

sPAT User Guide

This user guide will give you all the essential information needed for interacting with and deploying a Wildlife Computers sPAT.

Table of Contents

Almost Everything You Need to Know About the sPAT	3
Before you Begin	4
Anatomy of a Tag	4
Types of Data Received from sPAT	5
Tag Release Sequence	5
Pinger	7
Interacting with a Tag	7
Configuring Deployment Duration	9
Tag Details & Argos Settings.....	9
Gathering Tag Information	13
Offline Mode	15
sPAT Recovery Instructions.....	17
Download your Data	18
Tag Storage and Battery Maintenance.....	19
Special Considerations for Longer-term Storage.....	19
Sending Test Transmissions.....	20
Battery Exercise Routine	24
Technical Specifications	27
Additional Information	27
Contacting Wildlife Computers	30

Almost Everything You Need to Know About the sPAT

The sPAT is ready to deploy when you take it out of the shipping box. Wildlife Computers preprograms your sPAT with the desired deployment duration (30, 45, or 60 days) and ships the tag in Auto-Start mode so it begins its deployment as soon as the sensor hits sea water.

The rest of this user guide is helpful if you are curious about everything sPAT, if you need to change the deployment duration or release conditions, or if you recover your tag and want to download the archive. If none of these situations apply to you, you can stop reading here.



In the guide, you will see the yellow icon highlighting information where special attention should be paid.

The sPAT (also known as a PAT tag or PSAT) is a pop-up archival transmitting tag specifically optimized for short-term survivorship studies. The sPAT uses a suite of sensors and algorithms to monitor the status of the tagged animal for up to 60 days. Users can deploy the sPAT on by-catch, fish, shark, rays, skates, eels, and turtles. The sPAT is designed to be attached to an animal by a tether. The corrodible burn pin releases the tag from the tether on a pre-programmed interval (30, 45, or 60 days) or when the sPAT determines it is no longer attached to an animal. Data transmission occurs when the tag floats on the ocean surface after it releases from the tether.



Figure 1—sPAT tag rigged with a stainless- steel tether and a Titanium anchor.

Tags are shipped pre-programmed with default settings and in Auto-Start mode—the sPAT automatically starts the deployment when submerged in saltwater. At any time, a single pass of a magnet near the communication's port will cause the LED to gradually transition from bright to dim as confirmation that the tag is in Auto-Start mode.

Transmitted data will allow you to infer the status of the animal at the time of release. Data generated during a deployment includes:

- Daily Data for the entire deployment.
 - Minimum and maximum temperature and depth readings
 - Delta (difference between min and max) light-level for each UTC Day
 - 10-minute time series depth data for the end of the deployment to help determine the animal's fate
- The Argos generated pop-up location.

The sPAT will transmit for approximately three days and the data will show up in your Wildlife Computers Portal account as it is received.

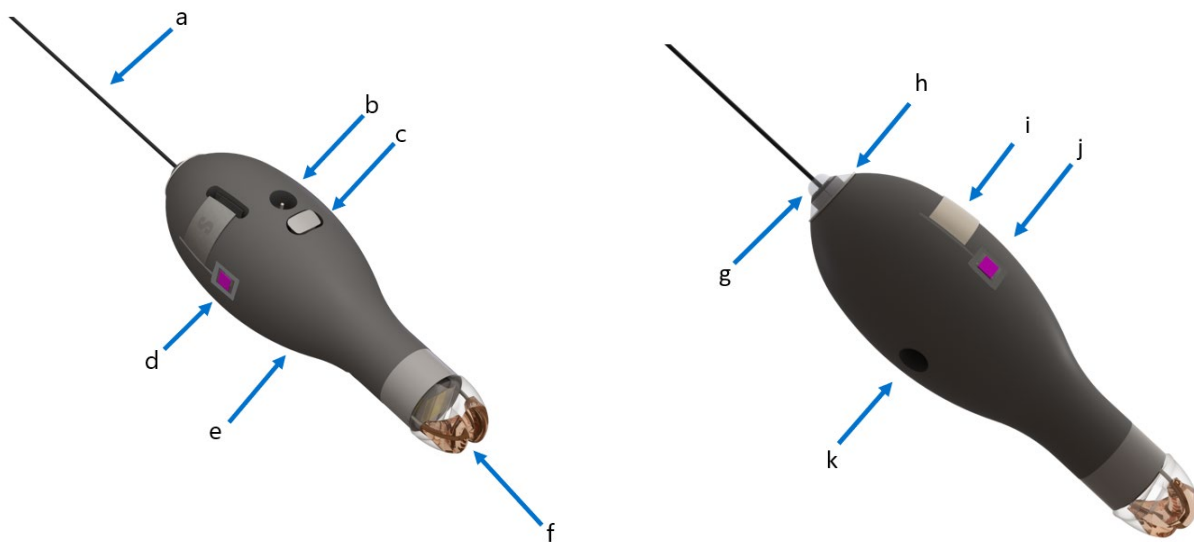
Before you Begin

The list below shows what is required to communicate with the sPAT:

- A Wildlife Computers online portal account.
- A Windows computer with Tag Agent Software and USB driver installed.
- A Wildlife Computers USB communications cable.
- A magnet.


Visit wildlifecomputers.com to download the required software (Tag Agent and the USB Driver) and setup an account. At the end of this document, there is a list of key terms and concepts for reference. We recommend inexperienced users review this list.

Anatomy of a Tag



Figures 2 & 3—sPAT tag showing: (a) Argos antenna, (b) temperature sensor, (c) communications port with plug, (d) light sensor (1 of 2), (e) float, (f) release pin, (g) LED light, (h) wet/dry sensor, (i) ground plate, (j) light sensor (2 of 2), and (k) pressure sensor.

The communications port is where the USB communications cable plugs into the tag. *Prior to deployment, this port should be sealed with the plug provided.* Smear a small amount of the silicone grease supplied onto the sides and bottom of the plug, align the plug and pins, and carefully push the plug into the port. If it does not align easily with the pins, rotate it 180° and try again. The plug prevents corrosion of the pins during the deployment; however, the plug is not required for the tag to function normally.

 ***The wet/dry sensor, ground plate, pressure sensor, thermistor, and electronic release pin should never be covered. Covering these sensors interferes with the tag's functionality. This includes antifouling coatings, brightly colored paints for recovery purposes, and attachment adhesives (e.g., epoxy).***

Types of Data Received from sPAT

Daily Data

Daily data messages contain the minimum and maximum temperature and depth readings from the fast-sampled archive data set, as well as the change in light-level for each UTC Day.

Time Series

The sPAT tag sends ten-minute time series depth data for the end of the deployment. If the tag releases on the scheduled day, it will send four days of time series depth data. If it is a conditional release (see [Tag Release Sequence](#) section) the tag will send time series depth data for the four days of data prior to the beginning of the conditional release period plus the entire conditional release period. Each time series message contains:

- Time series depth data at a ten-minute interval.
- The minimum/maximum values encountered during the time period covered by the time-series message period.



The absolute Min/Max values and point sample values may not match as the absolute values are determined from all archived data collected during the message period. This can give insight to the amount of aliasing that has occurred when generating the time series message.

Time Series Sensor Resolution

Time series sensor resolution will vary for each measurement. All the time series sensor readings have an associated resolution which is reported in the decoded data. The resolution is dynamically adjusted to compress the data for transmission.

Tag Release Sequence

The sPAT will be pre-programmed for your desired deployment duration (30, 45, or 60 days). The tag will begin the release sequence when that specified interval is reached unless a conditional release occurs prior to reaching the intended duration.

Conditional Release

The sPAT uses sensor measurements to make reasonable assumptions about the state of the deployment. Depending on your study design and the behavior of your study animal, you can program the tag to release and begin transmitting if certain conditions are met.

Auto-Detect Tag Detachment

The parameter automatically initiates release if the tag detects itself floating at the surface.

- Select a depth threshold that the tag must exceed before monitoring for detachment. This helps prevent triggering a conditional release before the tag is attached to its host animal. For example, if you program a sPAT tag and put it in Start mode using Tag Agent (while tag is attached to your PC) it will detect constant depth while it is sitting on your desk.
- Select how long the tag must be at the surface before a release will occur. The pin burn will occur after the specified time has elapsed.

Auto-Detect Mortality

This parameter monitors for three mortality conditions:

- **Floater**—the tag is floating at the surface (more than 50% of the wet/dry readings for every hour of the interval is dry, OR if the maximum depth during the premature release interval was \leq one meter).
- **Sitter**—the tag is sitting at a constant depth.
- **Sinker**—the tag remains below a certain depth.

Upon satisfying any one of these conditions, the tag automatically initiates release. To monitor for mortality, configure the following:

- Select a depth threshold that the tag must exceed before monitoring for detachment.
- Optionally, select the depth that the tag must remain below to be considered a sinker.
- Select the duration—this sets how long each of the depth criteria must be maintained before a release will occur. The pin burn will occur after the specified time has elapsed.
- Select the variance—variance is used here in a statistical sense (see Figure 3). Be mindful of the tidal activity in your study area.

A tag stuck on the bottom will detect some minor depth changes as the tides change the water depth. If you choose a range that is too small for local tidal conditions, the tag will not initiate a conditional release when it is stuck or sitting on the bottom.

Tag Release Sequence ⓘ

Release my tag [30] days after deployment start.

Auto-Detect Tag Detachment ⓘ ☒

Auto-Detect Mortality ⓘ ☒

Activate auto-detection after the first dive below [10] meter(s).

Start tag release sequence if:

- tag is floating at the surface
- tag is at a constant depth
- (optional) tag is deeper than [400] meter(s)

for longer than [1] day(s).

Use a depth variance of [2] meter(s). ⓘ

Figure 4—Tag release settings.

The release settings shown in Figure 4 will result in the following:

- The tag will release 30 days after deployment.
- The tag will release if it exceeds ten meters in depth and then meets any of the following criteria:
 - Stays within four meters (+/- two meters) of a constant depth for more than one day.
 - Stays deeper than 400 meters for more than one day.
- The tag will release if it reaches a depth of 1700 meters. This ensures that if the tag is sinking it will not reach its crush depth and become inoperable (this setting is not adjustable).

Release reasons as reported in the tag's status messages:

- **Interval**—the tag ran to the configured end of the deployment and the animal survived.
- **Pin Broke**—the tag sensed the release pin was broken, and the tag found itself floating on the surface for an extended period. Some external force pulled on the tether and broke the pin.
- **Floater**—the tag stayed within four meters of a constant depth for more than one day and was dry for most of the time. For some reason (mortality or attachment failure) the tag has come off the animal and is floating at the surface.
- **Premature**—the tag stayed within 4m of a constant depth for more than one day. The tag could be sitting on the bottom, attached to a dead animal. This could also be a floater, but the tag wasn't dry for most of the time. Examine the Depth Time Series data to make final determination.
- **Too Deep**—the tag detected that it was getting dangerously close to its maximum structural depth. The animal was dead and sinking or diving to a depth that is too deep for tag. Examine the Depth Time Series data to analyze sink rate.

Pinger

The pinger is used for tag recovery. The sPAT sends out low power "pings" after release while at the surface. The tag can be located with an appropriate receiver and directional antenna. The sPAT will ping at a one second interval for the duration of the Argos transmission period (approximately three days after release).

Interacting with a Tag

The sPAT will be shipped pre-programmed by Wildlife Computers. In the case where you need to change the deployment duration, release parameters, or if the sPAT is recovered after a deployment, follow the instructions below to communicate with the tag.

Tag Agent Software is used to communicate with the sPAT. Tag Agent and the USB Driver can be downloaded from our website: wildlifecomputers.com.

Plug the USB communications cable into the computer and connect to a tag carefully observing the orientation of the connector pins. The home page will display the Tag Status as Interactive in the lower left with tag information and sensor readings visible. If tag status remains Disconnected, swipe the magnet supplied near the communication port on the tag to view the tag in interactive mode.



Figure 5—Tag Agent screen prior to tag connection.

If the tag is new or has previously been programmed by another user, a pop-up box will appear asking if you wish to take ownership of the tag. Becoming a tag administrator gives you the authority to select and save new settings.

If tag settings have been updated through the portal using My Tags, a pop-up box will appear on opening Tag Agent advising that changes have been made and the tag's settings need to be updated.

The Administer Tag button allows you to modify the settings of the connected tag. Click the Send Changes button on the left of the screen to activate these changes.

The Download WCH tab shows a summary of data on the tag and gives you the option of downloading the archive and set-up info onto your local machine.



Figure 6—Tag Agent home screen.

Configuring Deployment Duration

To change tag Deployment Duration within Tag Agent, select the Administer Tag button in the upper menu.

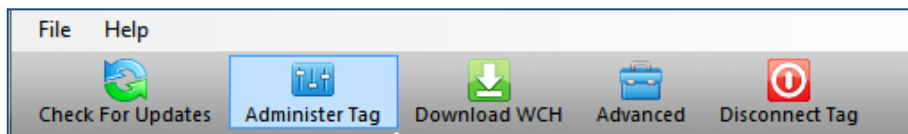


Figure 7—Tag Agent menu bar. Select Administer Tag to edit tag release settings.

A new window will open revealing three sections—Tag Information, Tag Release Sequence, and Transmission Settings.

Tag Details & Argos Settings

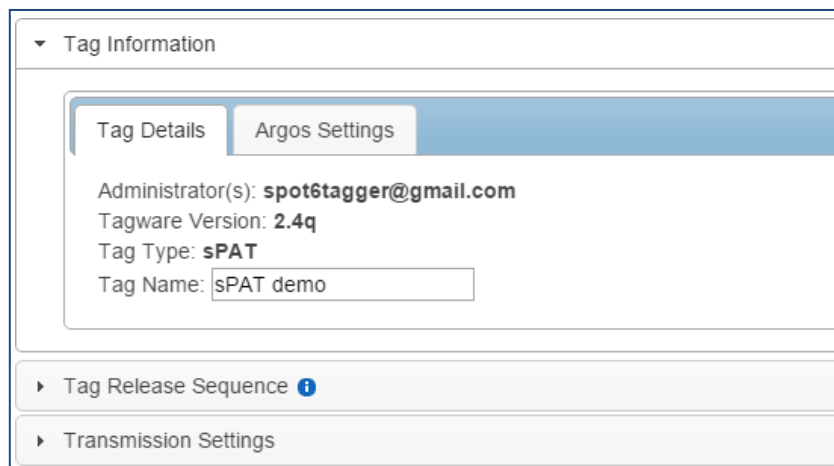


Figure 8—Expanded view of Tag Details tab.

Tag administrators, tagware version, and tag type are displayed on the Tag Details tab. Tag Name is an optional field which makes a tag or tags easy to find in the Tag Portal using the filter. The Argos Settings tab displays the tag PTT ID details.

For more information on these terms, reference the [Glossary of Terms](#) section at the end of this document.

In the Tag Release Sequence section, you can choose to release the tag 30, 45, or 60 days after the deployment starts. You can also adjust the Conditional Release settings.

▼

Tag Release Sequence ⓘ

Release my tag days after deployment start.

Auto-Detect Tag Detachment ⓘ

ON

Auto-Detect Mortality ⓘ

ON

Activate auto-detection after the first dive below meter(s).

Start tag release sequence if:

- tag is floating at the surface
- tag is at a constant depth
- (optional) tag is deeper than meter(s)

for longer than day(s).

Use a depth variance of meter(s). ⓘ

Figure 9—Tag Release Sequence.

Once settings have been chosen, use the blue Send Changes button (or Propose Changes button if working in Tag Portal) to load settings into tag. Tag Agent will confirm receipt of settings via dialog box. The Check for Updates tab on the top left navigation bar of Tag Agent home screen can be used at any time to see if settings updates are available.

Tag States: Start, Auto-Start, and Stop

The sPAT has three states: Auto-Start, Start, and Stop.

1. A tag in Auto-Start mode can be activated by sea water submersion. Wildlife Computers ship sPATs in Auto-Start.
2. Start mode activates the tag. In Start, data collection is running, and the tag begins monitoring for its set release condition.
3. Stop mode puts the tag into deep shutdown for storage. The tag will remain unresponsive unless connected to Tag Agent.

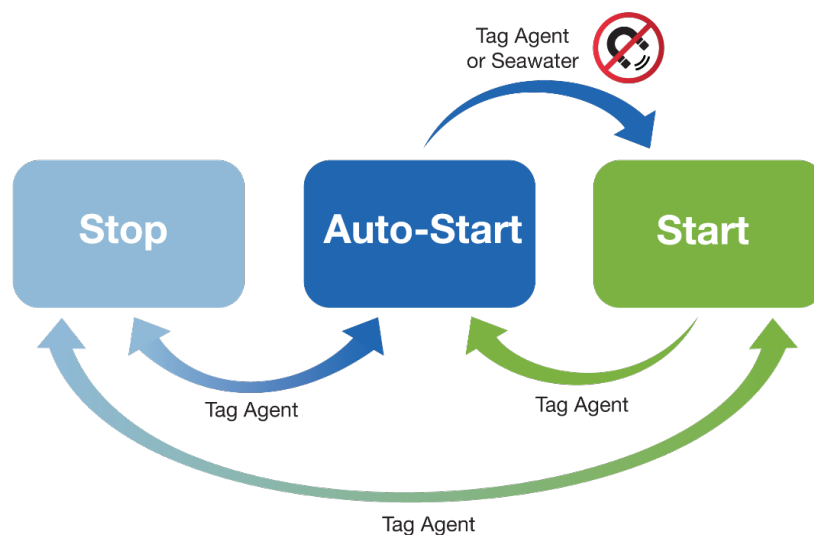


Figure 10—Tag States.

Disconnect from the sPAT

To disconnect from a tag, use the Disconnect Tag tab on the top right navigation bar. Do not simply unplug the USB communications cable.

The communications port should be sealed with the plug provided. Smear a small amount of the silicone grease supplied onto the sides and bottom of the plug, align the plug and pins, and carefully push the plug into the port. If it does not align easily with the pins, rotate it 180° and try again. The plug prevents corrosion of the pins during the deployment; however, the plug is not required for the tag to function normally.

Tags in Stop mode need to be connected to Tag Agent through the USB cable to awaken the tag.

LED Blink Patterns

Within Tag Agent, the Disconnect Tag button on the top right navigation bar can be used to put a tag in any state. Wildlife Computers ships the sPAT in Auto-Start mode.

Once disconnected in Auto-Start:

- At any time, a single pass of a magnet near the communications port will cause the LED to gradually transition from bright to dim as confirmation that the tag is in Auto-Start mode.



Be aware that your sPAT tag will begin transmitting and deplete the battery if left in Start mode and not deployed on an animal. If the tag is left in Start mode AND not put back into Auto-Start mode, the tag will initiate a premature release sequence. We DO NOT recommend keeping the tag in Start mode while OFF an animal.

Depth sensors are sensitive and nearby radio signals can cause the tag's depth sensor to "spike." A depth sensor "spike" can trigger the tag to think it's at a deeper depth and depending on the programming may cause the tag to prematurely satisfy its conditional release parameters. If this happens, the tag automatically initiates release.

- The LED turns on if the tag gets wet for a few seconds while in Auto-Start mode. After remaining wet for approximately ten seconds the LED blinks ten times, the archive is erased, and deployment begins.
 - The reset switch is disabled once the tag has been "mostly wet" for at least one hour—magnets no longer affect the tag unless the tag is connected to Tag Agent and reset.
- If the tag gets wet while in Auto-Start mode, but not long enough to enter "deploy" mode as above, the LED gradually goes from bright to dim and remains in Auto-Start mode.
- You can put the tag back Auto-Start mode by swiping it with a magnet within the first hour of a deployment. You will see the LED come on and gradually transition from bright to dim.



Auto-Start Light Pattern



**Tag Agent or
Seawater**



Start Light Pattern

Figure 11—LED Light Pattern.

Clearing the sPAT Archive

The archive is cleared automatically when a new deployment is started. The LED will indicate that the tag is clearing the archive with many rapid blinks. Leave the tag connected until Tag Agent indicates that the archive has been erased. This may take several minutes. Be mindful of this when selecting the tag state. If a tag is recovered, be sure to download the data prior to putting it back in Auto-Start or Start mode.

Gathering Tag Information

Checking Sensor Readings & Transmission Test

The sensor values displayed on the Tag Agent home screen are continuously updated from the tag. Sensor functionality can be validated by manipulating the sensors as follows:

- Ambient Temperature—responds quickly to warm air blown onto the thermistor located immediately above the communications port.
- Internal Temperature—this will change slowly as the entire tag changes temperature. Leaving a tag in a refrigerator for a while will change the value.
- Wet/Dry—connecting a wire from the large rectangular ground plate strap above the communication port to the metal ring around the base of the antenna (letters i and h respectively in fig. 2) should change the value from over 200 to less than 20.
- Light-Level—under typical office lighting, covering both light sensors (shiny squares on opposite sides of tag, letters d and j in fig. 2) with your fingers should drop the value by 20 to 40 counts.

Test Transmission

Under the Advanced button on the top menu there's an option to Send Test Transmission. When selected, a pop-up box with transmission values will appear.

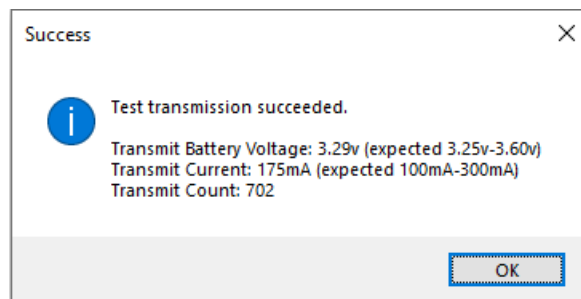


Figure 12—Test transmission results.

The Transmit Battery Voltage value will be lower in the pop-up box than on the Tag Agent home screen because it is measured when the battery is driving a transmission.

The Transmit Current will vary depending on the presence of conductive objects near the tag. It has been optimized for a tag that is floating in seawater.

Transmit Count is the number of transmissions the tag has made since it was manufactured.

Argos Transmitter Test

The Argos Transmitter Test allows for a full system test to confirm that the tag is successfully sending messages to the Argos satellites. Pop-up tags do not need to be initialized. After completing the test, **the tag will be in STOP mode, and you will need to communicate with it again prior to deployment.** Click on the Advanced Tab then Argos Transmitter Test.

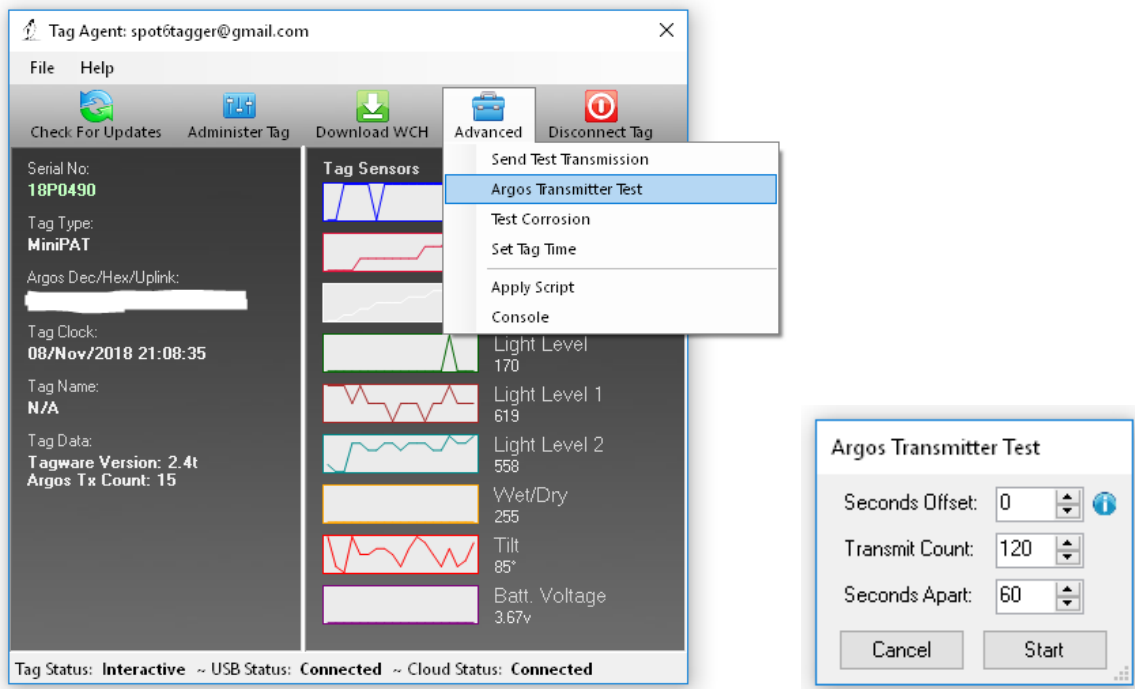


Figure 13—Argos Transmitter Test.

- Seconds Offset: If you will be testing multiple tags at one time, you can use this parameter to offset transmissions so the tags will not transmit at the same time.
- Transmit Count: How many times you want the tag to transmit. 120 transmissions at a 60 second interval will provide a 2-hour test, which is usually enough to coincide with a couple of satellite passes. Check the satellite passes in your area prior to beginning the test.
- Seconds Apart: The time between each transmission.
- When all the tags are set up and deployed, take them outside where they have a full view of the sky. For the best results, float the sPATs in a bucket of saltwater.

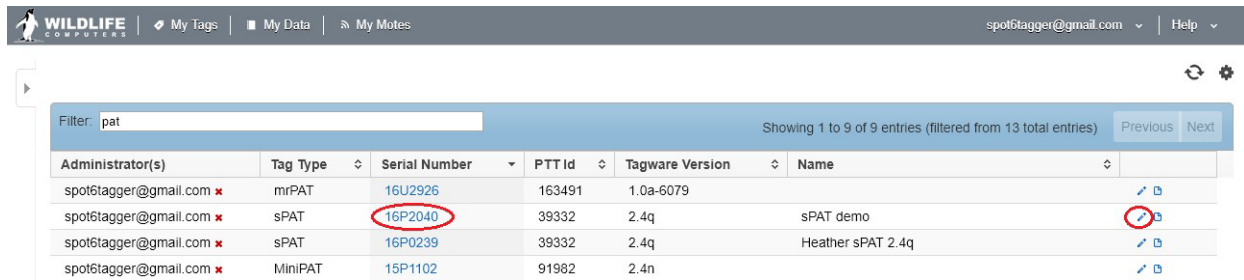


Upon completion of the Argos Transmitter Test, the tag will be in STOP mode, and you will need to communicate with it again prior to deployment. When the test is complete, verify that the LED light is not on. If the LED light is on, you MUST communicate with the tag using Tag Agent and manually place the tag in Auto-Start or Stop mode.

Using Tag Portal to Select Settings Remotely

Tag Portal is the cloud-based service offered by Wildlife Computers for remotely selecting tag settings. Configuring can be done without connecting to your tag. This enables project coordinators to review and select settings for their associates and programming to be done while tags are in transit, before arrival.

When logged into your Portal account, a list of the tags which you have administrator power over can be viewed under the My Tags tab. To select settings, click on the serial number of the tag you wish to configure or use the pencil icon.



Administrator(s)	Tag Type	Serial Number	PTT Id	Tagware Version	Name
spotstagger@gmail.com	mrPAT	16U2926	163491	1.0a-6079	
spotstagger@gmail.com	sPAT	16P2040	39332	2.4q	SPAT demo
spotstagger@gmail.com	sPAT	16P0239	39332	2.4q	Heather sPAT 2.4q
spotstagger@gmail.com	MiniPAT	15P1102	91982	2.4n	

Figure 14—List of tags within Tag Portal. To program select the serial number or pencil icon.

This will open a new window with setting selections. The same programming options are available whether settings are configured via Tag Portal or from within Tag Agent.

Once settings have been selected in Tag Portal, click the blue Propose Changes. This will save the settings in the cloud. The next time that tag communicates with Tag Agent (no matter who plugs the tag in), a dialog box will appear notifying that new settings are awaiting upload.

Multiple set-ups can be published resulting in a queue of configurations awaiting upload. In this case, a dialog box will reveal a list of the configurations published, when they were selected, and which administrator chose the settings.

Tag Portal maintains a historic record of tag settings each time changes are uploaded into a tag. The record is instantly updated so long as an Internet connection is available.

If tags are programed offline, using Tag Agent, the next time an Internet connection is established and Tag Agent software is open, the record automatically updates.

Offline Mode

Before you can program offline, you must download Tag Agent software and communicate with a tag while connected to the Internet. You can simulate offline mode by disabling your Internet connection.

What You Need Before You Begin

- A Windows-based computer with Tag Agent software and USB driver installed. Download both at WildlifeComputers.com.
- A Wildlife Computers Portal account.
- A Wildlife Computers USB communications cable.
- A Magnet.
- One of every tag type (i.e., sPAT, SPOT, SPOT-F, MiniPAT) you are taking in the field.

While Connected to the Internet

- Open Tag Agent and use the USB cable to connect a tag to your computer.
- Swipe a magnet near the communication port to establish connection. The tag LED will turn on and the Tag Agent home screen will appear.
- Use the Administer Tag tab to familiarize yourself with the tag setting options.
- Use the Disconnect Tag tab to select the tag state before unplugging.



If you are headed into the field with multiple tag types (i.e., sPAT, SPOT, SPOT-F, MiniPAT, etc.) be sure to communicate with one of each model while you have an Internet connection.

Using Offline Mode

Working offline is identical to working online. Internet status is displayed in the lower right corner.

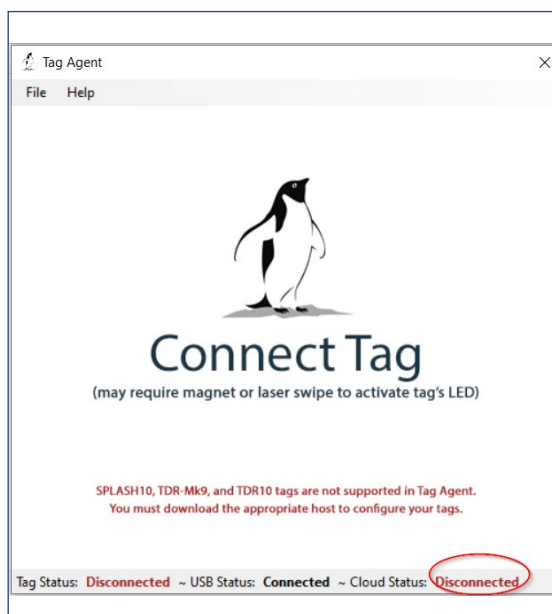


Figure 15—Internet status.



If the Internet connection is spotty, it is best to disable the connection entirely. A partial connection can prohibit settings from loading properly.

Programing Tags

- Open Tag Agent and use the USB communications cable to plug a tag into your computer.
- Swipe a magnet near the communication port to establish a connection.
- If the tag's internal clock needs adjusting, a pop-up box will appear along with a Date/Time Picker.

Hint—sometimes the Picker hides in the upper left corner of the screen.

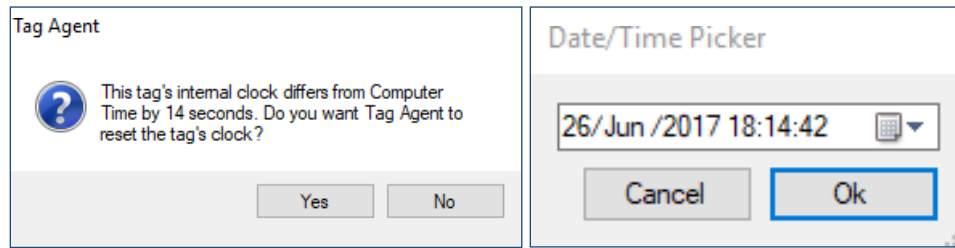


Figure 16—Pop-up boxes for date/time.

- Click the Administer Tag tab and make the required changes to the tag settings.
- Click Send Changes to push settings into the tag. A pop-up box will confirm the new settings have been applied.

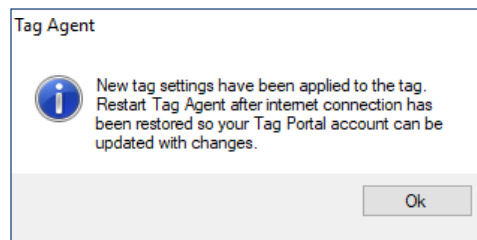



Figure 17—Pop-up confirming new settings.

- Use the Disconnect Tag tab to select the tag state before unplugging.
- Restart Tag Agent when the Internet connection is restored so a record of the selected tag settings will be saved.

Creating Local Templates

You can program a group of tags with the same settings using a local template. Click the Administer Tag tab and use the Template Manager  icon in the upper right corner of the screen to create and apply templates.



The Send Changes button must be selected after a template is applied to push settings into a tag.

sPAT Recovery Instructions

If the sPAT is recovered after deployment, it is possible that contamination of the communications port may cause some communication difficulties. The following instructions, in addition to describing how to recover the data, explain possible problems that might occur during the recovery and how to fix them. Even if all attempts to communicate with the sPAT fail, your deployment data are probably still in memory, and can be retrieved by Wildlife Computers.

Preparation for Post-Deployment Communication

When you recover your sPAT full of valuable deployment data, there are several steps to perform before attempting to connect it to the USB communications cable. As a precaution, it is advised to have the following on hand:

- Compressed air in a can
 - Electronic contact cleaner, if available
1. Thoroughly dry the sPAT with a paper towel.
 2. Remove the rubber communications port protection plug.
 3. Blow out any water in the communication port. Make sure the port is clean and dry. Compressed air in a can works well for this.



Communicating with a sPAT which has saltwater in the communications port will cause the pins to corrode very fast!

4. Count the number of pins in the communications port. If there are not four pins, one or more have corroded or broken off. Stop there and send the sPAT to Wildlife Computers, and we will download your data.
5. Examine the pins in the communications port. If they are rusty or corroded, send the sPAT back to Wildlife Computers for downloading.
6. If all four pins look clean and golden in color, you can continue and attempt to establish communications.
7. You may wish to spray some contact cleaner into the communications port as a precaution.

If you can establish a communication connection with the tag, you are now ready to download your data with Tag Agent.

Download your Data

Use the Download WCH button on the Tag Agent top navigation bar to download SPAT archival data (Figure 11). You'll be prompted to save the .wch file to your computer. The file can then be uploaded into the Data Portal for decoding, analysis, and storage.

Put tag into Stop mode after downloading the data.



Figure 18—Tag Agent menu bar. Select Download WCH to download archived data.

Tag Storage and Battery Maintenance

Proper tag storage and battery maintenance are important to minimize passivation, maintain optimal battery voltage, and prepare the tags for deployment.

As a standard, sPAT tags ship in “Auto-Start” mode for immediate deployment, unless otherwise specified. When stored correctly, tags may experience battery life loss of one to two percent for every year of non-use.

sPAT Storage—Less Than One Month

If your deployment date will be less than one month, simply store the tags in “Auto-Start” mode. The optimal storage temperature range is 0° to 5° C. Tags must not be stored at temperatures warmer than 5° C or colder than -20° C. Remember to read the [pre- and post-deployment checklists](#) to optimize your deployment.

sPAT Storage—Longer Than One Month

If your deployment date is more than one month away, place the tags in “Stop” mode before storing. Refer to the [Special Considerations for Longer-term Storage](#) section of this User Guide for battery maintenance while in storage.

To put tags in “Stop” mode, open Tag Agent. In the top menu, click the “Disconnect Tag” tab. Scroll down to “Stop” and follow the prompts. The optimal storage temperature range is 0° to 5° C. For long-term storage, tags must not be stored at temperatures warmer than 5° C or colder than -20° C. Remember to read the [pre- and post-deployment checklists](#) to optimize your deployment.

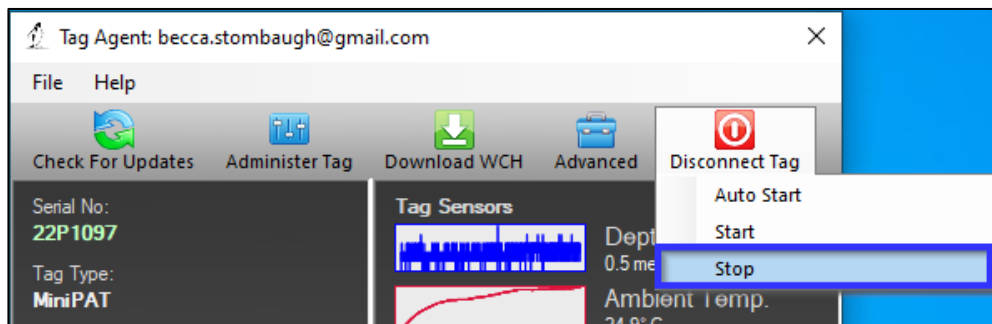


Figure 19—Example of how to put tag in Stop mode in Tag Agent.

Special Considerations for Longer-term Storage

sPAT tags can be stored longer than a month, but particular care must be taken to avoid battery passivation. Battery passivation may cause low voltage readings and in extreme cases may compromise the battery. For this reason, batteries must be exercised.

Exercising Tags with Tagware Version 2.5b and Greater

If your tags are running tagware version 2.5b (or greater), **connect to each tag at least three months prior to deployment** and send [Test Transmissions](#) in Tag Agent to confirm the Transmit Voltage is 3.25V or higher.

Confirm your tag's tagware version on the main Tag Agent screen.



Figure 20—Location of Tagware version on Tag Agent main screen.



If your tags have a tagware version that precedes 2.5b (for example, 2.4z), return these tags for a free tagware upgrade. Please contact your Technical Sales Consultant (tags@wildlifecomputers.com) to coordinate the return.

Exercising Tags with Tagware Versions Prior to 2.5b

If your tags have a tagware version that precedes 2.5b (e.g., 2.4z), **connect to each tag monthly** and exercise the batteries by sending [Test Transmissions](#) in Tag Agent.

Sending Test Transmissions

Tips to Optimize Sending Test Transmissions

To optimize this test, consider the following:

- **Antenna angle should point UP.** The angle of the antenna should mimic how the tag will orient while transmitting in the field.
- **Never lay the tag flat or have the tag antenna touch anything.**

Pop-up tags transmit when they reach the water's surface. While floating, the ground pad remains under water. For this reason, a good angle and height orientation for the Sending Test Transmissions is shown below.



Figure 21—Optimal orientation of pop-up tag for Test Transmission.

Connect to each sPAT and log into Tag Agent. In the menu at the top, click the “Advanced” tab. Scroll down to “Send Test Transmission” and follow the prompts.

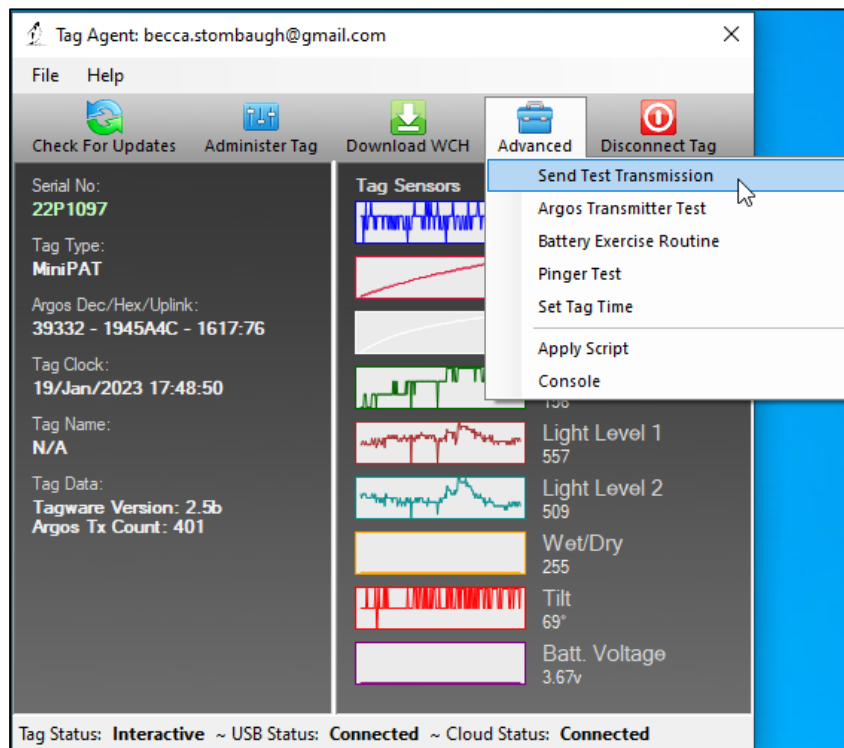


Figure 22—Example of Send Test Transmission.

The test transmission voltage should read 3.25V or higher and the battery voltage displayed on the main sensor screen should be around 3.5V. If the output values of three consecutive test transmissions are all within the expected range(s), and all sensors on the main sensor screen are within the normal range, the tag is ready to continue storing or it is ready to deploy.

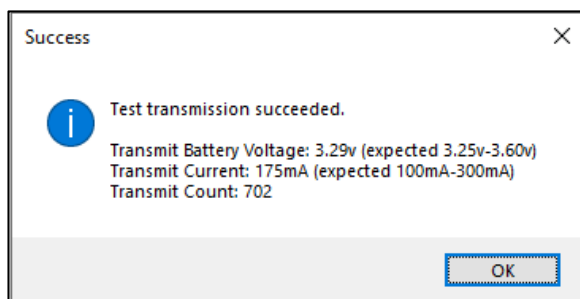


Figure 23—Example of acceptable transmit battery voltage and acceptable transmit current.

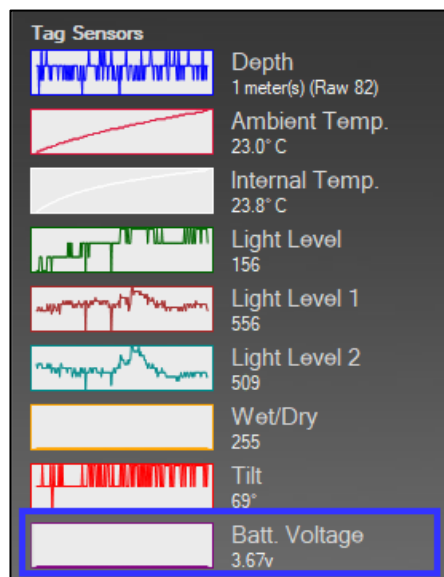


Figure 24—Example of acceptable battery voltage and normal readings for all sensors on the main screen of Tag Agent.

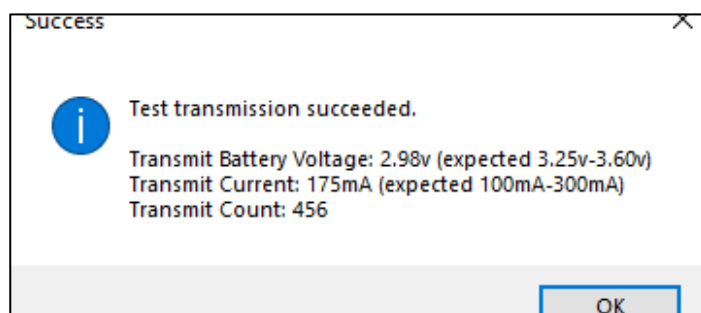


Figure 25—Example of low transmit battery voltage and acceptable transmit current.

If you see a lower than acceptable voltage, it may be due to passivation forming during storage. We recommend taking additional steps to dislodge passivation by performing the [Battery Exercise Routine](#) in Tag Agent.

Battery Exercise Routine

If a tag shows a low voltage reading after sending a Test Transmission, run the Battery Exercise Routine in Tag Agent.

Tips to Optimize the Battery Exercise Routine

To optimize this test, consider the following:

- **Antenna angle should point UP, either held in your hand or supported in a non-metallic cup or drinking glass. It is ok if the tag touches the side of the cup.** The angle of the antenna should mimic how the tag will orient while transmitting in the field.
- **Never lay the tag flat or have the tag antenna touch anything.**

To start the test, under the Advanced tab, select “Battery Exercise Routine.”

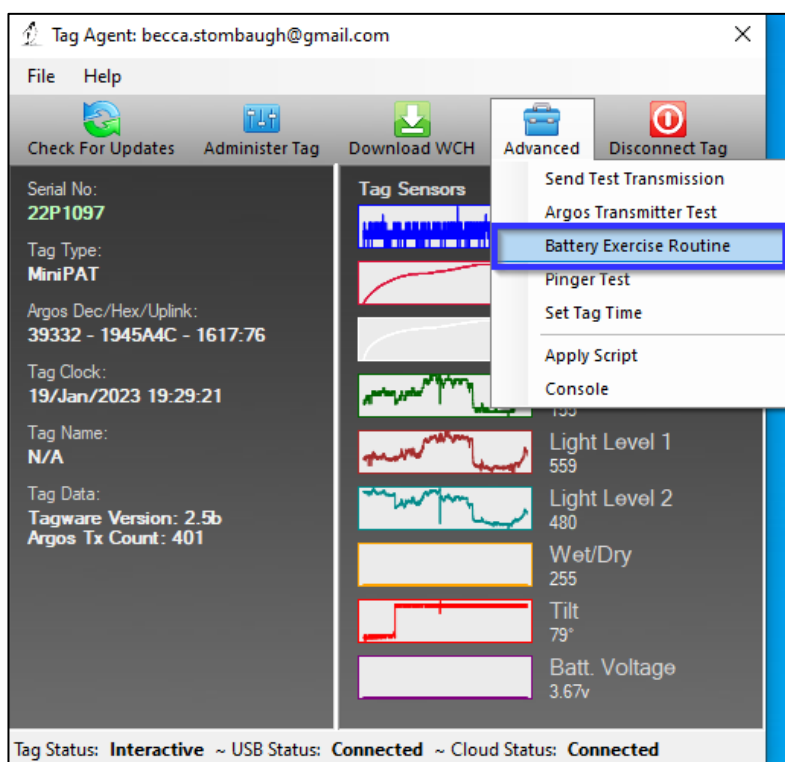


Figure 26— Battery Exercise Routine location in Tag Agent.

The following box will appear:

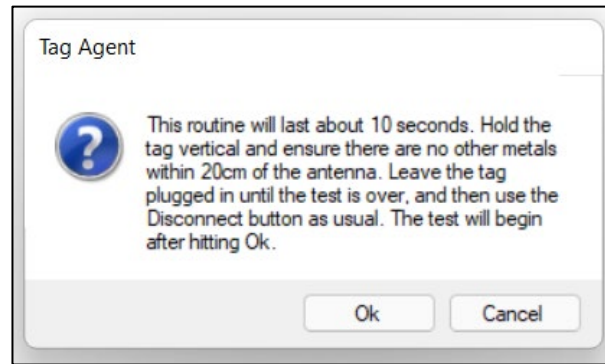


Figure 27— Battery Exercise Routine prompt.

- To run the test, click "OK" to exercise the battery. The test will perform ten transmissions very quickly.
- To exit test, click "Cancel."

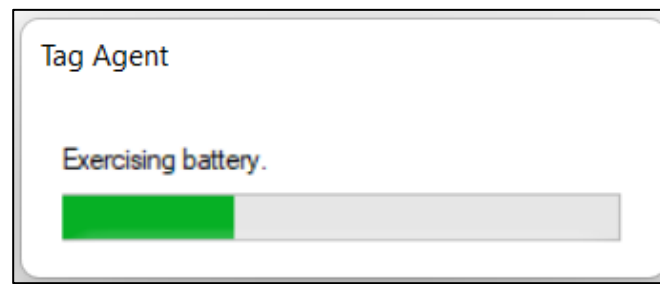


Figure 28— Example view of ongoing Battery Exercise Routine test.

After the test's initial run, if the battery voltage is *below* the recommended threshold, Tag Agent will prompt you to run the test again. Click Ok.

- *You will see the prompt up to nine more times if the battery voltage continues to read below the recommended threshold.*

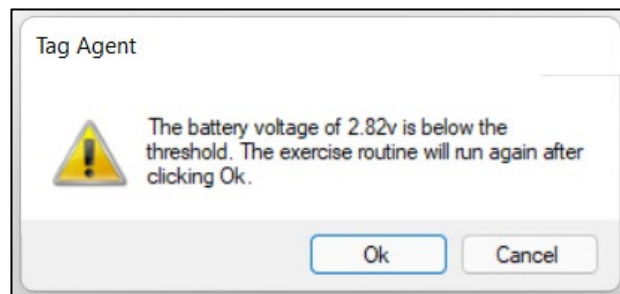


Figure 29— Low voltage output. Prompt to rerun test.

If the battery voltage is still below the threshold after ten runs of the test, contact your Technical Sales Consultant (tags@wildlifecomputers.com).

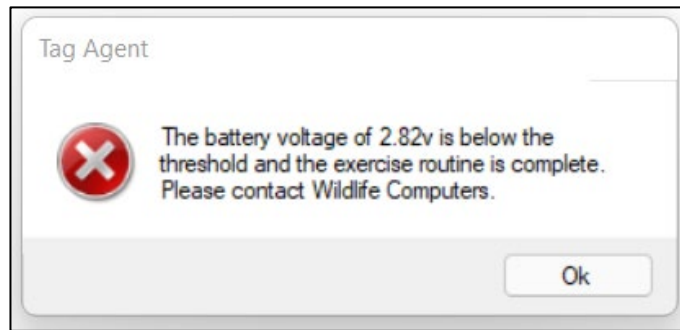


Figure 30— Low voltage output. Prompt to contact Wildlife Computers.

If the battery voltage is *above* the threshold during any part of the Battery Exercise Routine, Tag Agent will display the following message:

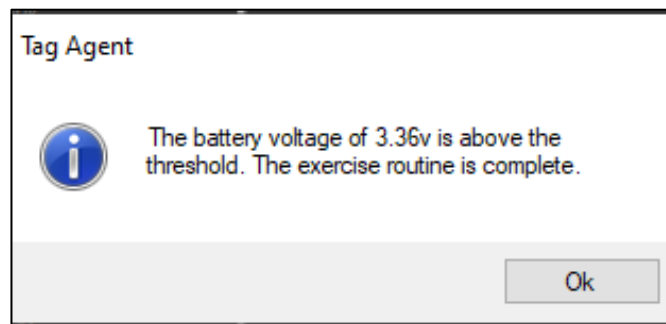


Figure 31— Acceptable voltage output prompt.

When you see this prompt, the tag is ready for storage or deployment.

The outcome of each test gets saved to the TagLog for each tag within the Tag Portal. Depending on which test is performed—Test Transmission or Battery Exercise Routine—the name of the test will appear in the column.

4-Dec-2022 17:40:19	rebecca@wildlifecomputers.com	Test Transmission (2.2.39.0)	166 BV 67 Vx 39 lx 99 Refl 44 Count miniPAT>
4-Dec-2022 17:40:37	rebecca@wildlifecomputers.com	Test Transmission (2.2.39.0)	169 BV 67 Vx 39 lx 100 Refl 45 Count miniPAT>
4-Dec-2022 17:41:00	rebecca@wildlifecomputers.com	Test Transmission (2.2.39.0)	168 BV 67 Vx 39 lx 99 Refl 46 Count miniPAT>
4-Dec-2022 17:41:56	rebecca@wildlifecomputers.com	Battery Exercise (2.2.39.0)	169 BV 67 Vx 37 lx 91 Refl 47 Count miniPAT> 169 BV 67 Vx 37 lx 91 Refl 48 Count miniPAT> 169 BV 67 Vx 37 lx 92 Refl 49 Count miniPAT> 168 BV 67 Vx 37 lx 92 Refl 50 Count miniPAT> 168 BV 67 Vx 37 lx 92 Refl 51 Count miniPAT> 168 BV 67 Vx 37 lx 92 Refl 52 Count miniPAT> 168 BV 67 Vx 37 lx 92 Refl 53 Count miniPAT> 168 BV 67 Vx 37 lx 92 Refl 54 Count miniPAT> 168 BV 67 Vx 37 lx 92 Refl 55 Count miniPAT> 168 BV 67 Vx 37 lx 92 Refl 56 Count miniPAT>

Figure 32— Tag Portal TagLog view of Test Transmission and Battery Exercise Routine test results.

In the above example, “169 BV” is a representation of the transmission voltage. **To convert to voltage, divide by 51. In this case 169 BV / 51 = 3.31 v.**

Technical Specifications

Dimensions	118 mm (length) X 38 mm (diameter)
Weight in Air	61 g
Pressure Rating	2000 m
Memory	64 MB
Operating Frequency	401.678 MHz
Maximum Deployment Length	60 days
Sensors	Light, Pressure, Temperature, Wet/Dry
Light	$5 \times 10^{-12} \text{ W/cm}^2$ to $5 \times 10^{-2} \text{ W/cm}^2$
Pressure	Range: 1700 m/Resolution: 0.5 m
Temperature	Range: -20° C to 50° C/Resolution: 0.05° C
Conductivity Operational Limits	0.1 to 5 S/m
Optimal Storage Temperature Range (°C)	0° C to 5° C
Communication	Via USB port using Wildlife Computers USB communications cable

Additional Information

Glossary of Terms

- Administrator—someone who has the authority to publish tag settings.
- Argos ID—uniquely identifies a transmitter for the Argos system. The ID consists of a decimal number and a hexadecimal (base 16) number.
- Argos location—a location generated by the Argos system from uplinks received during a satellite pass. Get more information about how the Argos system works here: www.argos-system.org.
- Argos uplink—a radio transmission intended for the Argos satellite system.
- Daily Data—generated from sensors over a fixed 24-hour period.
- Data message—created by the tag to transmit data through the Argos system. Each data message is transmitted as payload in an Argos uplink. To increase the likelihood of its reception by the Argos system, each message is sent a fixed number of times.
- Data Products—the diverse types of data available from Wildlife Computers tags.
- Deployment—the period when a tag is associated with an animal and actively collecting and sending telemetry data.
- Location uplink—a transmission intended to generate an Argos location. These uplinks can also carry a data message payload. Multiple uplinks are required to generate an Argos location.
- Pinger—a UHF radio tracking beacon.
- Repetition Interval (repetition rate)—how often a tag tests for dry conditions and tries to transmit.

Set at 90 seconds for sPATs, this value is assigned by CLS (Argos) and set by Wildlife Computers.

- Start/Auto-Start/Stop—the different tag states. When in Start mode, the tag will generate locations and/or collect sensor data. Auto-Start will allow the tag to Start using a magnet or when reading wet. Stop causes the tag to do nothing until reconnected to Tag Agent.
- Summary Period Data—generated from sensors during a defined number of hours.
- Tag Agent Software—the program used to change tag states and select tag settings and connect a tag to the Wildlife Computers Tag Portal.
- Tagware—the software version running on a tag.
- Tag Portal—the cloud-based service offered by Wildlife Computers for remote tag setup. A historic record of tag settings and templates are maintained within the Tag Portal.
- USB Communications Cable—the Wildlife Computers communication cable required by Tag Agent.
- Wet and Dry—the state of the tag as determined by the wet/dry sensor which measures conductivity.

What is Antifouling Paint and Why You Should Apply It

Heavily fouled tags can be hugely detrimental to tagging studies as fouling growth over critical sensors impedes the tag's transmitting performance. Especially for deployments in tropical waters, it is imperative that tags be protected against marine growth.

Wildlife Computers leaves the decision to apply antifoul coating after manufacturing and before deployment entirely to the researcher's discretion. Excluding animals that regularly haul-out, ***we strongly recommend that tags be treated with some antifouling coating to ensure the best possible chance of a successful deployment as Wildlife Computers does not provide warranty against biofouling.***

Wildlife Computers endorses two antifouling coatings: Micron and Propspeed.

Micron is a range of copper-based antifouling paints, many with a biocide that repels barnacles. For optimal protection, it is critical to use [International Paints' Interprotect primer](#) in addition to the paint. Micron66* is a great choice for slow movers like sea turtles and whale sharks. Other Micron saltwater paint options are available and should work well. Proven choices are Micron 66, 77, 99, CSC, and Extra SPC. If Micron paint is unavailable in your area, find an alternative copper-based ablative antifouling paint with a suitable primer. Wildlife Computers does not currently apply Micron antifouling paint.

**Micron66 has been discontinued but can still be found in some stores. Wildlife Computers has been testing Micron CSC and Micron Extra SPC as a replacement. sPAT pop-up tags will float with one coat of primer and two coats of Micron CSC. Micron Extra SPC is heavier, restricting the application on sPAT tags to one coat of primer and one coat of Micron Extra SPC paint. Once antifouling paints and tethers are applied, Wildlife Computers recommends performing a float test.*



Tags painted with Micron must only be handled with gloves as Micron contains copper and biocides.

Store the tags in a Ziploc® bag as Micron gives off a strong odor. Store the tags in a cool place optimally between 0° C and 5° C.

Propspeed is a foul release silicon coating, not an antifoul, that impedes biofouling adhesion. Propspeed is non-toxic and widely available. Propspeed relies on movement for its effectiveness—the more water

moves over its surface, the better it performs, as marine growth cannot get a grip to grow. Propspeed can last up to a year and is relatively non-toxic according to the manufacturer.

Wildlife Computers offers an optional service to sand, mask, and paint tags with Propspeed antifouling and coat the wet/dry sensors with conductive polymer. Wildlife Computers offers Propspeed antifouling painting at a charge of \$100 per tag prior to shipping.

For instructions on how to apply antifouling coatings, videos, and more:

<https://wildlifecomputers.com/our-tags/extras/anti-fouling/>

Antifouling Tests

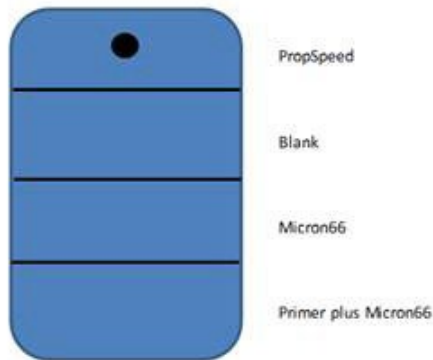
Wildlife Computers have been undertaking tests on antifouling paint in various parts of the world.

Below is an image of submerged polyurethane and epoxy test plates after two months on a wharf pile in New Zealand.

Propspeed is at the top and has done a reasonable job but has started to fail. Next is a placebo blank area with no protection that has fouled badly. The next strip down had Micron without a primer and the Micron has nearly worn away completely.

The Micron at the bottom has one coat of Interprotect primer and three coats of Micron—it is pristine. We recommend this set up for a successful project.

The plates are as follows:



Contacting Wildlife Computers

U.S. and International

Members of the Wildlife Computers technical sales and support team are in Redmond, WA, USA, and Havelock North, New Zealand, allowing us to cover promptly a wide range of time zones.

Mailing and Shipping

Wildlife Computers

8345 154th Avenue NE

Redmond, WA 98052 USA

Email

Sales, Quotes, and Inquiries: tags@wildlifecomputers.com

Technical Support: support@wildlifecomputers.com

Phone

+1 (425) 881 3048

Website

WildlifeComputers.com

For Asian Clients

While we welcome your direct correspondence, we recommend that you contact our colleague, Yong Huang, for assistance. Mr. Huang understands the special purchase processes for your countries and will provide you with the best service for the best price. He also is fluent in Japanese, Chinese, and English.

Mailing Address—Please ship tags to our central office in Redmond, WA.

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