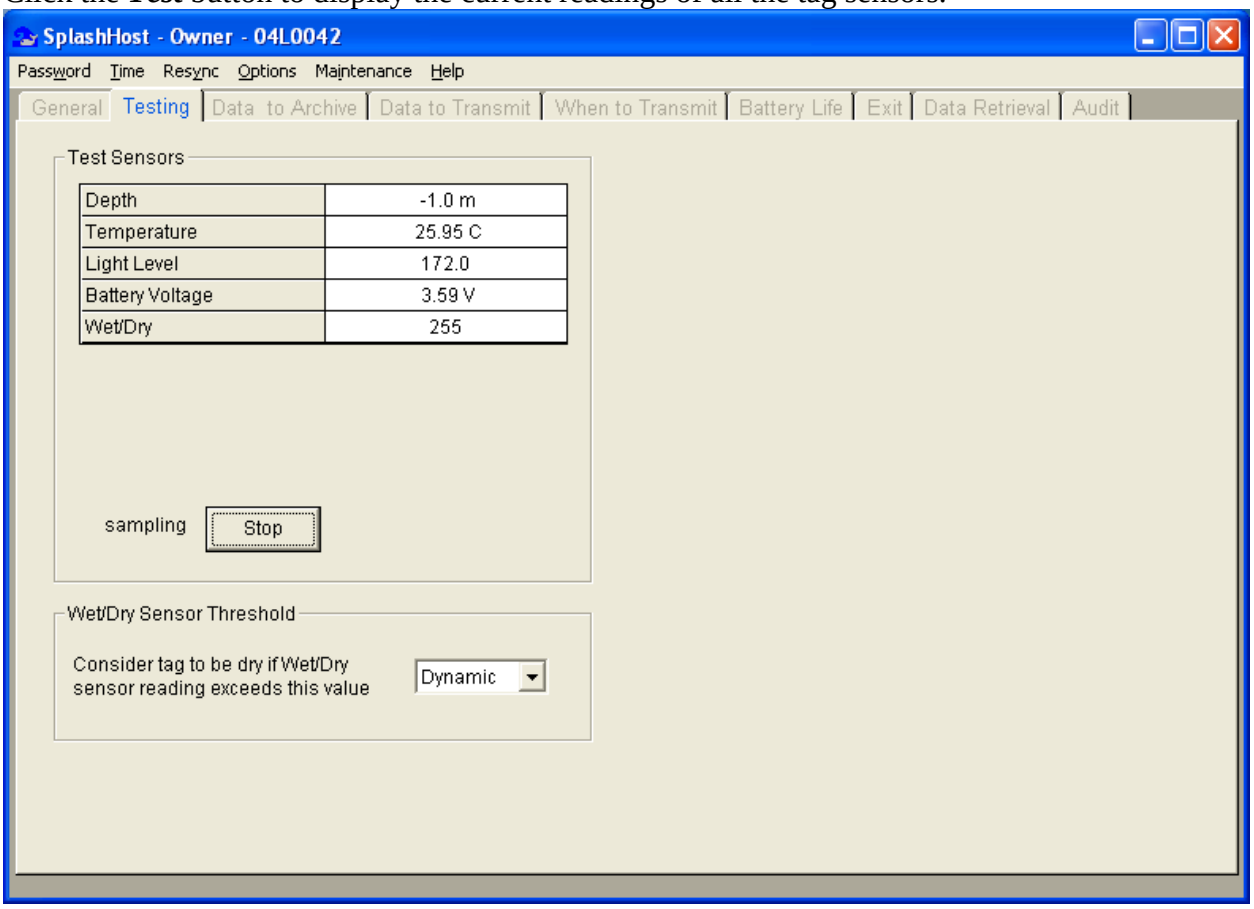
Testing tab – Verify Sensors and Argos Transmitter

The ***Testing*** tab allows you to verify the sensors and transmitter are functioning correctly.



Test Sensors section

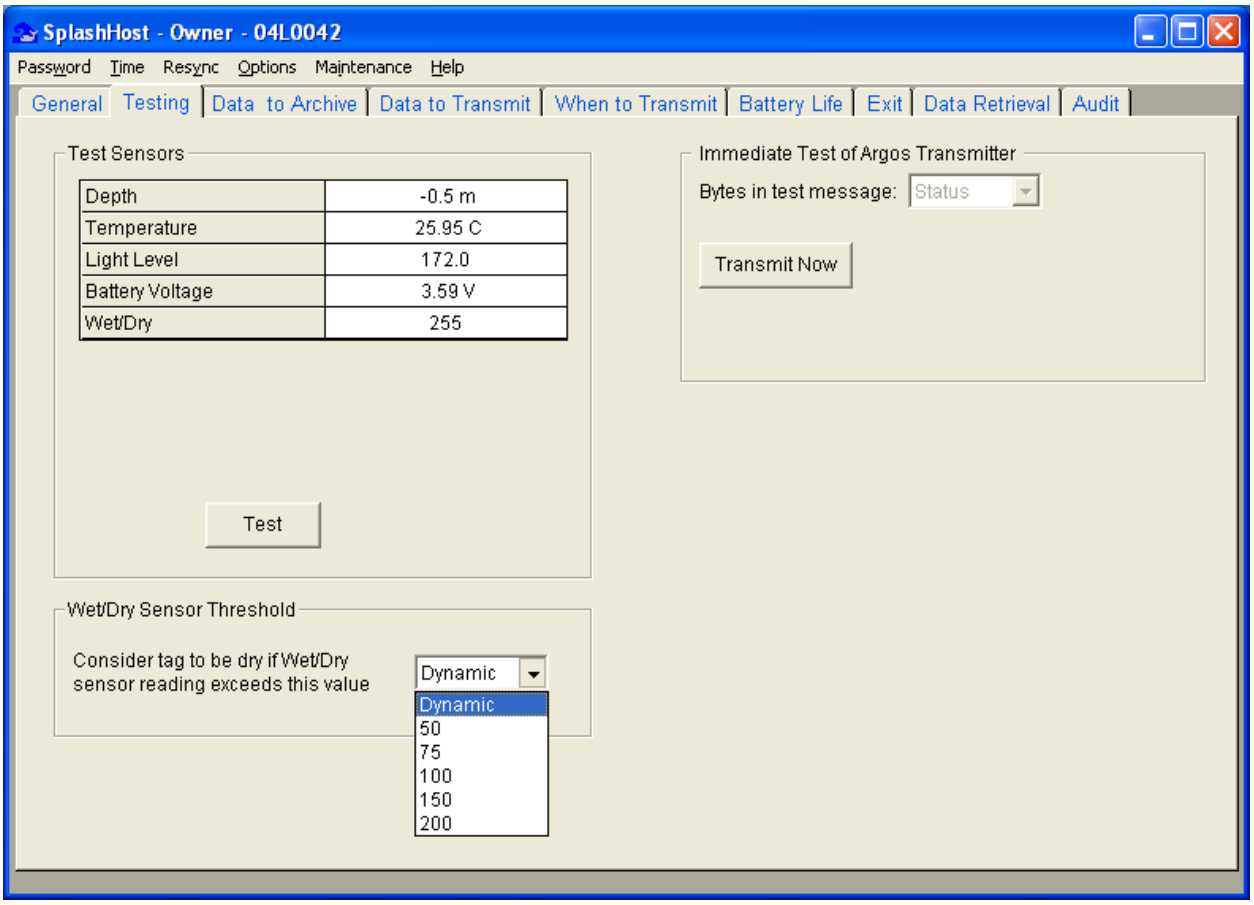
Click the ***Test*** button to display the current readings of all the tag sensors.



Verify the sensor readings are reasonable.

Depth: -5 to +5m (the depth will auto-zero during the deployment)
Temp: current temperature
Light Level: ~50 (when light sensor is covered) to ~180 (bright room)
Battery Voltage: greater than 3.0V
Wet/Dry Sensor: 255 if the Wet/Dry sensor threshold is set to *Dynamic*.

Wet/Dry Sensor Threshold parameter section



The SPLASH tag determines if it is wet or dry. It does this by taking a Wet/Dry sensor reading and comparing the reading to the *Wet/Dry sensor threshold*. If the current reading is less than the threshold, Splash considers itself wet; otherwise it is dry.

The tag can be configured with either a fixed or dynamic conductivity threshold. A fixed value never changes during the tag's deployment. If configured for a dynamic threshold, the SPLASH tag computes the threshold value hourly.

The *Dynamic* threshold setting is recommended for the majority of applications. This will accommodate most changes of salinity, including the movement of the animal through water masses of varying salinity.

There may be instances, however, where the *Dynamic* setting is not appropriate. These include deployment in brackish (low-salinity) water, and areas where there is a discrete top layer of fresh water over the seawater (areas of high glacial melt). Read *How the Dynamic Wet/Dry threshold is calculated* below if your application might require a fixed threshold value.

How the Dynamic Wet/Dry threshold is calculated

The wet/dry sensor measures the conductivity between the wet/dry sensor washers (see *SPLASH tag Diagram* on page 7). These readings vary between about 20 (maximum conductivity measurable by the sensor, the value of high-salinity seawater) to 255 (sensor is unable to measure any conductivity, the value of a completely dry tag in air).

The value the Wet/Dry sensor reads when fully immersed in seawater is variable, affected by the salinity of the water, the size of and distance between the washers, and any fouling (e.g., algae) over the washers.

The tag primarily uses the wet/dry readings to determine when it is "dry enough" to initiate a transmission. The best chance for at-sea locations is for the tag to transmit as soon as the *base of the antenna* is out of the water. There is usually residual conductivity measured between the washers when a tag emerges from the water.

When configured for a *Dynamic* Wet/Dry sensor threshold, the following mechanism is used:

1. The tag reads the Wet/Dry sensor each second, keeping track of the highest and lowest readings.
2. At the end of an hour, the highest and lowest values that occurred at least twice during that hour are noted.
3. If the difference between the highest and lowest is less than 30, no new threshold is computed.
4. If the difference is greater than 30, a proposed new threshold is calculated to be the lowest value plus ¼ difference between the lowest and highest.
5. If the proposed new threshold differs from the current value, the tag sets the Wet/Dry threshold to the new value. A record is written to the archive to note this change.

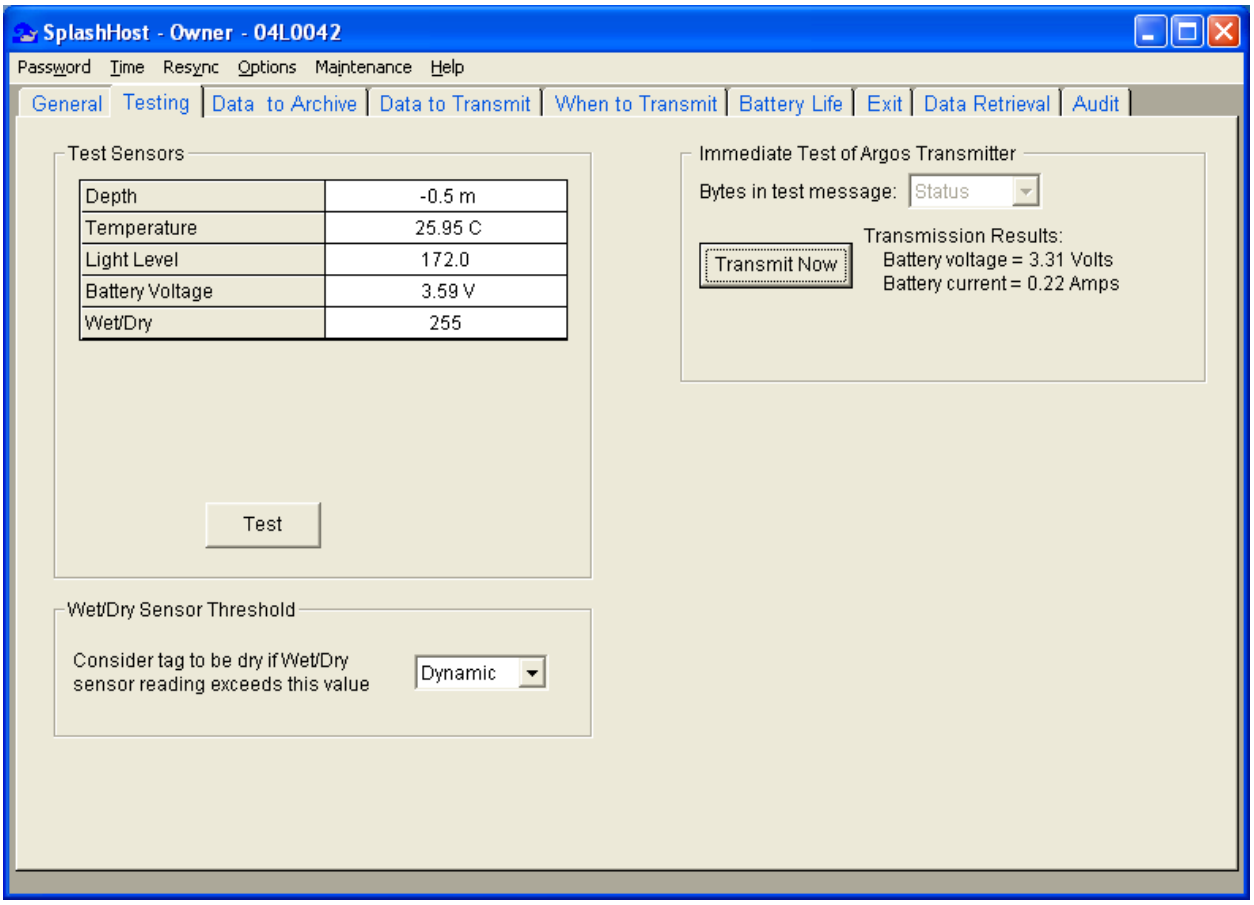
Fixed Wet/Dry threshold

The Dynamic Wet/Dry threshold calculation is optimized for areas where there the water salinity is well-mixed, and the animal regularly comes to the surface. It may not be appropriate for areas of discrete salinity changes (e.g., areas of high glacial melt), or animals that do not reliably surface once an hour (e.g., sharks, some turtles).

In such cases, one must have a sample of the water in which the tag will be deployed. Measure the wet/dry value by carefully immersing the wet/dry sensors in the water, and noting the reading when the washers are fully immersed. Be careful not to get the comm port wet. If the reading is *R*, set the threshold to be 510*R/(255+R). We suggest you contact us if you are considering using a fixed value.

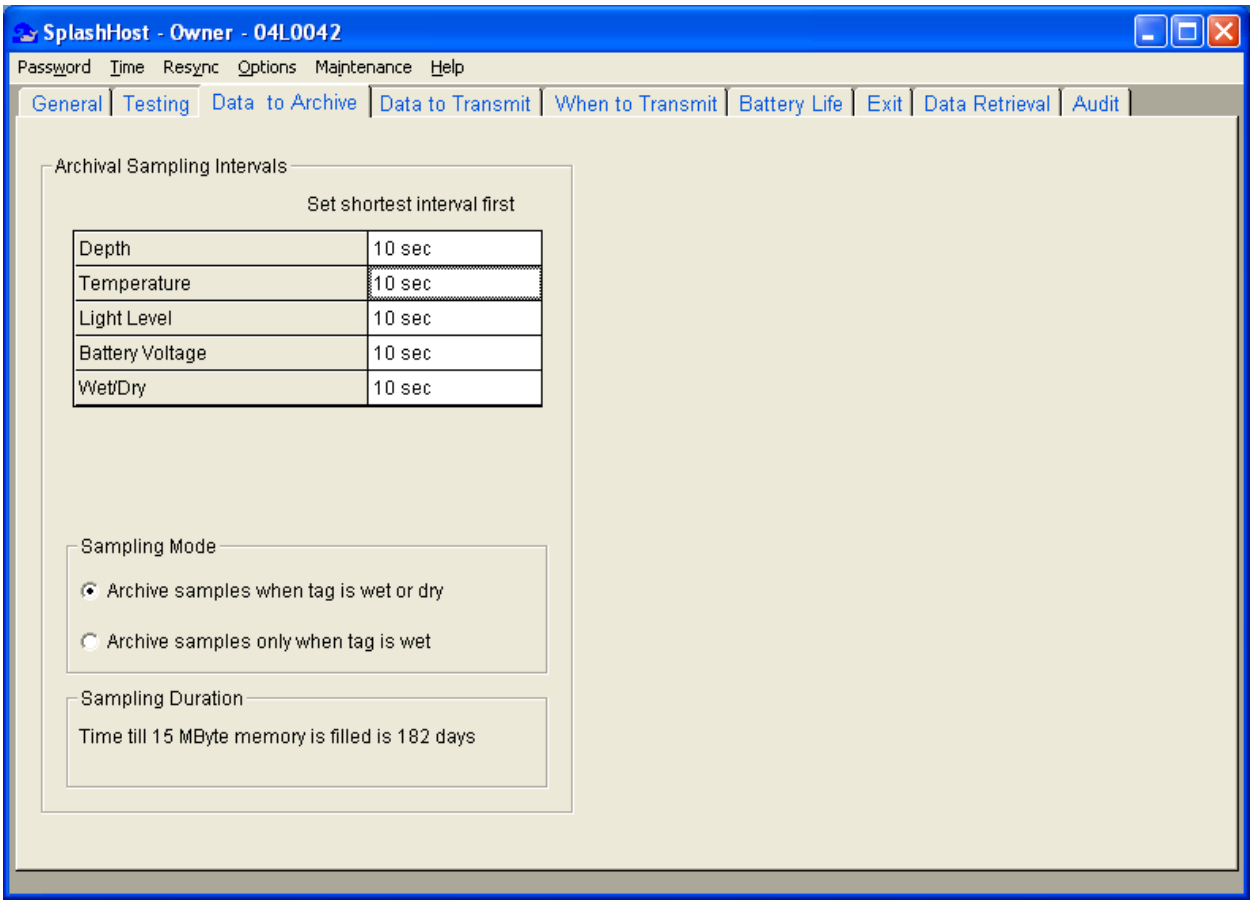
Note that the SPLASH tag is designed for marine, not freshwater deployments. There may not be enough difference between the readings for freshwater and air for the tag to reliably determine "wet" versus "dry".

Immediate Test of Argos Transmitter section



Click the ***Transmit Now*** button to immediately initiate a transmission. You can detect the transmission with an Argos uplink receiver, or any receiver that is sensitive to 401.65 MHz. The battery voltage during the transmission will be displayed. This should be 3.0V or greater.

Data to Archive tab –How archival data are collected



The tag has a total of approximately 14 Mbytes of non-volatile memory available for the storage of archival data. Two bytes are required to store each reading. The battery power required for sampling is negligible.

The tag must be recovered in order to retrieve the archival data.

Archival Sampling Intervals section

Click the box containing the sampling interval to change the sampling rate for the sensor. Generally you will not wish to sample battery voltage. The battery voltage is store by the tag automatically every hour.

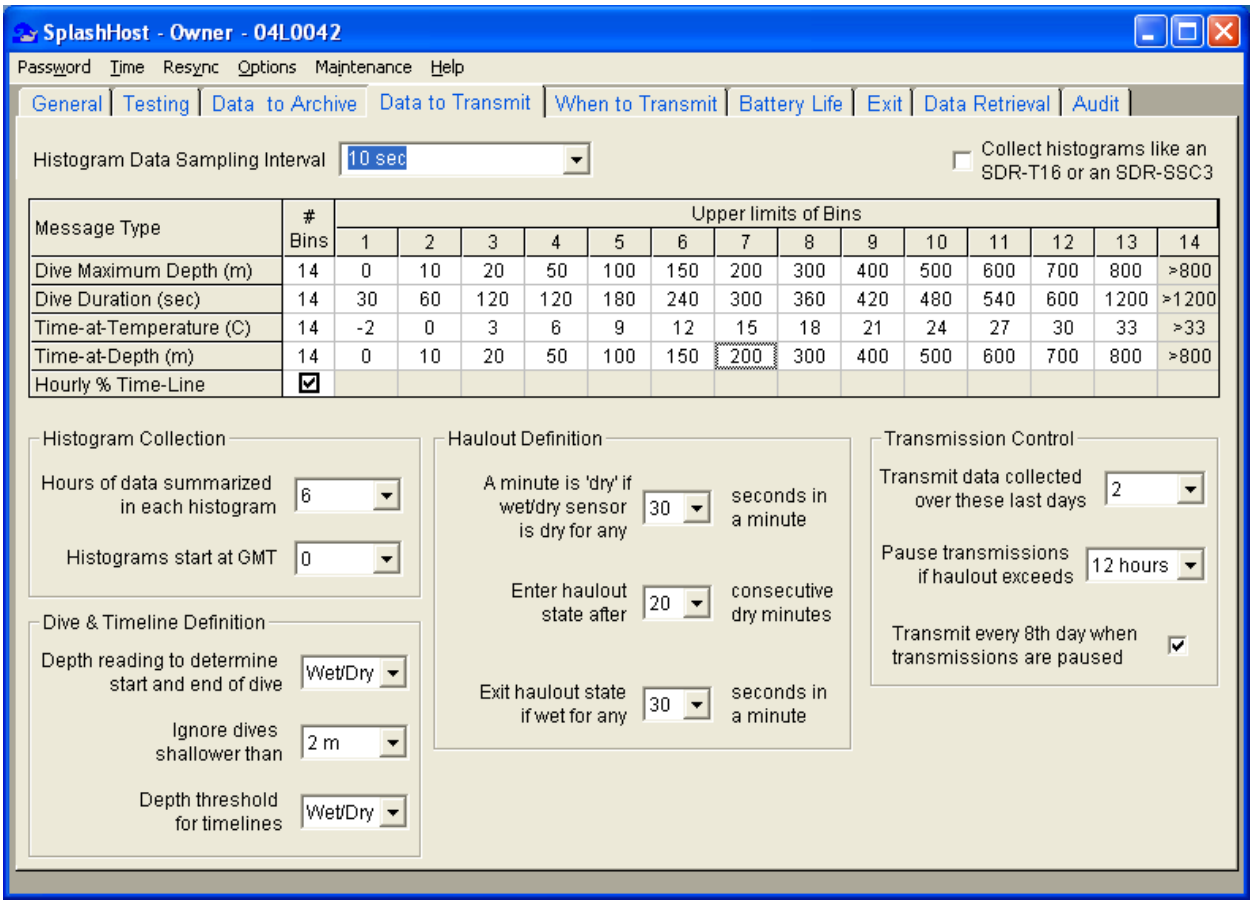
Sampling Mode parameter section

The sampling mode determines how the tag should store samples depending upon the wet/dry sensor. *Archive samples when tag is wet or dry* will store the samples regardless of the wet/dry sensor readings. The *Archive samples when tag is wet* option will just keep track of the times when the tag is dry; no data samples are store if the tag is dry.

Sampling Duration parameter section

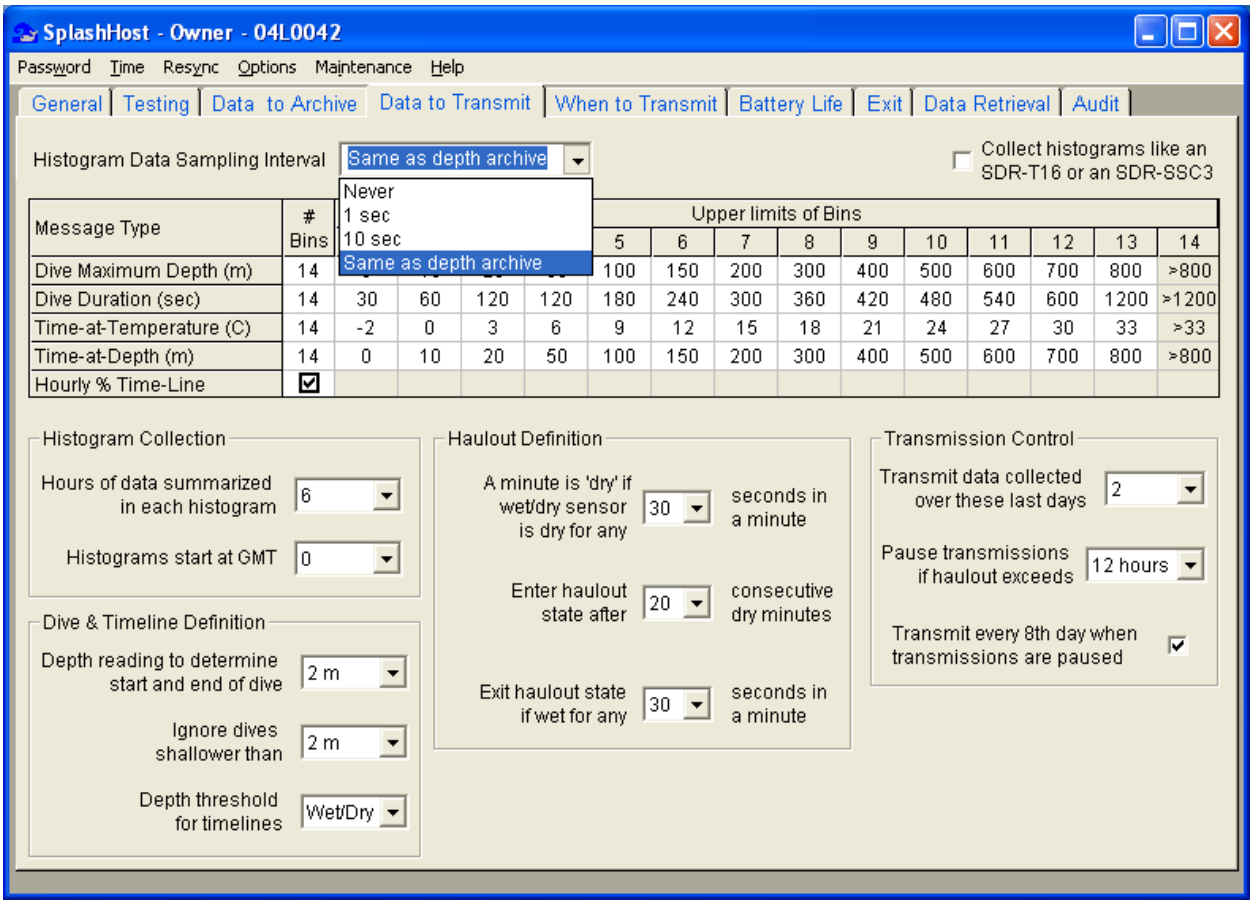
The tag will calculate the number of days it will take to fill the available archival memory, based on the sampling intervals that have been set for each sensor.

Data to Transmit Tab–How transmitted data are collected and summarized



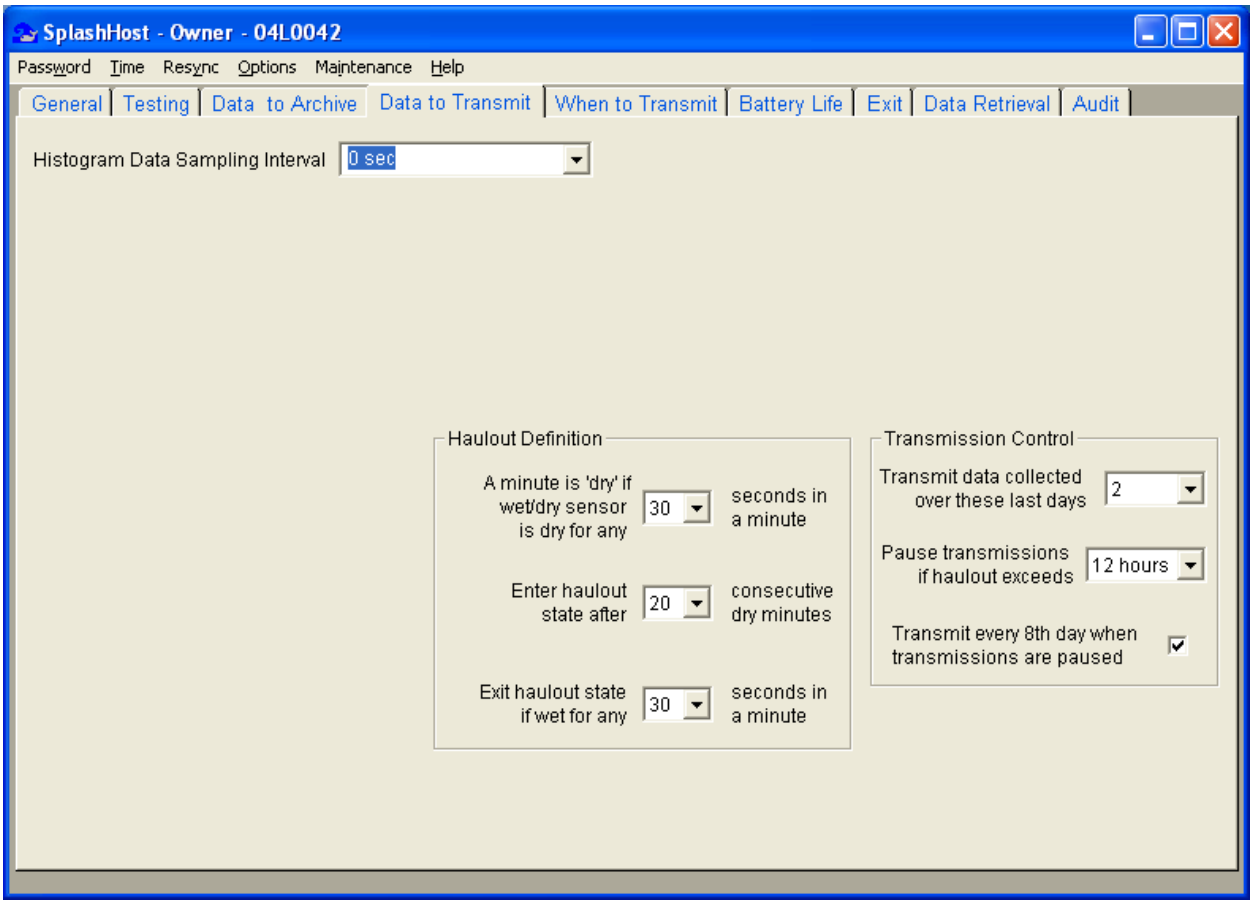
The *Data to Transmit* tab gives you access to the parameters that define the sampling interval for the collection of data to be used in the transmitted messages, the bin limits of the histograms, the duration of the histogram periods, the thresholds for dives and timeline calculations, the determination of haulout periods, and the option to suspend transmissions after a number of haulout hours.

Histogram Data Sampling Interval parameter

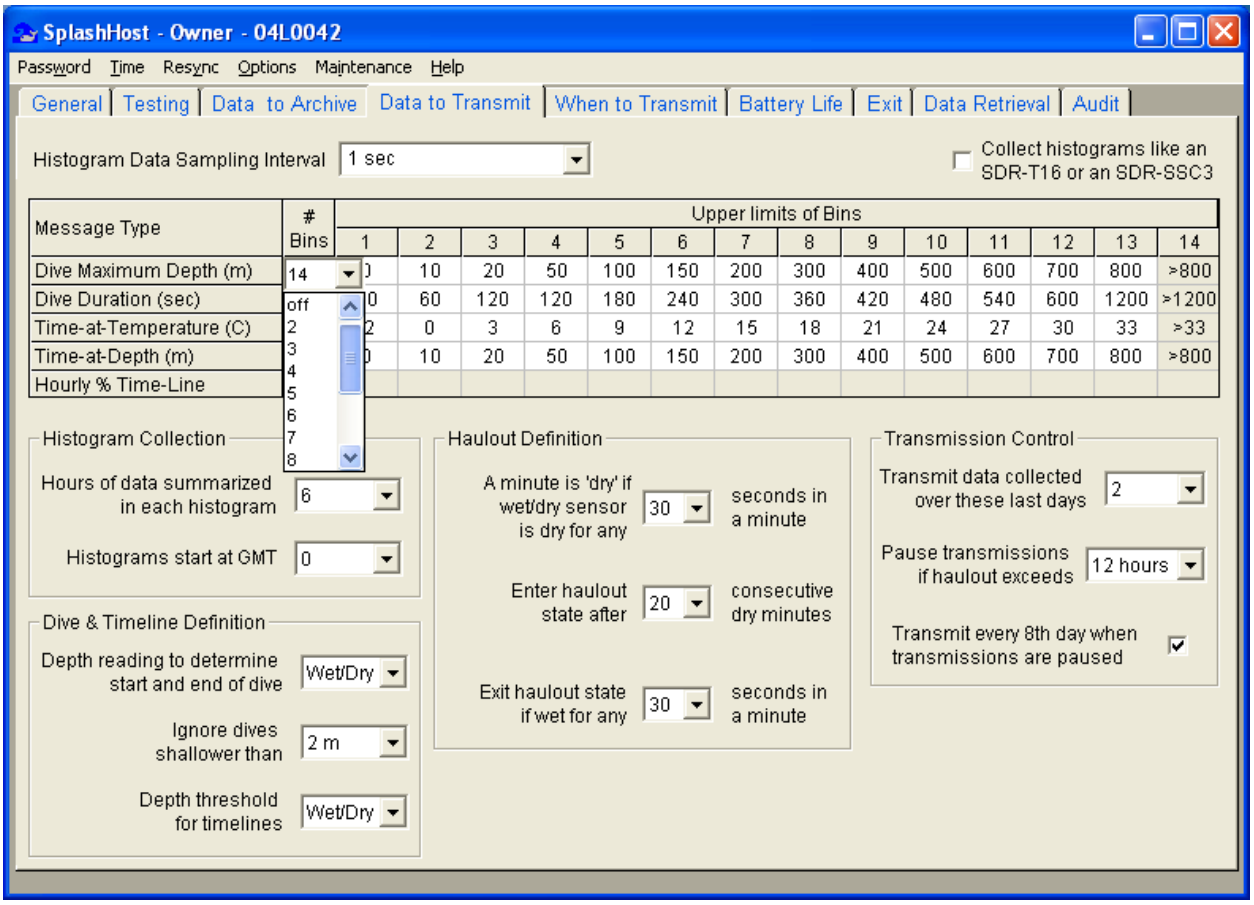


The tag allows you to set a sampling interval for the histograms. This sampling interval can be independent from the archival sampling interval, or set to be the same. Note that the older Wildlife Computers SDRs used a histogram sampling interval of 10 seconds.

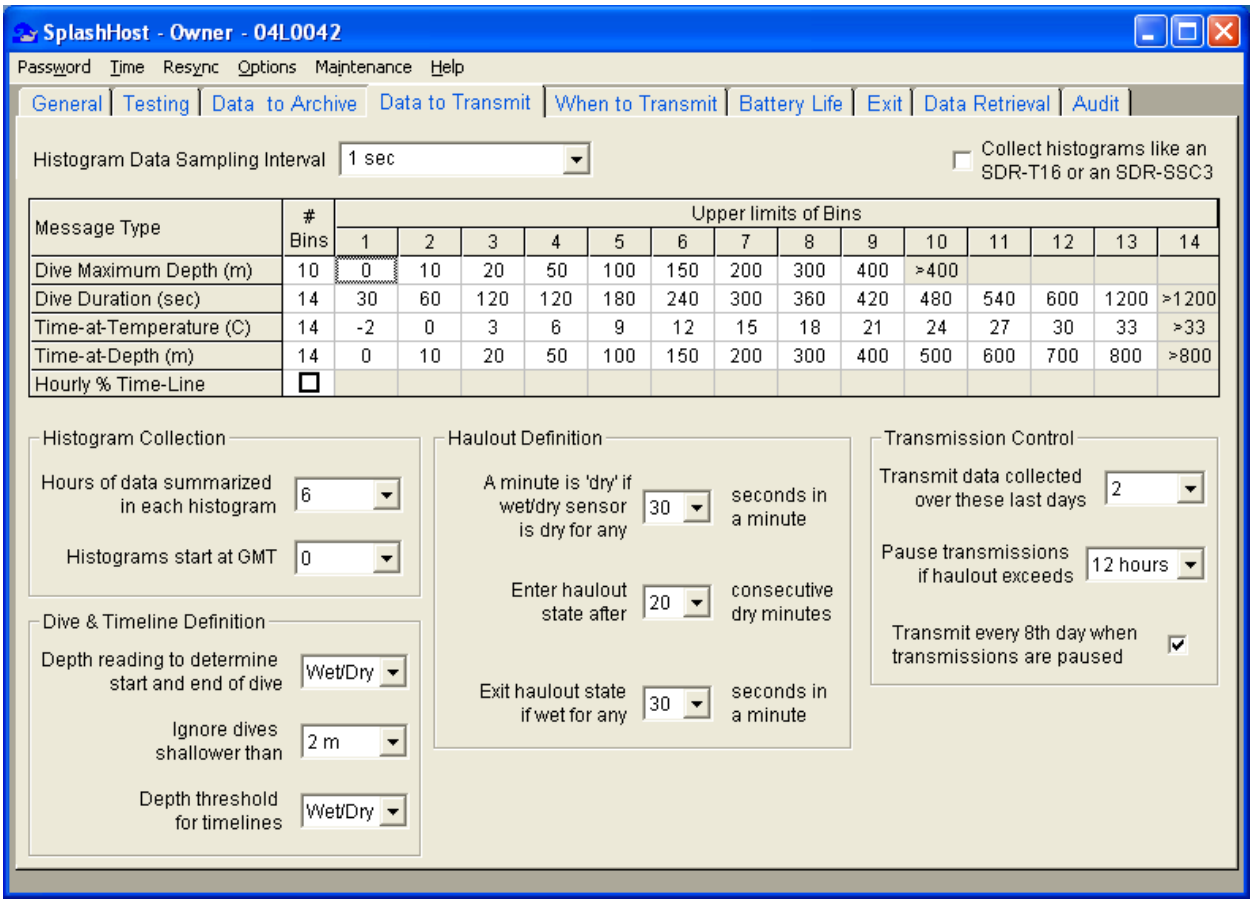
Note that if you set the *Histogram Data Sampling Interval* to *Never*, the tag will only transmit status messages. Archival data will be collected.



Bin Limits parameters



Set the total number of bins for each message type by clicking the drop-down arrow next to the number of bins.



Enter the upper limit for each bin. Note that you can press <Enter> after typing in the bin's upper limit to move to the next bin for that message type. SplashHost will sort the limits into ascending order once you move the curser off the message type's row.

Histogram Collection parameters section

Hours of data summarized in each histogram.

Note there is a trade-off between resolution and data throughput. A finer resolution (i.e., fewer number of hours per histograms) means more messages will be required to cover a 24-hour period. Use a low number of hours when your experiment needs the fine resolution, you have an animal that spends large periods of time at the surface and you expect many transmissions to reach the satellite. Note that even then, one or two hour histograms can have "holes" in the data. Six hours has proved to be a good number for most marine mammals.

Histograms start at GMT "value"

You may want to offset the start of the histogram period to coincide with the diurnal patterns of the animal's behaviour. If you know the local time at which you wish the histogram to start, calculate the Histogram start at GMT "*value*" using

"value" = (Local time to start histograms – longitude / 15) mod (hours of data summarized in each histogram)

Longitude is positive for E and negative for W in this definition. The "mod" operator returns the integer remainder after dividing the number preceding the mod operator by the number following the mod operator (e.g., 10 mod 3 = 1).

Dive & Timeline Definition parameters section

Depth reading to determine start and end of dive

The SPLASH tag starts a dive once the depth sensor reads deeper than this parameter, and ends the dive when the depth sensor reads shallower than this parameter. If this parameter is set to "Wet/Dry", a dive starts when the wet/dry sensor first reads "wet", and ends when the wet/dry sensor reads dry.

Ignore dives shallower than" value"

The maximum depth is calculated for each dive. Dives whose maximum depth is less than this parameter are not included in the Dive Maximum depth or Dive Duration histograms.

Depth threshold for timelines

This is the threshold depth for the Hourly Percentage timelines. The timelines report the percentage of the hour the SPLASH tag was at or shallower-than this threshold value. Setting this value to Wet/Dry results in the timelines reporting the percentage of the hour the SPLASH tag was dry (indication of haulout).

Hourly Percentage timelines can be used to correct aerial surveys (how often is the animal shallow enough to be seen by the surveyors), or to determine haulout (dry) patterns.

Haulout Definition parameters section

A minute is dry if wet/dry sensor is dry for any "value" seconds in a minute

This parameter defines when a minute is considered "wet". Note that this is the total number of seconds the wet/dry sensor reads "dry". The "dry" seconds do not need to be consecutive.

The default value for this parameter is 30.

Enter haulout state after "value" consecutive dry minutes

The SPLASH tag supports two different transmission rates, depending upon whether the tag is in a "haulout" state or not. These two separate rates help optimize message throughput and battery conservation. The slower haulout transmission rate saves battery power. The faster at-sea rate provides more opportunities for an uncorrupted transmission to reach the satellite.

This parameter controls how long the tag must be dry (consecutive dry minutes) before entering the haulout state, thus slowing the transmission rate. Set this value to the number of minutes the tag must be dry before you consider your animal "hauled out".

Exit haulout state if wet for any "value" seconds in a minute

Note that this is the total number of seconds the wet/dry sensor reads "wet". The "wet" seconds do not need to be consecutive.

The default value for this parameter is 30.

Transmission Control parameters section

Transmit data over these last days

Data collected and formatted for transmission are stored in memory onboard the tag. Because the Argos system is one-way (the tag does not know if a message has been received by the Argos system), it is necessary to transmit the same data multiple times to increase the probability that a given message is received. This parameter controls how many days previous to the current day the tag cycles through and transmits.

As a general rule, set this value to be at least one day more than the number of days between tag transmissions (either due to animal behavior or duty cycling). That is, if you are studying an animal that surfaces at least daily (any air-breather), and you duty-cycle the tag to be one day on and two days off, set this parameter to be "3".

Non-air-breathers present a bigger challenge. The animal may not surface for many days or weeks. If the animal has not surfaced for many weeks, then only spends a limited time at the surface, you must decide on your experimental objective. You may want to set this parameter to be the number of days prior to the surfacing if that is the behaviour you are most interested in. Conversely, you may want to set this parameter to be much larger if you are interested in the behaviour while the animal was not at the surface, and your experiment can accommodate "holes" in the data.

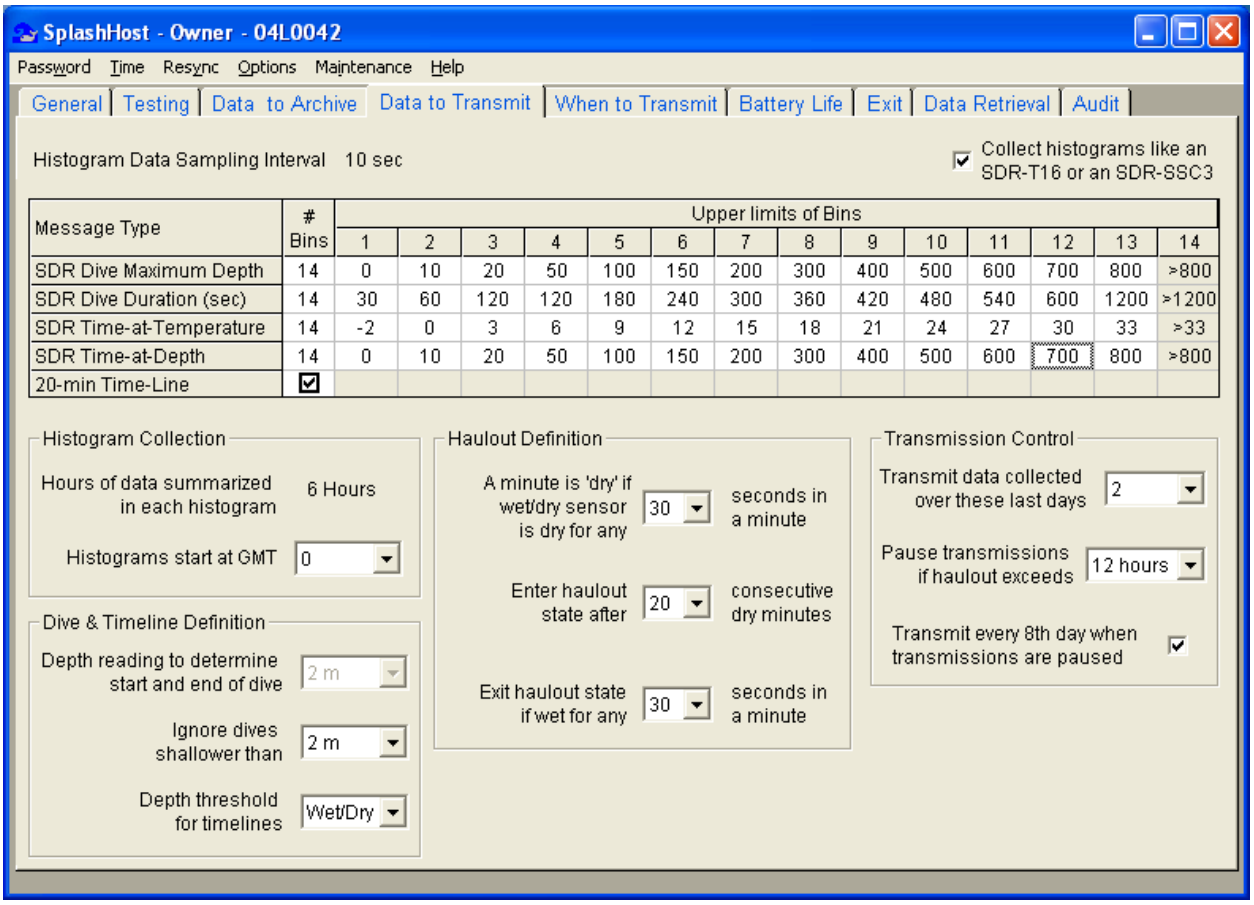
Pause transmissions if haulout exceeds "value"

This parameter allows you to conserve battery life by suspending transmissions after the animal is hauled out.

Transmit every 8th day when transmissions are paused

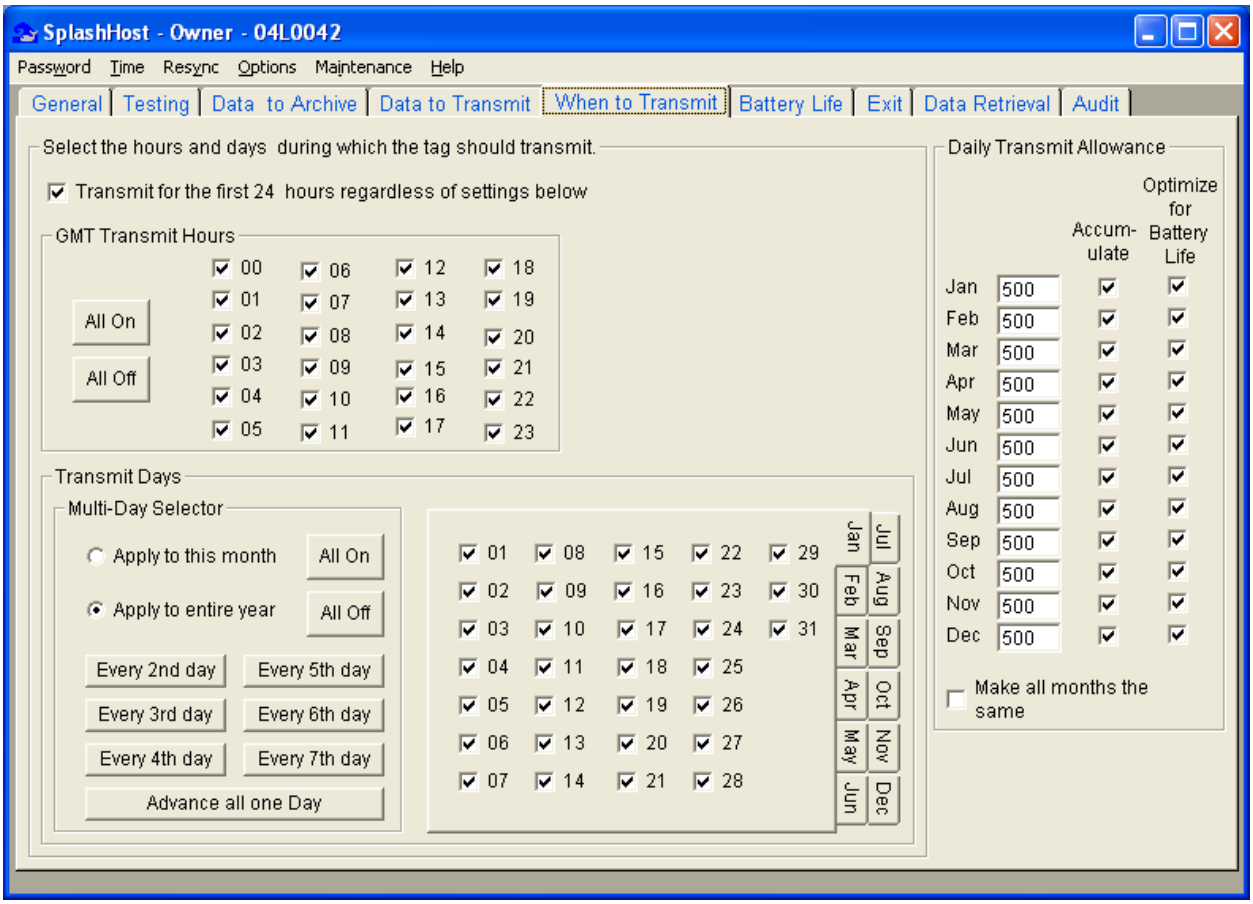
When this parameter is enabled, the tag will override the suspension of transmissions because of haulout (see above parameter) and transmit for 24 hours every 8th day. This is useful if you have an animal that may haulout for extended periods of time and you want confirmation that the tag is still functioning.

Collect histograms like an SDR-T16 or SDR-SSC3 parameter



Enable this parameter if you wish the SPLASH to emulate the older versions of Wildlife Computers SDRs. This will pre-set the number of histograms to 14, allow you to enable the 20-minute timelines (rather than the Hourly Percentage timelines), and force the start and end of dives to be the same value as the minimum depth of dives analyzed. All other parameters can be set as usual.

When to Transmit tab – Program when the tag should transmit



Transmit for the first 24 hours regardless of settings parameter

Enabling this parameter is useful if you wish to verify a tag is transmitting, regardless of duty cycling and good hours of coverage.

GMT Transmit Hours parameters section

Argos satellites are polar orbiting, thus there is better coverage at higher latitudes. Also, an Argos satellite is most likely to be in view during local dawn and dusk. You can conserve battery by limiting the hours of the day during which the tag transmits to times when a satellite is most likely to be in view.

How to determine when a satellite is in view

To determine when the satellites will pass overhead, we suggest using the web-based program called J-Pass 2.0 (http://liftoff.msfc.nasa.gov/RealTime/JPass/20) to calculate hours of satellite coverage for the Argos satellites.

To use the J-Pass 2.0 program:

- On the Location tab, enter the latitude and longitude, and adjust the time for GMT

- On the Control tab, select the drop-down selections: Satellites=Custom, Search Criteria=Custom, Start from=Today (or whatever your start date)
- On the Satellite tab, select: Select method=manual select, Visual magnitude=no limit, then choose the NOAA 11, 12, 14, 15 and 16 satellites
- On the Search tab, select: Minimum Elevation=20, Minimum Lit Duration=3 minutes, all times of day
- Go back to the Control tab, and click Start.

Note that J-Pass does not reflect the most recent Argos satellites (current info as of September 2003). Thus, actual satellite coverage will probably be a bit better. You can also contact Service Argos and see if they can provide more accurate hours of coverage (hours that include the most up-to-date details for all the satellites).

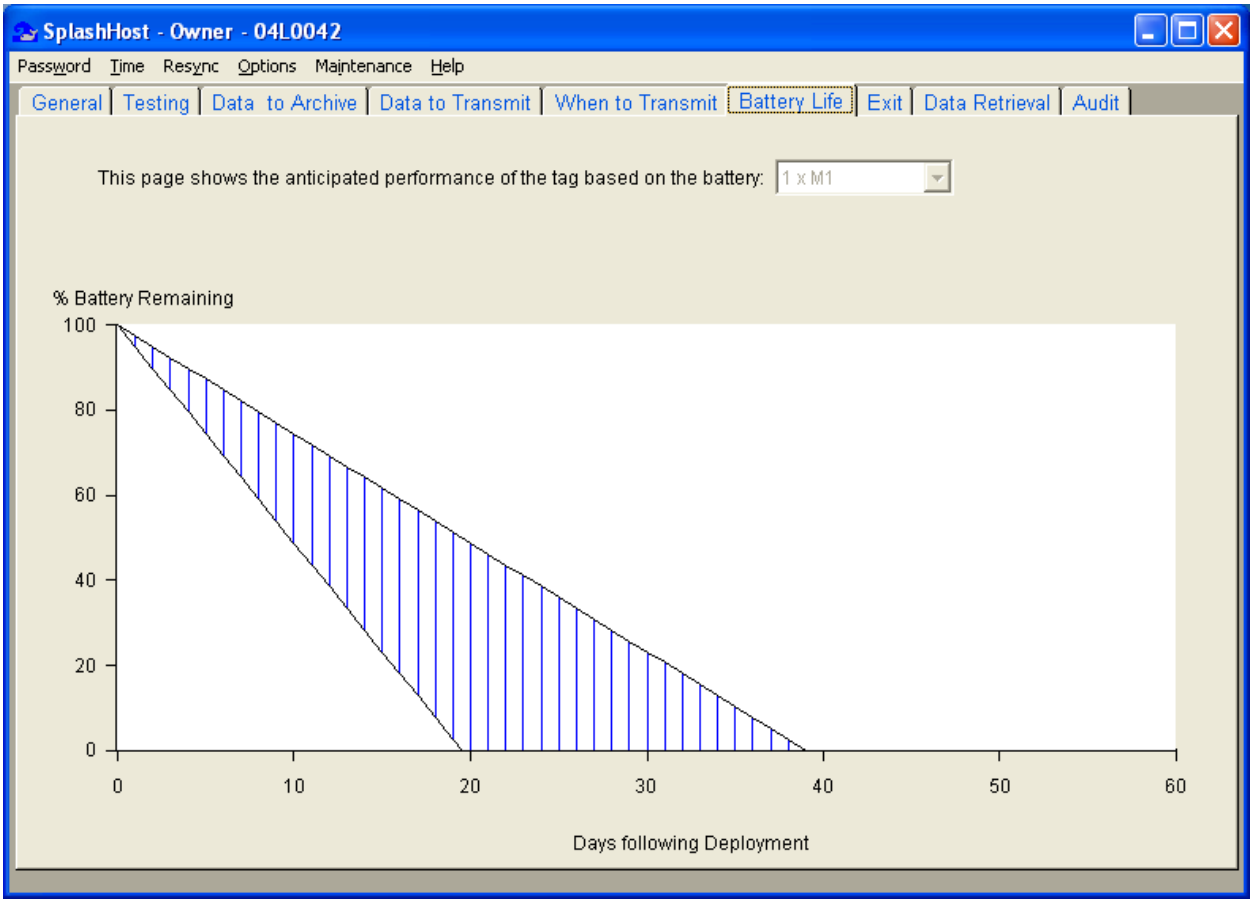
Transmit Days parameters section

You can extend the battery life by controlling which days of the year the tag will transmit. Note each day of the year can be set as “on” or “off”. This can be useful if you are more interested in locations during certain times of the year. For example, if you know your animal will be hauled out during March and April and begins its migration in May, you may want to set the tag to transmit every third day for March and April, then transmit daily for the months following while the animal is at sea.

Daily Transmit Allowance parameters section

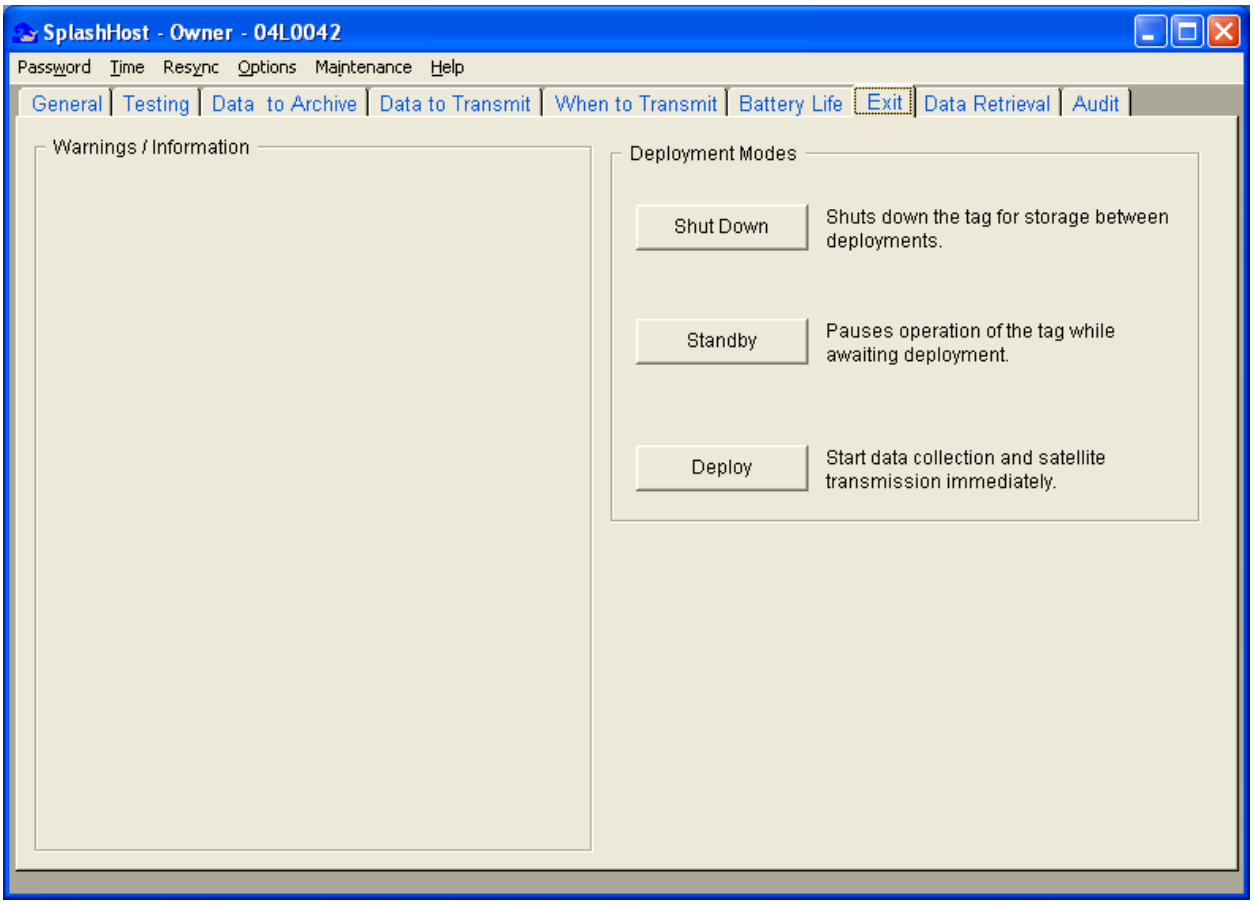
Generally 250 transmissions per day is sufficient for one location calculation a day in mid-latitudes.

Battery Life tab – Estimated days of deployment



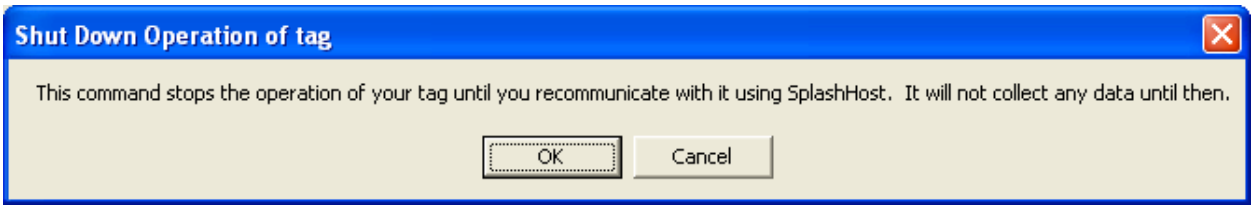
This tab calculates the expected number of days of deployment based upon the battery configuration of the tag and the programmed transmission regime.

Exit tab –Terminate communications



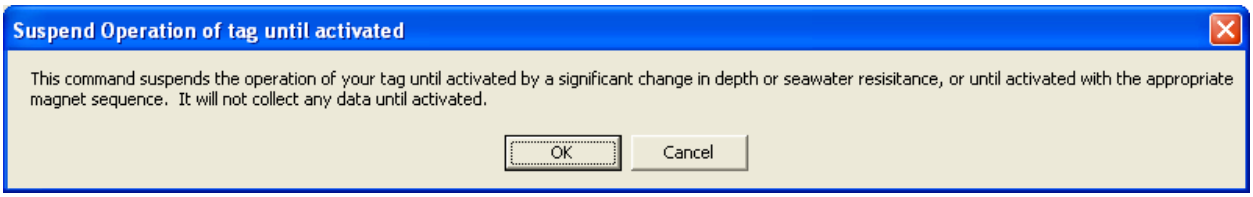
Deployment Modes

Shut Down mode



This shuts down the tag for storage between deployments. No data are collected and no sensors are monitored. The clock remains powered, however, and the parameters are maintained. You must re-establish communications to deploy the tag.

Standby mode



This pauses the operation of the tag while waiting for deployment. The tag can be toggled between Deploy and Standby modes using a magnet (see *Deploying the SPLASH tag* on page 55).

Deploy mode

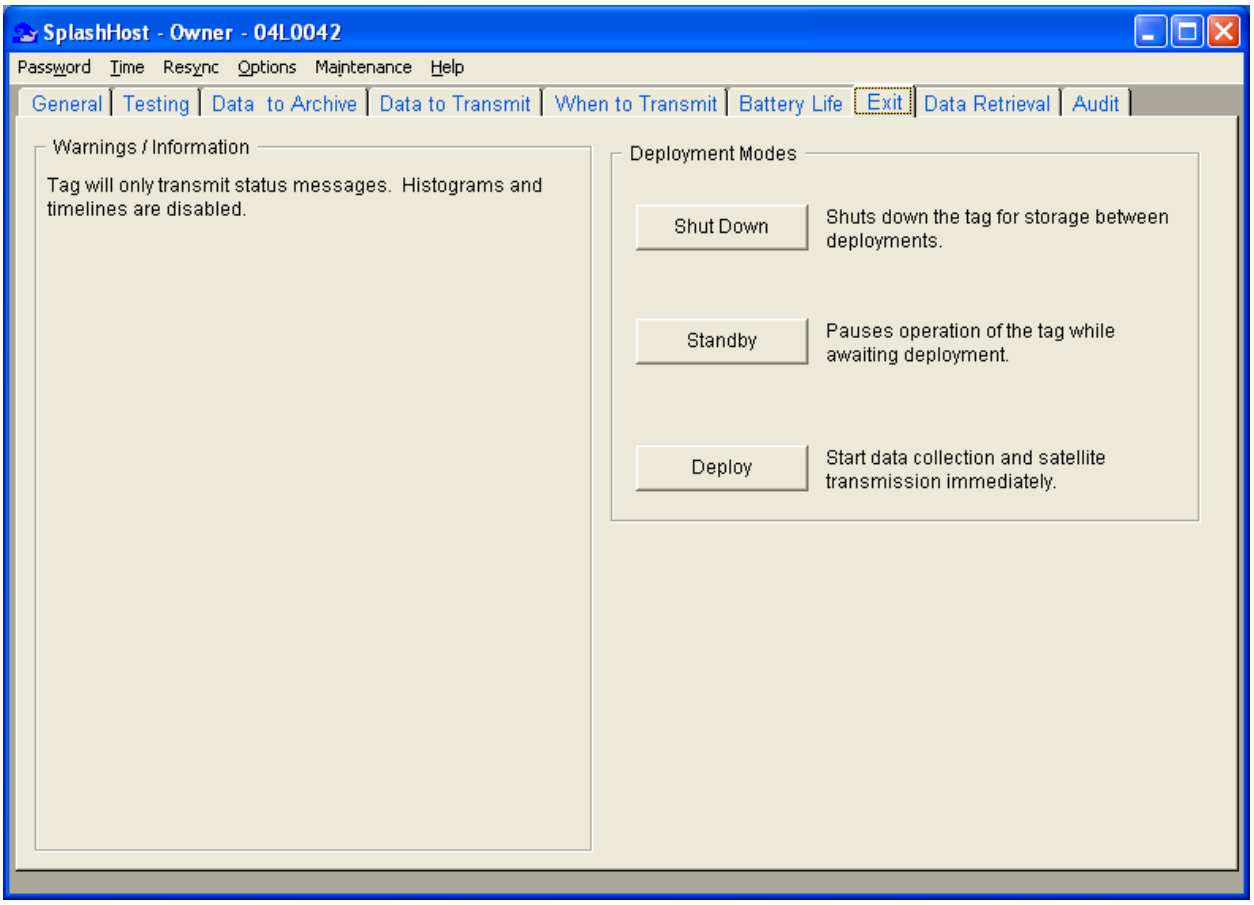
This immediately deploys the tag. The tag will begin sampling and transmitting based upon the parameters.

Activating the tag

The recommended means for deploying the SPLASH tag is to either exit communications in Deploy mode, or to use a magnet as described in *Deploying the SPLASH tag* on page 55.

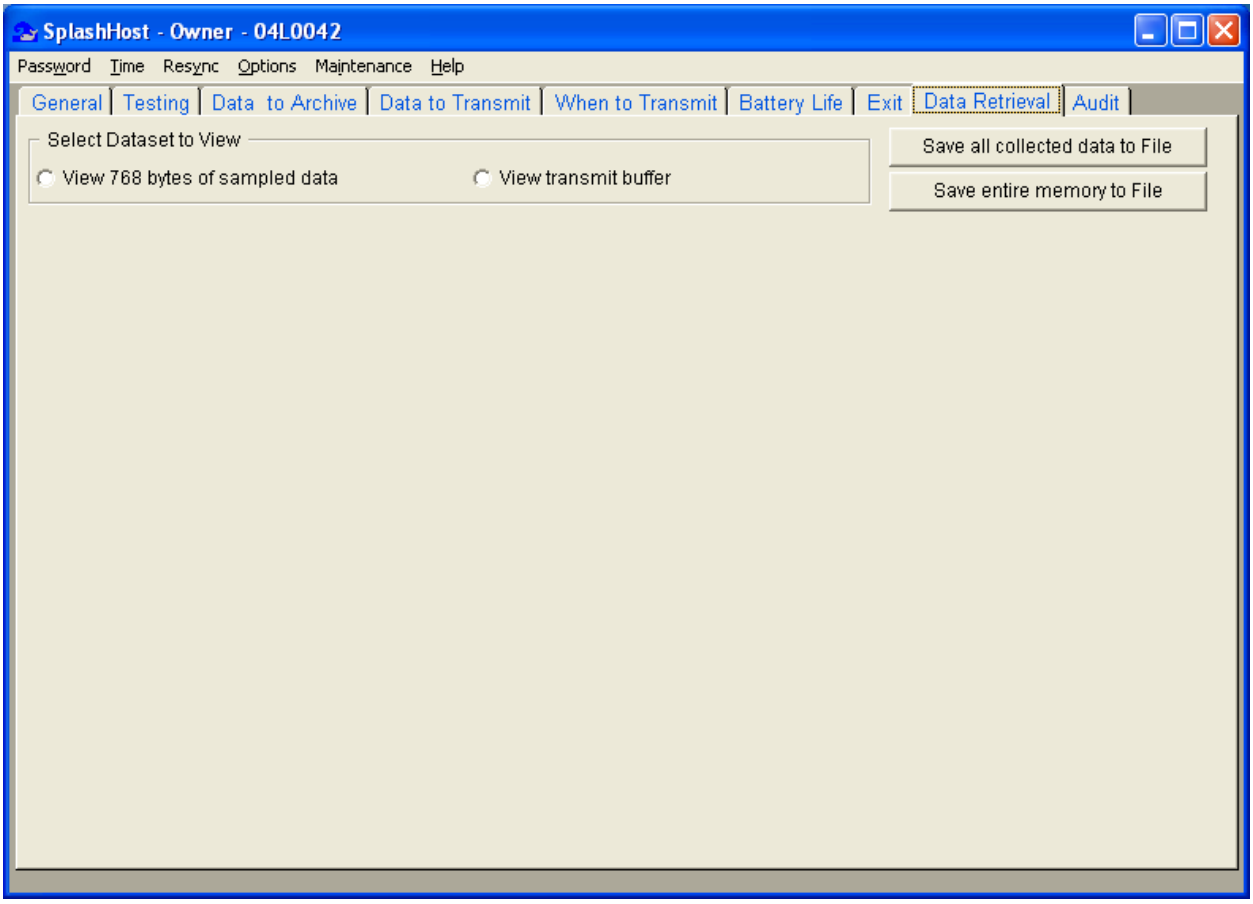
However, the tag will also go from Standby to Deploy mode when it has “gone deep” or “gotten wet”. This is a failsafe mechanism only, and should not be relied upon to put the tag into Deployed mode. *You should always verify the tag is deployed prior to releasing your animal*!

Warnings/Information



Generally this area of the screen will be blank. If, however, SplashHost detects that current parameters will prevent either histogram or archival data from being collected for the full length of the deployment, a warning will be displayed. The user then has the option of changing either histogram or archival data sampling parameters. The SplashHost does not require the user to make a change.

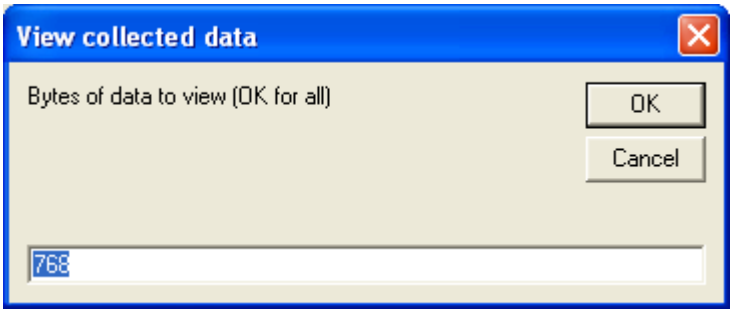
Data Retrieval tab – Download collected data from the tag to your PC



Both the archival and histogram data can be viewed by SplashHost, as well as saved to a file.

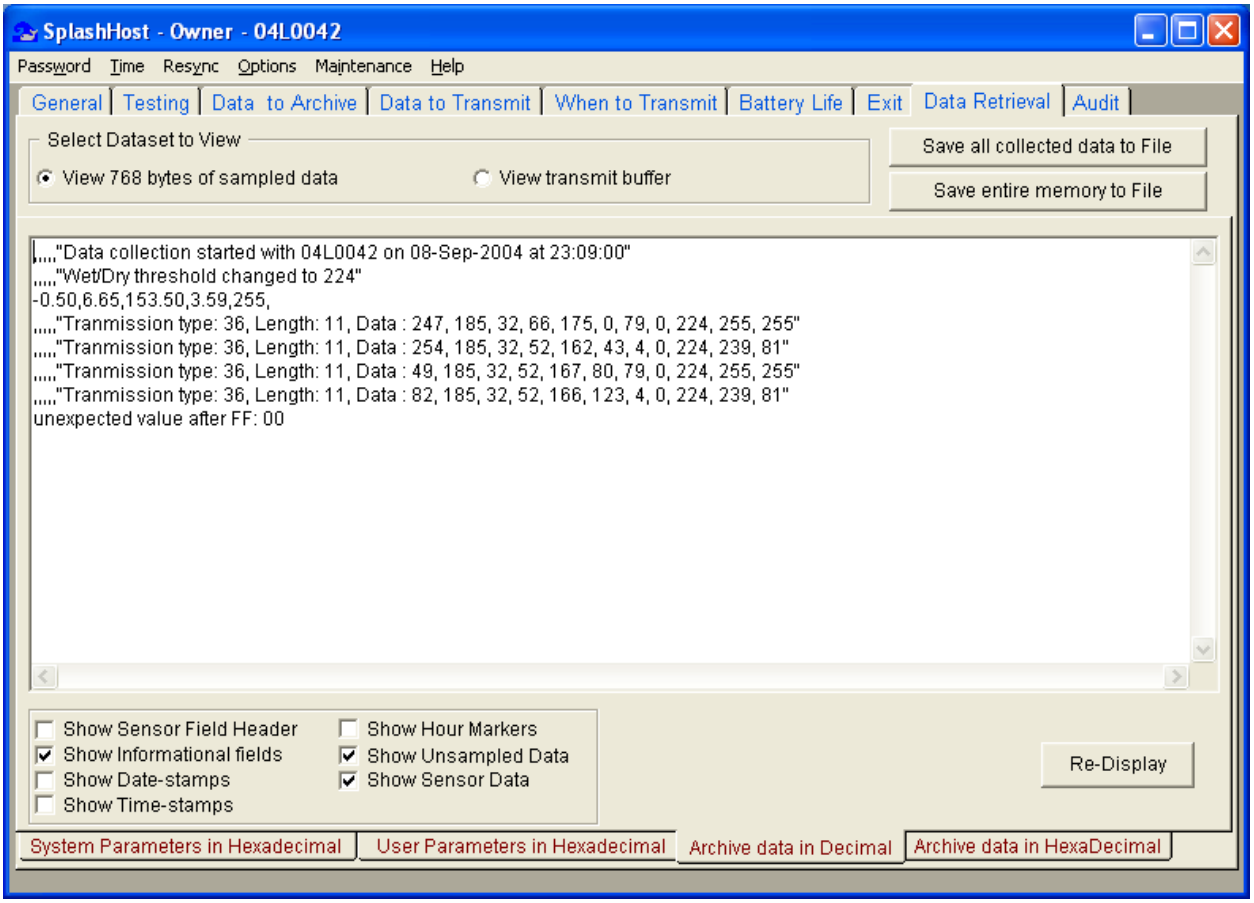
Select Dataset to View

The options offered in *Select Dataset to View* do not save the data to a file. You will be prompted with



Click the ***OK*** button.

This is an example of a view of sampled data



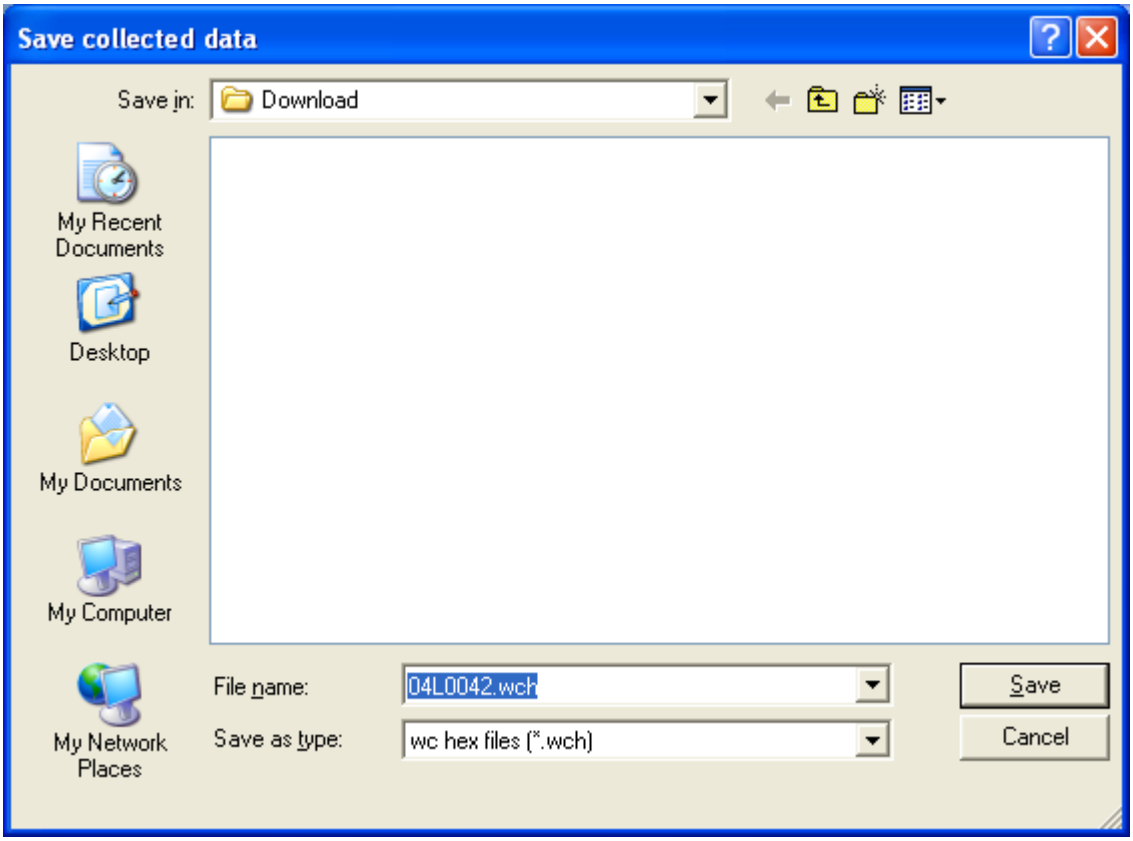
Save all collected data to file button

The tag maintains a pointer that indicates address in memory where the collected data ends. Clicking this button writes the data up to this pointer to the file. This is useful if you are testing the tag and don't want to take the extra time to write the entire memory to a file.

Save entire memory to file button

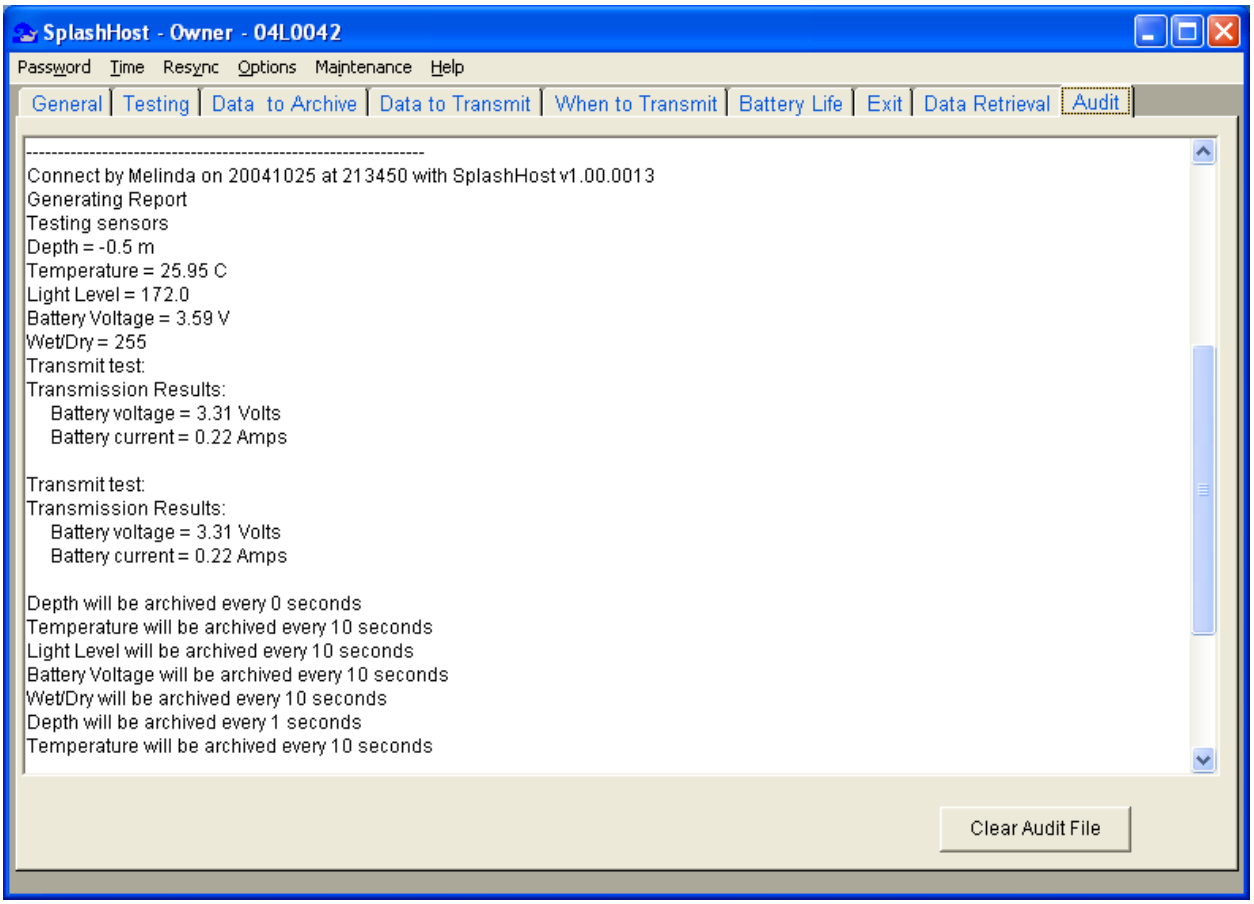
Use this button for tags that have been recovered after deployment. This ensures that, even if the pointer were corrupted, all memory is written to the file. You might even want to save the entire memory to a file twice to ensure the download was successful.

Both of the ***Save*** buttons will ask you where to save the file.



Note that the data are saved in a compressed format, called “wch”. We provide programs (HexDecode, Instrument Helper) to decode the .wch files.

Audit Tab – See what was done during communications with tag.

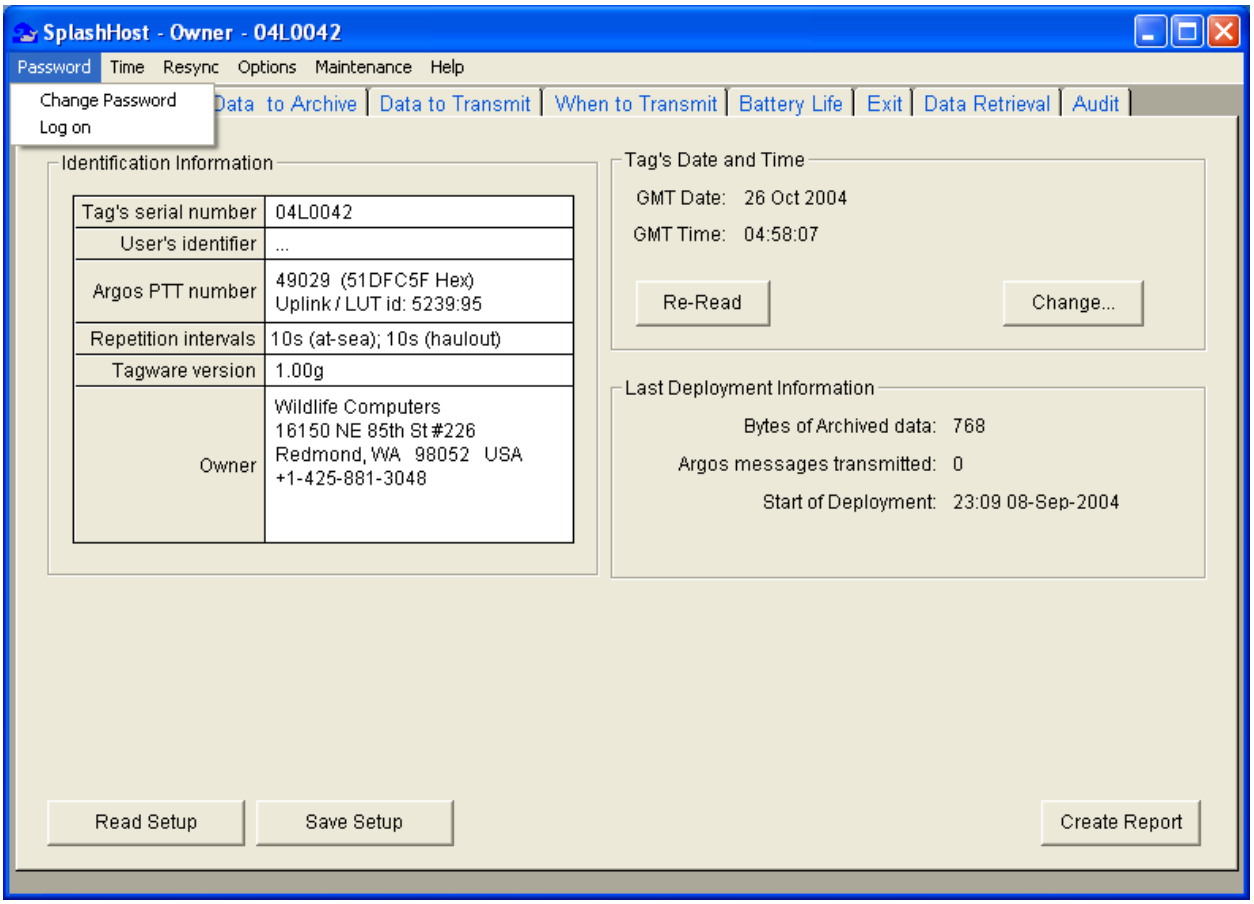


This audit trail is maintained on the PC that was used to communicate with the tag. As long as you communicate on the same PC, additional sessions will be appended to the Audit file. This file resides in the same folder as the SplashHost executable.

If you change PCs, you will establish a new record on that second PC.

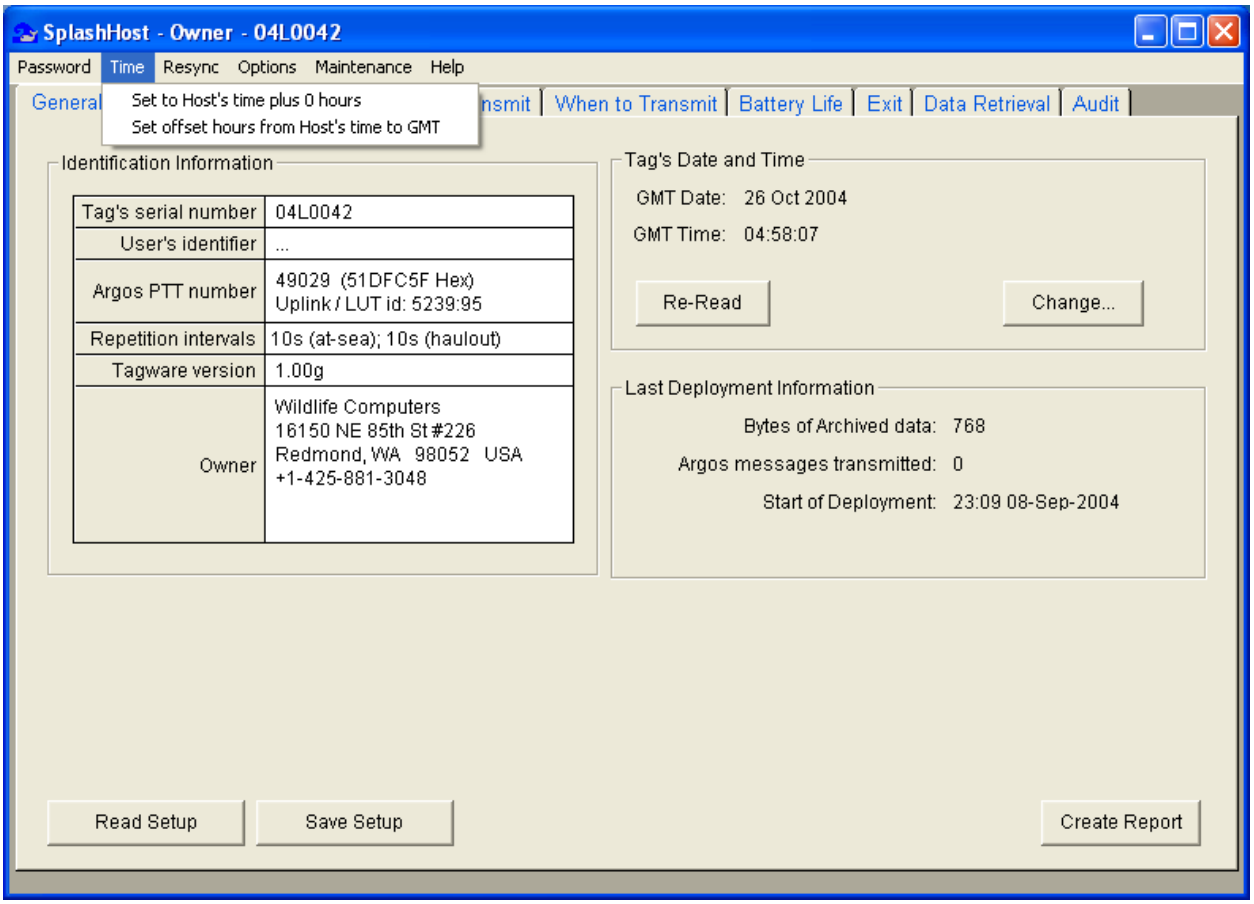
Menu Functions

Password: Change the Password



You can change your password any time after you have logged on as a user. Acceptable passwords include entries up to 31 characters. If you forget your password, you will have to return the tag to Wildlife Computers so we can reset it.

Time: Set tag Time and Date (alternate method)

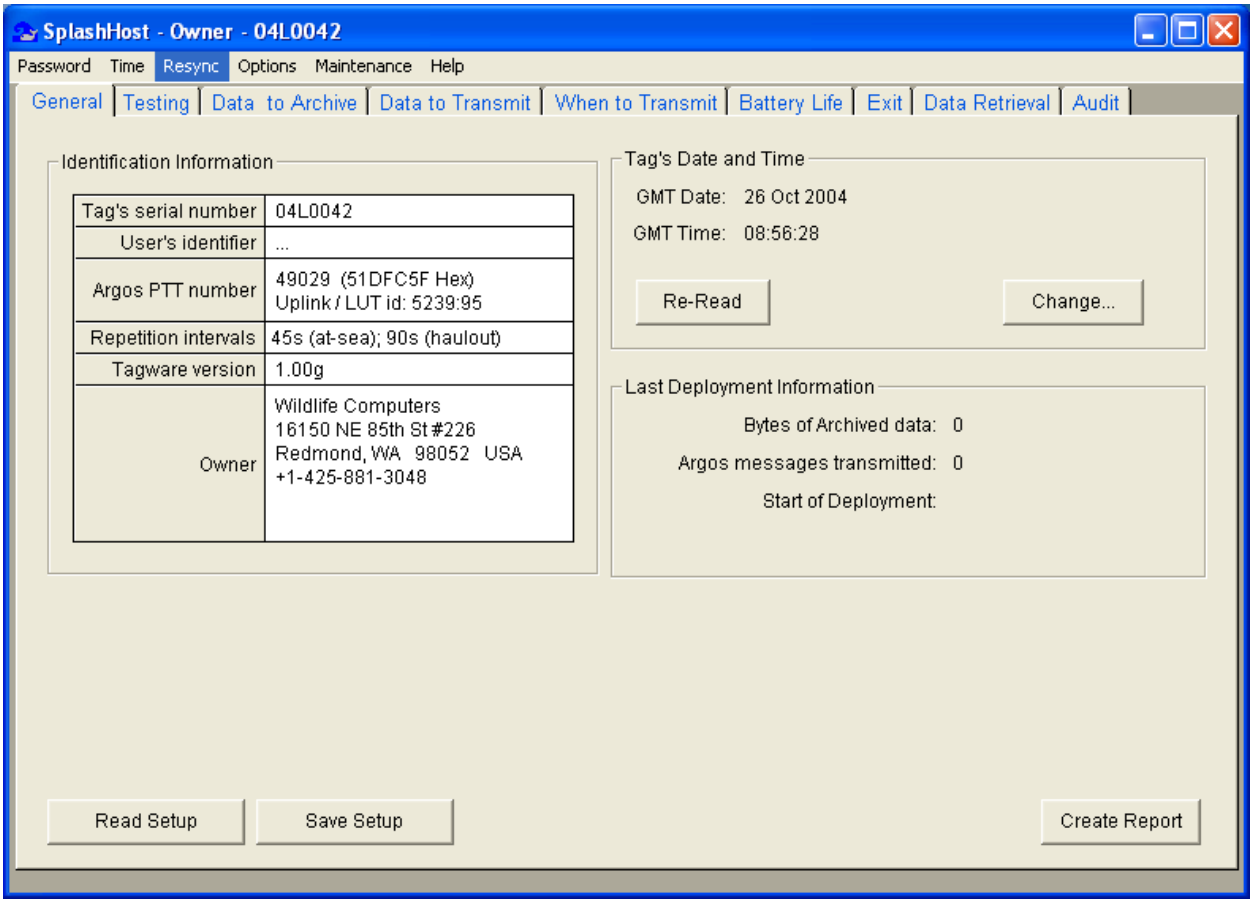


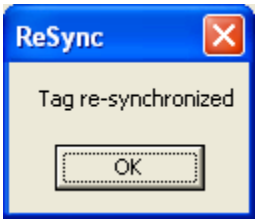
See the *Set tag's date and time* section on the *General* tab for an explanation of setting the tag's time.

Resync: Resynchronize communications

Occasionally the tag loses synchronization with the SplashHost. If so, a message will pop-up saying this has occurred. Click ***OK*** to acknowledge the message.

Then select the *Resync* menu function.



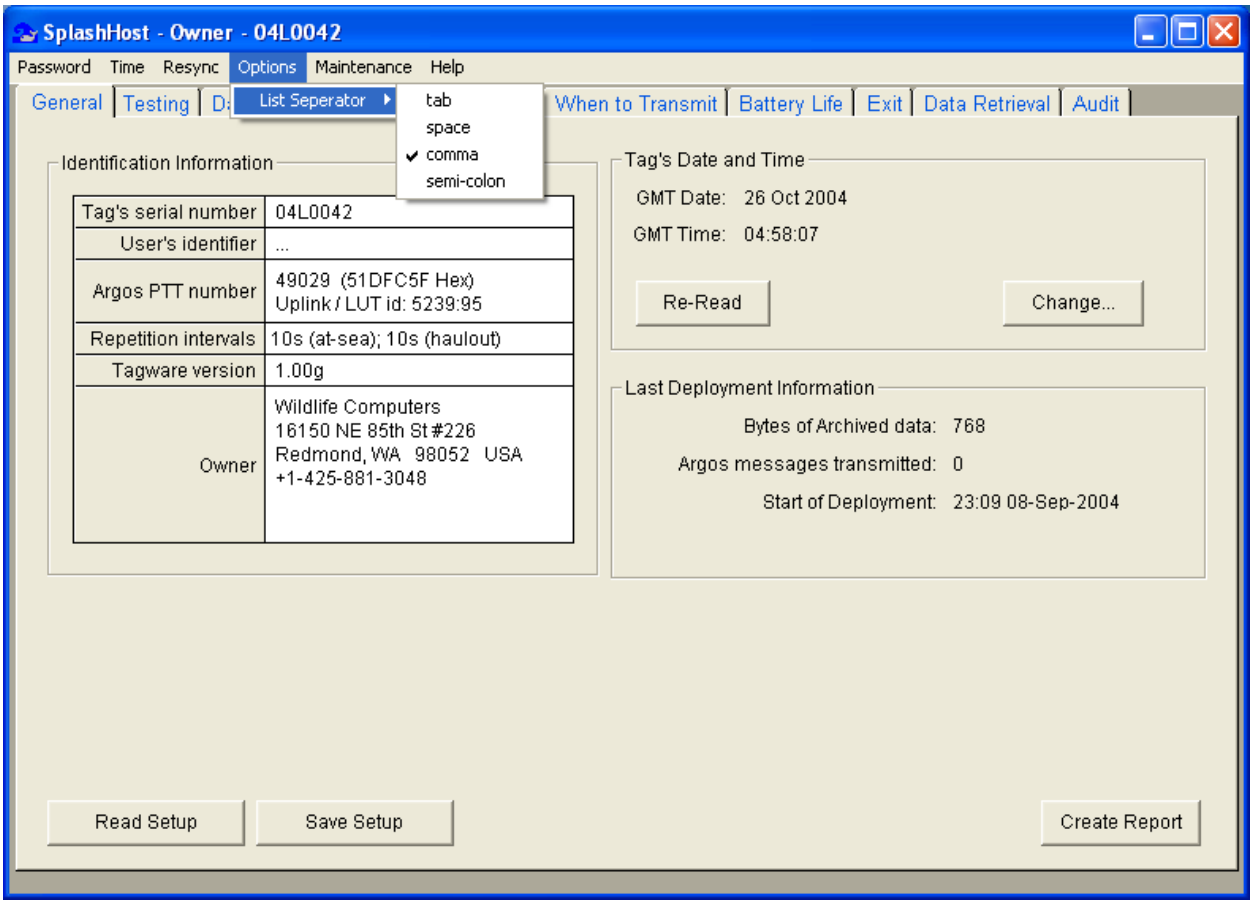


If the *Tag re-synchronized* message does *not* appear, restart the SplashHost program. Pass a magnet over the reset switch to re-establish communications with the tag. You do not need to disconnect the tag to do this.

Options: Define List Separator for downloaded data

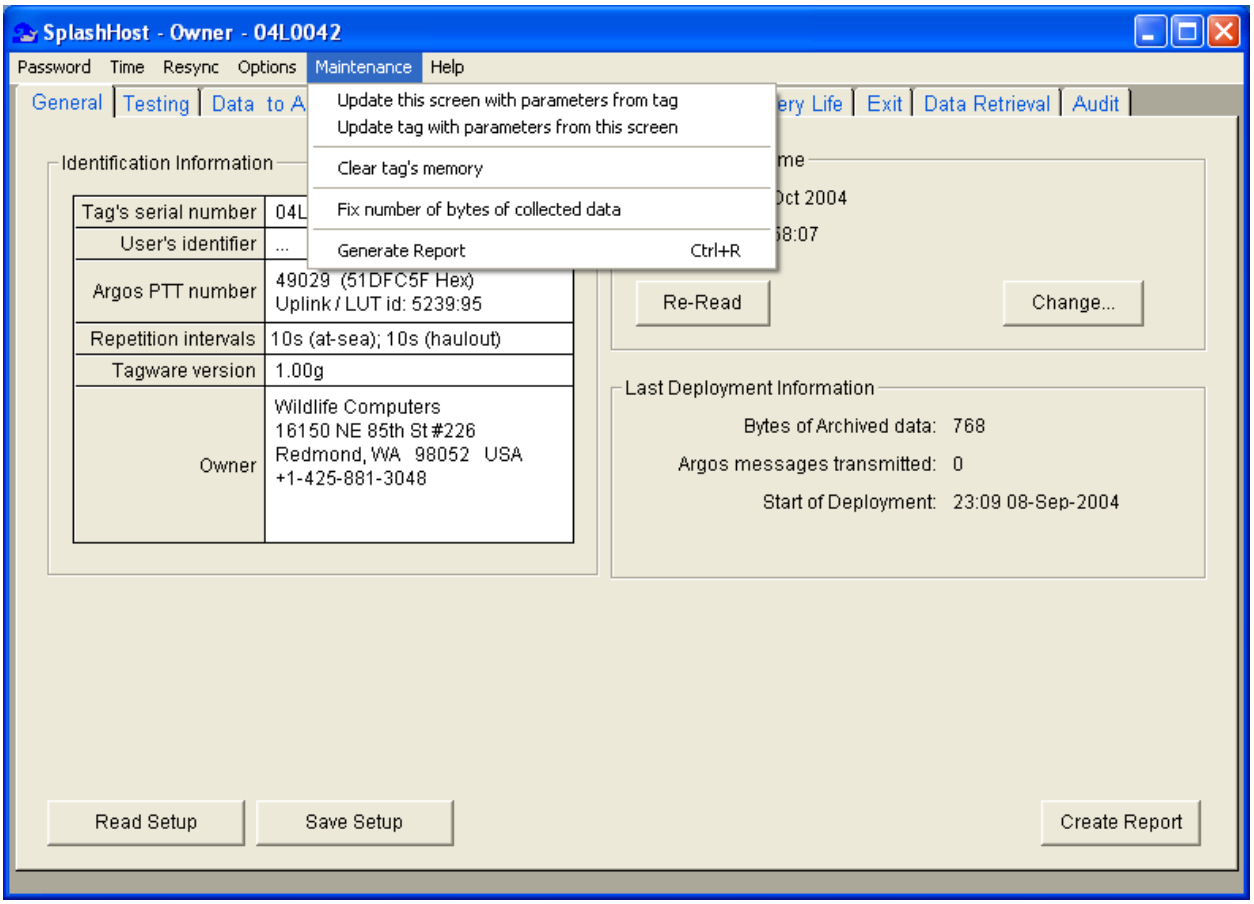
This selection determines the data format used on the **Data Retrieval** Tab separates the data into columns and is a good choice for data to be exported to Excel.

Wildlife Computers analysis programs utilize hexadecimal data and are not impacted by what is chosen from this menu list.



Maintenance: Miscellaneous functions

This menu function contains advanced features. They are not features required for most deployments.



Update this screen with parameters from tag

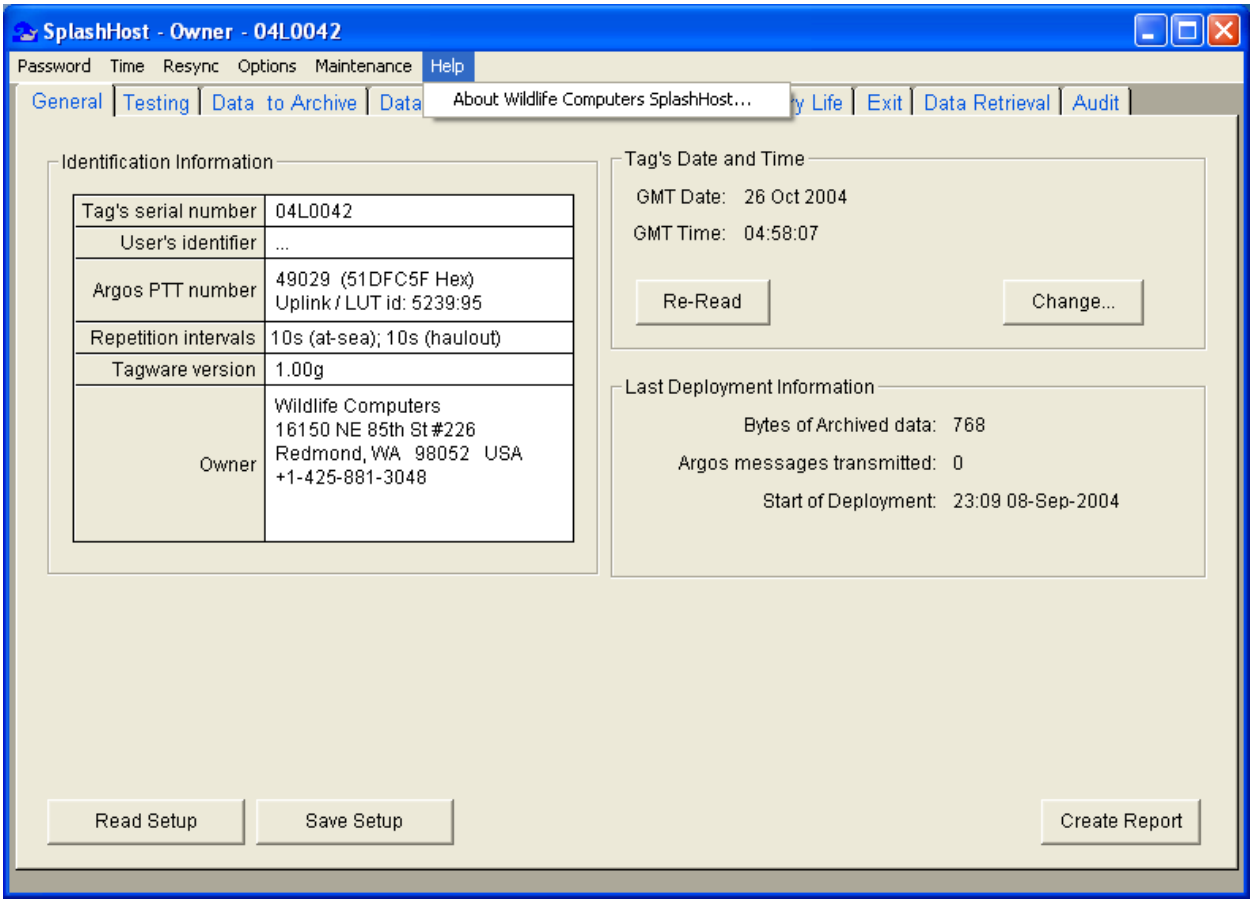
Update tag with parameters from this screen

Clear tag's memory

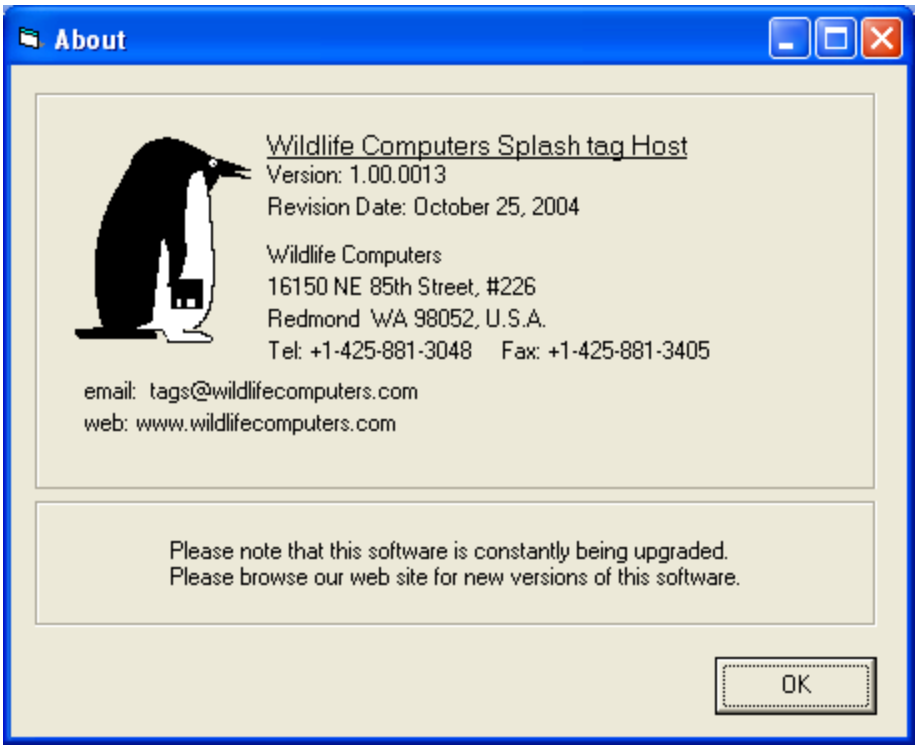
Fix number of bytes of collected data

Generate Report

Help: SplashHost Version number



This menu item displays the version of SplashHost


About
Wildlife Computers Splash tag Host
Version: 1.00.0013
Revision Date: October 25, 2004
Wildlife Computers
16150 NE 85th Street, #226
Redmond WA 98052, U.S.A.
Tel: +1-425-881-3048 Fax: +1-425-881-3405
email: tags@wildlifecomputers.com
web: www.wildlifecomputers.com
Please note that this software is constantly being upgraded.
Please browse our web site for new versions of this software.
OK

Deploying the SPLASH tag

SPLASH modes.

The SPLASH is never entirely "turned off". When it is in Shutdown mode, it is monitoring for a communications connection. It only looks for a communications connection, and ignores other inputs such as a magnet, getting wet, or going deep.

The other modes are Deployed (transmitting according to schedule) or in Standby (monitoring for a signal to go into deployed mode). When you exit communications by clicking the ***Standby*** button in SPLASHHost, the tag goes into Standby mode. Clicking the ***Deploy*** button puts the tag into Deployed mode.

NOTE: The SPLASH has two LEDs, one by the communications port (controller LED), and one on the board to which the antenna is connected (transmitter LED).

Standby mode.

When in standby mode, the SPLASH wakes up every six seconds to check its conductivity and depth sensor. If SPLASH finds that the conductivity or depth readings have significantly changed from the running average of the previous eight readings, it increases its sampling rate to once per second. The controller LED will flash at this rate (i.e, once per second). If the change lasts for five seconds (five flashes), SPLASH automatically enters the Deployed mode and displays the controller LED pattern as described below.

Note that switching from Standby to Deploy mode because of changes in conductivity or depth is a failsafe mechanism only. You should *always* verify the tag is in Deploy mode before releasing your animal.

Deployed mode.

When first deployed, SPLASH dimly lights its controller LED while waiting for the top of the next minute. SPLASH is not recording data or transmitting messages during this phase.

Once the top of the minute is reached, the SPLASH begins sampling. The SPLASH will flash its controller LED every time it wakes up to sample data, either for the archive or the histograms. For example, if the SPLASH is set up to sample for the archive every seven seconds, and for the histograms every 10 seconds, the LED will flash every 7^{th} and 10^{th} second. The controller LED will stop flashing after 31 hours.

The transmitter LED will always flash when the SPLASH transmits data (at the fast/slow transmit rate, which is generally about every 45/90 seconds).

Displaying and changing mode with a magnet.

You can display and change the mode of the SPLASH after exiting communications by using a magnet. In summary, a single swipe of the magnet over the controller reset switch position (see

SPLASH tag Diagram on page 7) displays the mode of the SPLASH, then offers a long LED flash. It takes a second swipe of the magnet during a long LED flash to change the mode.

To display the mode:

Swipe a magnet once across the controller reset switch position. The controller LED will flash in a sequence that displays the mode of the SPLASH tag.

- Standby mode LED pattern: ***2 double- flashes (2 flashes, a 3 second pause, and 2 more flashes)***
- Deployed mode LED pattern: ***10 flashes***

To change the mode:

Once the mode is displayed, the ***LED will stay on for a long flash (on for 2 seconds)***. This indicates you can change the mode with a magnet. It is only during this time the SPLASH mode may be changed with a magnet.

- If you keep the magnet away from the SPLASH during this long LED flash, the SPLASH will stay in its current mode.
- *If you swipe a magnet across the board during the long LED flash, you will toggle the mode.* If the SPLASH was toggled to the Standby mode, the LED will flash as described in "Standby mode" above (two double-flashes). If the SPLASH was toggled to the Deployed mode, the LED will flash as described in "Deployed mode" above (10 flashes).

Sealing the communications port

The tag is supplied with small white communications port plugs and silicone grease. These are designed to protect the communications port pins during the deployment.

Place a *very* small amount of the silicone grease in the comm port, then firmly press the comm port plug in place.

Note that the communications port is sealed against water intrusion and electrically-isolated during deployment. The comm port plug and silicone grease are just extra protection for the pins.

Recovered Tags

Remove the communications port plug and clear the port of any remaining silicone grease and water. Canned compressed air (used to blow dust away from keyboards) works well at this task.

Be sure the communication pins are clean and dry before communicating with the tag. Saltwater plus the current to the pins can cause the pins to corrode and break.

Storing Tags

Lithium batteries develop an oxide layer over their anodes to minimize self-discharging. This is called passivation. This process is exacerbated at high (30C+) temperatures. The passivation layer is "burned off" when current is drawn from the battery. Very little current is drawn from the tag when it is in Standby mode, so a passivation layer can form.

If the passivation layer becomes too thick, the battery voltage drops so low that the tag cannot function.

Tags that will not be deployed for an extended period of time (more than one month) should be stored in a refrigerator or freezer (5 to -20C). This minimizes the battery passivation.

The tag should be tested after storage, prior to deployment. It is not necessary to warm up the tag prior to proceeding with the test.

To test the tag:

- Establish communications with the tag.
- Go to the Testing tab to test the sensors
- Check the battery voltage by performing immediate tests of the Argos transmitter.
    - The battery voltage may be below 3.0V initially, but should increase after several tests transmissions
    - The battery voltage displayed when testing the transmitter indicates the performance of the battery under a load. This should be 3.0V or above.

Other Advice or Guidelines

1. Do not cover the sensors
    a. Light sensor (pink square).
    b. Pressure transducer (black dot)
    c. Wet/dry sensors. It is especially important to ensure the wet/dry sensors are as clean as possible prior to deployment. Clean them with a fine-grade sandpaper, and make sure they do not get covered with epoxy during attachment.
2. If you will be traveling on a commercial carrier with your Splash tags.
    a. We recommend that the user always take a laptop or other computer to the field location, even if the tags have been set up in advance, so that communication with the tag is possible on site if necessary.
    b. We strongly recommend that the user **ALWAYS** re-verify that the tag is still in the proper mode following travel to the field site.

Contact Information

If you have been unable to find the answer to your question in this manual, our user support staff is available by email, phone or fax. Detailed questions which are not time-critical are best addressed by sending an email or fax with the details for staff review. Response will be by email or telephone.

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Redmond, WA 98052 USA