

# MiniPAT User Guide

---

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

## Table of Contents

Before you Begin.....	3
About the MiniPAT.....	3
Anatomy of a Tag.....	4
Interacting with a Tag.....	5
Configuring Tag Settings.....	8
Tag Information.....	9
Tag Release Sequence.....	9
Data Product Settings.....	12
Transmission Settings.....	19
MiniPAT Recovery and Data Download Instructions.....	24
Tag Storage and Battery Maintenance.....	25
Sending Test Transmissions.....	27
Technical Specifications.....	29
Additional Information.....	30
Contacting Wildlife Computers.....	37





## Before you Begin

The information contained in this guide is designed to help you get the most from your deployment. In the guide, you will see the yellow icon highlighting information which special attention should be paid.

The list below shows what is required to configure and deploy the MiniPAT:

- A Wildlife Computers Data Portal Account.
- A Windows® computer with Tag Agent and our USB driver installed.
- A Wildlife Computers communications cable.
- A magnet.

Visit [wildlifecomputers.com](http://wildlifecomputers.com) to download the required software (Tag Agent and the USB communications cable driver) and setup an account. At the end of this document, there is a list of key terms and concepts for reference. We recommend unpracticed users review this list.

## About the MiniPAT

The MiniPAT is a pop-up satellite archival tag used to track the behavior and migration of marine animals. It is an archival tag equipped with an Argos transmitter and a corrodible attachment link. The MiniPAT 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 date, or optionally when the MiniPAT determines it is no longer attached to an animal. Depth, temperature, and light-level data are collected and summarized for transmission through Argos. Transmission occurs after the release of the tag from the tether, while the tag is floating on the ocean surface. This guide describes how to set up and deploy the MiniPAT. Transmitted data products are also explained.



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

## Anatomy of a Tag

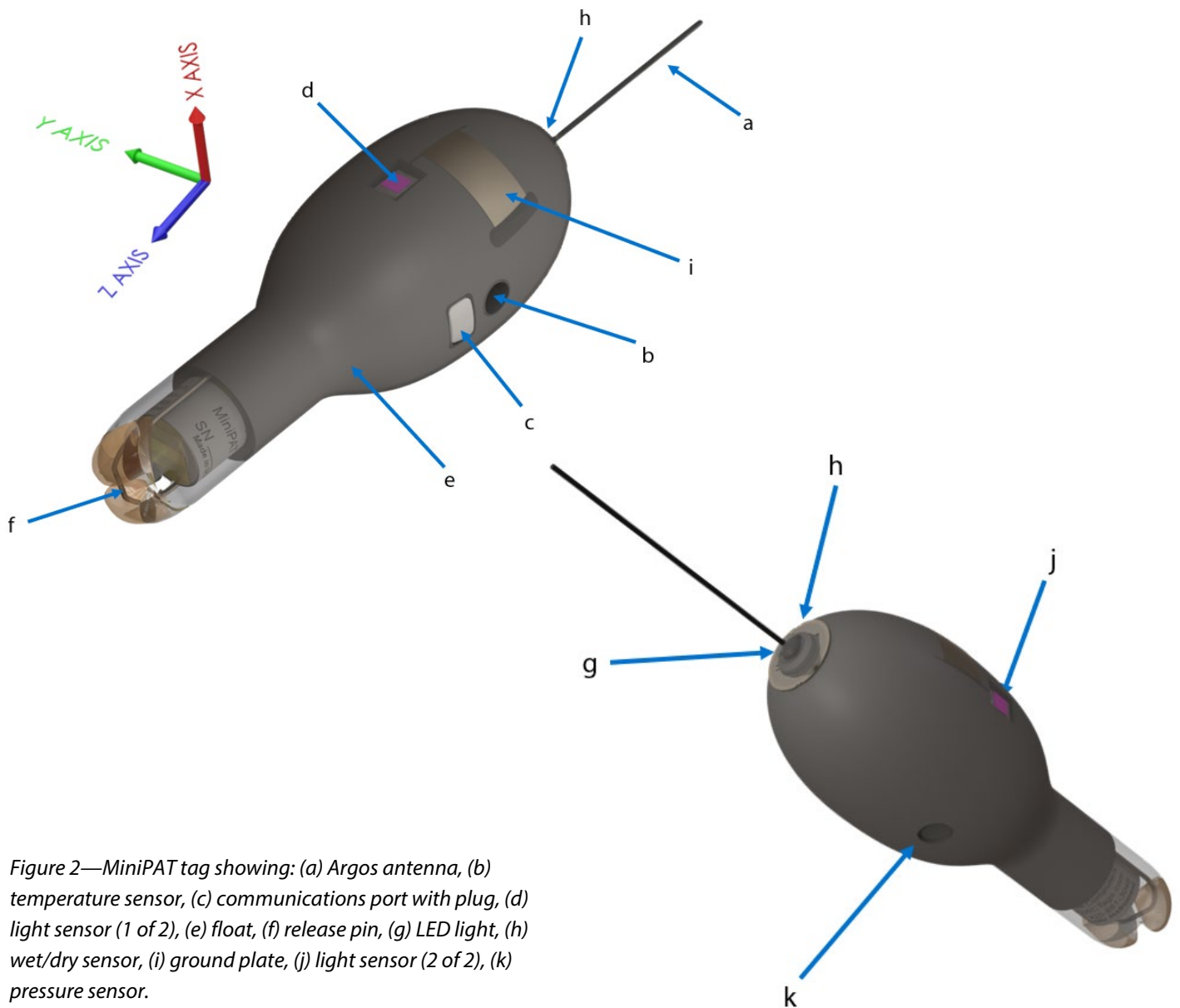


Figure 2—MiniPAT tag showing: (a) Argos antenna, (b) temperature sensor, (c) communications port with plug, (d) light sensor (1 of 2), (e) float, (f) release pin, (g) LED light, (h) wet/dry sensor, (i) ground plate, (j) light sensor (2 of 2), (k) pressure sensor.

The communications port is where the Wildlife Computers Communications Cable connects to the tag. Prior to a 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 not be covered. Covering these sensors will interfere with the normal function of the tag. This includes antifouling coatings, brightly colored paints for recovery purposes, and attachment adhesives (e.g., epoxy).

## Interacting with a Tag

Tag Agent Software is used to communicate with the MiniPAT. Tag Agent and the USB Communication Cable driver can be downloaded from our website: [wildlifecomputers.com](http://wildlifecomputers.com). Once installed, Tag Agent can be used to:

- Change tag states.
- Configure the tag settings.
- Upload remotely-selected settings into a tag.
- Check sensor readings and conduct test transmissions.

To communicate with a tag, open Tag Agent Software (Figure 3).

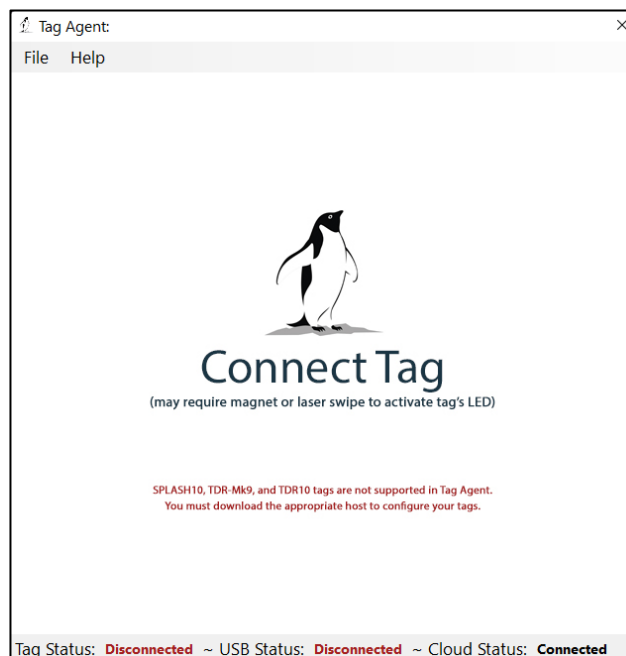


Figure 3—Tag Agent screen prior to tag connection.

Use the USB communications cable to plug the tag into your PC. Take care to ensure that the pins are aligned. Once plugged in, swipe a magnet near the tag communication port to establish connection. The tag LED at the base of the antenna will turn orange, and the Tag Agent home screen will appear with tag information on the left and sensor readings on the right (Figure 4).

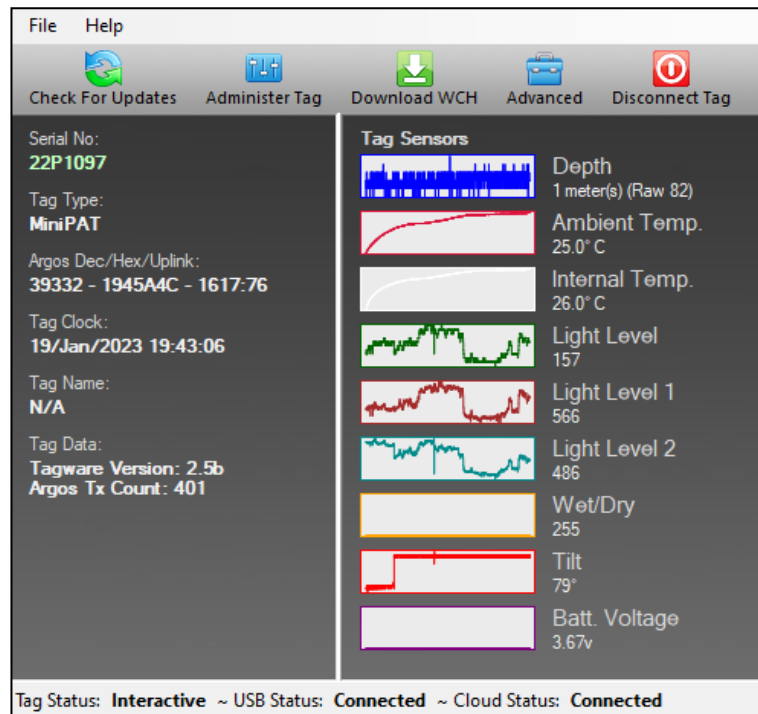


Figure 4—Tag Agent home screen.

## Tag States: Auto-Start, Start, and Stop Modes

MiniPAT tags have three states: Start, Auto-Start, and Stop. When in Start mode, a tag is running and will begin its deployment. Auto-Start allows the tag to Start by submersion in seawater (for use in brackish or freshwater contact Wildlife Computers). In Stop mode, the tag will remain unresponsive unless connected to Tag Agent. [Stop mode is used for storage of tags for periods longer than a month.](#)

## Changing Tag States with a Magnet

Within Tag Agent, the Disconnect Tag tab on the top-right navigation bar can be used to put a tag in any state.

Once disconnected, a single pass of a magnet near the communication port will cause the tag to blink the indicator light, revealing its current state.

- Two blinks and a pause repeated three times means the tag is in Auto-Start mode.
- Ten rapid blinks indicate the tag is in Start mode.
- No blinks indicate the tag is Stopped.

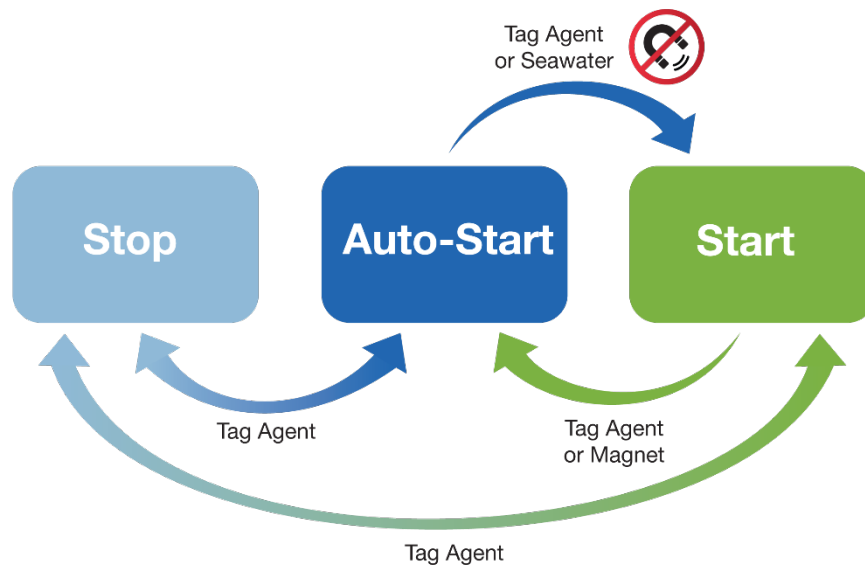


Figure 5—Tag states.

A magnet can be used to toggle the MiniPAT out of Start mode. This requires two specifically timed passes of the magnet. First, swipe the magnet and wait for the tag to indicate its current state. At the end of the blinking pattern (10 rapid blinks in a row if started) the indicator light will remain on for several seconds. If the magnet is swiped a second time during the extended light-on stretch, the state will toggle. The second swipe needs to happen in the window when the light is on. MiniPAT cannot be toggled from Auto-Start to Start with a magnet.

If you Start a MiniPAT but do not deploy it on an animal, the tag will initiate a premature release according to your settings (see page 10). Once premature conditions are met, the tag will then begin to transmit and deplete the battery. Best practice is to not leave a MiniPAT started while off an animal.



***Be aware that your MiniPAT tag will begin transmitting and depleting the battery if left in Start mode and not deployed on an animal. If the tag is left in Start mode, the tag will initiate its premature release sequence based on your settings. 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 fulfill its conditional release parameters. If this happens, the tag automatically initiates release.***

For the first five days of deployment, toggling with the magnet will switch the tag from Start state into Auto-Start state. This allows a tag to be redeployed without having to be plugged into Tag Agent. After five days, the magnet toggle will put the MiniPAT in Shut-down mode. This is to avoid unintentional data erasure. If a new deployment is started, the MiniPAT will write over data previously collected.

In addition to revealing the tag state, the LED also indicates the following conditions:

- Erasing the archive—many rapid blinks with the LED mostly on indicate that the tag is clearing the archive in preparation for a new deployment.
- Sample rate—
  - MiniPATs with tagware 2.4p or older for the first two hours of a deployment (or until the tag depth exceeds five meters) the tag will briefly blink at the sampling interval.
  - MiniPATs with tagware 2.4q or newer will NOT blink at the sampling interval after deployment.

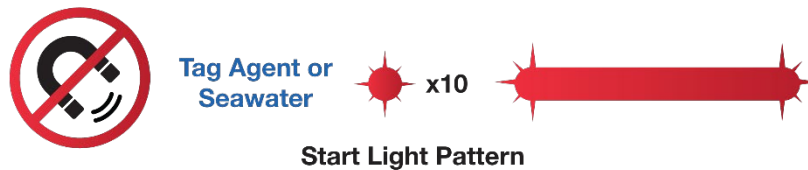


Figure 6—LED light pattern.

## Configuring Tag Settings

To configure tag settings within Tag Agent, select the Administer Tag button in the upper menu.



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

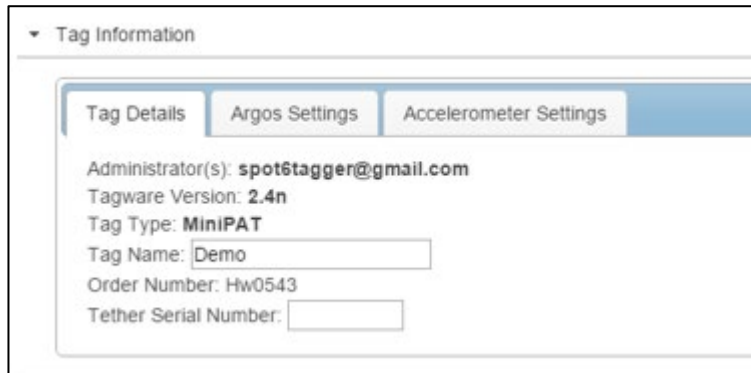
A new window will open revealing four sections: Tag Information, Tag Release Sequence, Data Product Settings, and Transmission Settings.

## Tag Information

### Tag Details & Argos Settings

Tag administrators, tagware version, and tag type are displayed on the Tag Details tab (Figure 8). Tag Name is an optional user-definable 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. The Accelerometer Settings show if the accelerometer channel(s) are being archived. See the [What's in the Archive](#) section for more details.

For more information on these terms, reference the Glossary of Terms section at the end of this document.



The screenshot shows a web interface titled "Tag Information" with a dropdown arrow. Below the title are three tabs: "Tag Details", "Argos Settings", and "Accelerometer Settings". The "Tag Details" tab is active. The content of the tab includes the following text and input fields:

- Administrator(s): **spot6tagger@gmail.com**
- Tagware Version: **2.4n**
- Tag Type: **MiniPAT**
- Tag Name:
- Order Number: **Hw0543**
- Tether Serial Number:

Figure 8—Expanded view of Tag Details tab.

## Tag Release Sequence

These settings define when the tag will activate its release mechanism.

Either an interval release or scheduled date release can be set. The release will begin at 20:00 UTC after the number of days specified or on the chosen date.

The tag automatically sets its archival sample interval based on the deployment length specified.

For more information on the archive, see the [What's in the Archive](#) section.

### Conditional Release

The MiniPAT 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

This 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 MiniPAT tag and put it in Start mode using Tag Agent (while tag is attached to your PC) it will detect constant depth while it's 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, not at 20:00 UTC like the scheduled release.

## Auto-Detect Mortality

This parameter monitors 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  $\leq 1$  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 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, not at 20:00 UTC like the scheduled release.
- Select the variance—variance is used here in a statistical sense (see example below). Be mindful of the tidal activity in your study area. A tag stuck on the bottom will detect some minor depth changes as 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.

The release settings shown in Figure 9 will result in the following:

- The tag will release 180 days after deployment.
- The tag will release if it exceeds 10 meters in depth and then meets any of the following criteria:
  - Stays within 5 m (+/- 2.5 meters) of a constant depth for more than 3 days.
  - Stays deeper than “xxx” m for more than 3 days (where xxx is your nominated depth).
- 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.

If your animal naturally remains at a constant depth for longer durations, consider disabling the Auto-Detect Mortality feature.

Tag Release Settings

Release my tag 180 days after deployment start, or on this given date (dd-mm-yyyy)

The tag will set its Archive Sample Interval to 3 second(s) based on a 180 day deployment.

Activate Premature Release - Tag Detachment  ON

Activate Premature Release - Mortality  ON

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 xxx meter(s)

for longer than 3 day(s)

Use a depth variance of 2.5 meter(s)

Release tag if it is at a depth below 1700 m

When released and trying to transmit, ignore the wet/dry sensor after 45 days

Enable Homing Pinger - Interval: 0 second(s)

Use an external release device

## Adaptive Transmission Schedule for Conditional Release

In the case of early release, the MiniPAT transmits time series data messages in addition to its scheduled data products. This can help when investigating the cause of the conditional release event. The time series interval depends on deployment duration.

If the conditional release is:

- Less than 15 days the MiniPAT will transmit 300 second time series for depth and temperature (unless the originally programmed interval was faster).
- Between 15 and 30 days, the MiniPAT will transmit 600 second time series for depth and temperature.
- Greater than 30 days AND no temperature or depth time series were initially enabled, the MiniPAT will create 600 second time series messages for the four days leading up to release.

## Ignore Wet/Dry After 45 Days

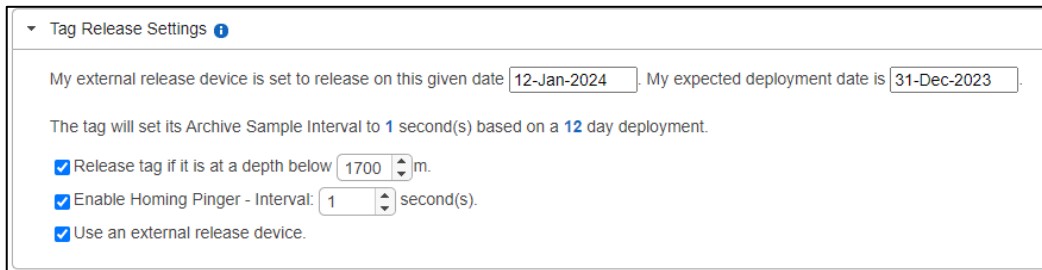
You can optionally choose to have the tag ignore its wet/dry condition 45 days after release. The tag will then attempt transmissions at its scheduled repetition interval until the battery expires. This setting can be useful if a tag is fouled or hung up on debris, in which case the wet/dry sensor may indicate wet, even when the tag is at the surface. The longer a tag is at the surface the more susceptible it is to damage and predation.

## Pinger

The pinger is used for tag recovery. When enabled, the MiniPAT sends out low power “pings” after release, while at the surface. The tag can be located with an appropriate receiver and directional antenna. A one or two-second ping interval is the most appropriate setting for tracking and mimics a typical UHF tracking transmitter. Excess power drawn from the pinger is negligible. The transmissions sent by the pinger are very short and do not carry any data.

## External Release Device

If using an external release device, such as [Wildlife Computers Programmable Timed- Release \(PRD-TI\)](#), the MiniPAT will not burn its release pin. With the burn pin still intact, the MiniPAT can be redeployed. Set the date the external release device is programmed to release and expected deployment date. Based on this range, the tag will calculate the archival sample interval. The pinger feature can be enabled to assist with recovery.



The screenshot shows a web interface titled "Tag Release Settings". It contains the following information:

- A dropdown menu labeled "Tag Release Settings" with an information icon.
- Text: "My external release device is set to release on this given date" followed by a date input field containing "12-Jan-2024".
- Text: "My expected deployment date is" followed by a date input field containing "31-Dec-2023".
- Text: "The tag will set its Archive Sample Interval to 1 second(s) based on a 12 day deployment."
- Three checked checkboxes with associated settings:
  - "Release tag if it is at a depth below" followed by a spinner input field set to "1700" and the unit "m".
  - "Enable Homing Pinger - Interval:" followed by a spinner input field set to "1" and the unit "second(s)".
  - "Use an external release device."

Figure 10—Release settings for a 12-day deployment using an external release device. The pinger is enabled, as well as a failsafe to release the tag if it registers a depth greater than 1700m.

## Data Product Settings

Data products are the distinct types of data available from Wildlife Computers tags.

To take full advantage of the capability of the tag, great care should be taken in considering which data products to enable and the frequency of message generation. If too many messages are generated not all of them will be received. In this case, the result will be random gaps of time during the deployment for which data are missing.

Many settings on the tag affect the total number of Argos messages generated. These include:

- Enabled data products.
- Duty-cycling of enabled products
- Sampling Interval
- Summary Period

The combined effect of the chosen settings is shown at the bottom of the Data Products Settings section. The number of messages generated per day and the total number of messages generated during the entire mission are displayed. In the case of duty-cycling, two values are shown to account for the different number of messages generated during on and off duty-cycle days. A warning is displayed when the message total exceeds the maximum likely to be successfully received. The total number of messages received varies depending on the sea-surface.


The rule of thumb is, the fewer number of messages that the tag generates, the greater the probability that ALL generated messages will be received. Some study objectives require finer temporal resolution,

contiguous temporal coverage, and/or longer deployment durations such that many messages are generated. In these instances, one can use duty-cycling to help control when the “holes” in the data occur.

## Duty Cycling

Duty cycling is the generation of Argos messages on an intermittent schedule, rather than daily. Duty-cycling can be used to reduce the total number of messages generated and to extend deployment duration.

- Duty-cycle a data product by selecting: Generate On Schedule
  - The scheduler will appear at the base of the section (Figure 11).
  - Select your preferred pattern, either On-Off-On or Off-On-Off and fill in the number of days for each step.
  - The same schedule is used for all duty-cycled data products.



The screenshot shows a configuration window titled "Schedule" with an information icon. It features two radio buttons: "On Off-On" (selected) and "Off On-Off". To the right, there is a text input field with three dropdown menus: "Initially on for 30 day(s), then off for 1 day(s) and on for 2 day(s)".

Figure 11—Argos message generation duty-cycle pattern. Messages are initially generated for 30 days then off for one day and on for two. The off one, on two pattern repeats for the duration of the deployment.

## Daily Messages

### Light-level and SST Geolocation

Light-level and sea-surface temperature messages are always generated daily. The dawn and dusk transitions are used to calculate geolocation. Two light-level curves are created for each day of the deployment containing the following information:

- Whether or not the curve contains a dawn or dusk transition.
- Nine light-level and depth samples taken during each transition.
- A sea-surface temperature for each transition. This is compiled from the samples taken up to seven hours on the dark side and one hour on the light side of the transition.

### Light Attenuation Constants

The tag calculates daily light attenuation constants, correcting the light measurements for depth. For most applications, having light attenuation constants turned on is appropriate. If this feature is disabled, the tag uses predetermined values for the light attenuation constant. Disabling this feature can be useful for animals that follow isoluminescence (e.g., swordfish).

### 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. Each message contains four days of data.

## Orientation Data

This data product characterizes the vertical orientation over time of a single-point mount MiniPAT. Orientation data uses the onboard accelerometer and is designed to detect activity. It is only available on shorter deployments with the archive sample interval is one second.

For each UTC Day, one message is generated that contains two-hour summary periods with:

1. Time upright
2. Number of times the tag was *knocked down*.
3. Wet/dry summarization.

There are adjustable parameters for this data product:

1. The knockdown detector identifies changes in tag orientation. Select the threshold that qualifies a change in acceleration as a knockdown event.
2. To determine the amount of time a tag spends upright versus tilted, a threshold definition of upright is needed.

Daily Data cannot be duty-cycled.

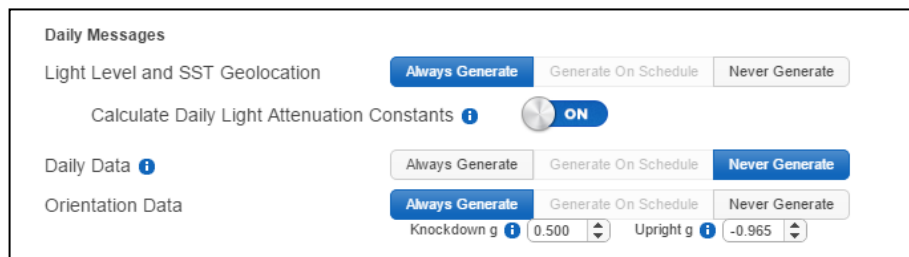


Figure 12—Daily Message data products. Screen capture shows Light-level messages generated daily, Light Attenuation calculations turned on, Daily Data messages turned off, and Orientation Data turned on.

## Time Series Messages

MiniPAT tags can send time series depth, temperature, and activity data through Argos. Depth and temperature time series provides low frequency reporting of sensor data for instruments which may never be recovered. Activity time series counts outliers in activity above an average activity level. This data is derived from 10Hz acceleration data.



**Activity Time Series is only available on deployments of 96 days or less.**

### Sampling Interval

Time series messages can be generated using one of five sample intervals (75, 150, 300, 450, 600 seconds). This determines the number of Argos messages generated per day. **The time series sample interval is entirely independent of, and unrelated to, the archive sample rate.** 48 summarized samples, covering one message period, will fit into one Argos message. Messages are transmitted in sequential order to maximize the probability of receiving continuous runs of data.

Possible Time-Series combinations:

- Depth
- Temperature
- Depth and temperature
- Depth and activity\*
- Depth, temperature, and activity\*

\*To enable Activity Time Series, Depth Time Series must be enabled.

Sampling Interval (seconds)	Argos Messages Per Day			Message Period (hours)
	Depth or Temp (One channel)	Depth and Temp (Two channels)	Depth, Temp and Activity (Three channels)	
75	24	48	72	1
150	12	24	36	2
300	6	12	18	4
450	4	8	12	6
600	3	6	9	8

Figure 13—The number of Argos messages created per day and the corresponding message sample period for the five time series sample intervals.

The sample interval determines the number of messages generated per day. Selecting a short (75-second) time series sampling interval will rapidly generate many messages. This may be appropriate for a short deployment. However, if too many messages are generated, they may not all be received. The result will be random gaps of time during the deployment for which there is no time series data. Selecting a longer sampling interval will improve the odds that there will be no gaps; however, the temporal resolution of each datum will be reduced. Different study objectives will warrant different trade-offs between coverage and temporal resolution.

Each depth and temperature time series message contains:

- The time series data sampled at the specified interval.
- The minimum and maximum values encountered during the period covered by the time series message period as measured at the fast archive sampling rate.



**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.**

Each activity time series message contains:

- The number of active events occurring in each time series interval (ex: 75 sec or 600 sec).
- The overall level of activity for the period of the message (ex: 1 hour or 8 hours).

Duty-cycling can be used to reduce the number of time series messages generated. Duty-cycle settings do not affect the tags archive sample rates.

### Examples of Time Series Sampling Settings

For the MiniPAT tag, on average approximately 2,000 Argos messages are received following release. With this number in mind, one can work backwards to determine how quickly a time series can be sampled given a preferred deployment length. Following are some typical set-ups:

- 20-day deployment = 75-second sampling interval for depth, temperature, and activity time series. 72 messages per day x 20 days = 1500 messages.
- Three-month deployment = 300 second sampling interval for depth and temperature time series. 12 messages per day x 90 days = 1080 messages.
- Eight-month deployment = 600 second sampling interval for depth and temperature time series. 6 messages per day x 240 days = 1440 messages.

### Time Series Sensor Resolution

Time series sensor resolution will vary for each measurement. All 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.

### Summary Messages

To maximize information throughput, the MiniPAT condenses sensor observations into summarized messages.

### Mixed-Layer Temperature

Mixed-layer temperature messages describe the amount of time the animal spends in the mixed layer, the depth of the thermocline, and temperature of the mixed layer. When enabled, one message is created for each summary period and includes:

- Time in the mixed layer (percent)
- Depth of mixed layer (max)
- Temperature of mixed layer (min, max, avg)
- Temperature of the sea surface (min, max, avg)
- Overall depth (min, max)
- Overall temperature (min)

The mixed layer temperature is continuously calculated by the tag. To calculate the mixed layer temperature the tag uses either a temperature measurement from depths shallower than 5 meters or whenever the temperature gradient is less than 0.05°C per 15 meters. By comparing the depth-temperature pairs with the mixed layer temperature, a temperature difference greater than 0.5° C is considered to indicate a depth below the mixed layer (Wildlife Computers pers. comm. 2023).

## Profile of Depth and Temperature (PDT)

PDTs record the minimum and maximum temperatures observed at different depths.

- Low-resolution—the minimum and maximum temperatures observed at 8 depths are recorded and transmitted in one message per summary period. The depths are chosen dynamically to include the minimum and maximum depths detected, where the difference between the minimum and maximum is separated into 6 equal parts. The most frequented depth within each part is recorded (plus the minimum and maximum depths) to make up the 8 depths observed for the profile. You will only receive 8 depths (with corresponding temperatures) with low-resolution profiles.
- High-resolution—the minimum and maximum temperatures observed at 16 depths are recorded and are transmitted in two messages per summary period (when a tag exceeds 400m). The depths are chosen dynamically to include the minimum and maximum depths detected, where the difference between the minimum and maximum is separated into 14 equal parts. The most frequented depth within each part is recorded (plus the minimum and maximum depths) to make up the 16 depths observed for the profile.
  - When enabled, for summary periods where the tag exceeds  $\geq 400\text{m}$ , the tag will record the 16 depths for a high-resolution profile. However, even if high-resolution is enabled, if all dives during a summary period are  $\leq 400\text{m}$ , the tag will default to low-resolution profiles, recording 8 depths (with corresponding temperatures).
  - For data compression reasons, high-resolution PDT summaries require two messages to send 16 depths. To allow you to see the entire range of the profile (even if you only receive one of the two messages), every other depth (with corresponding temperatures) is transmitted in the first message. The remaining, alternating depths are in the second message (essentially filling in the gaps of the first message).

**Please contact your technical sales consultant at [tags@wildlifecomputers.com](mailto:tags@wildlifecomputers.com) to enable this feature.**

- PAT-style PDTs are oceanographic profiles. As the time and order of the values are not transmitted it is not possible to determine animal behavior using PDT data.

Depth points are distributed between the minimum and maximum depths observed during each summary period.

## Histogram Messages

Two types of histograms are available:

- Time-at-Depth (TAD) histograms bundle the depth sensor measurements collected into bins based on how much time the tag was at the user-defined depth ranges.
- Time-at-Temperature (TAT) histograms bundle the temperature sensor measurements into bins based on how much time the tag was at user-defined temperatures.

Histograms are generated starting at 00:00 UTC.



## Histogram Bin Limits

There are twelve bin limits for each of the two histograms. These numbers are the upper inclusive limit for each bin. The limits in the first eleven boxes can be edited. The twelfth bin limit shows the highest valid sensor measurement and cannot be adjusted.

## Summary Period

The summary period is the collection duration of the summary messages. The summary period can range from one hour to 24 hours, but the chosen period must divide the day evenly. The summary periods begin immediately after midnight UTC by default and run to the end of the UTC Day. Selecting a six-hour summary period will cause the tag to split the day into four periods from 00:00 hrs. to 06:00 hrs.; 06:00 hrs. to 12:00 hrs.; 12:00 hrs. to 18:00 hrs.; and 18:00 hrs. to 24:00 hrs. This pattern will repeat on the next UTC Day.

The screenshot shows the 'Data Product Settings' interface. It is divided into several sections: 'Daily Messages', 'Daily Data', 'Orientation Data', 'Time Series Messages', 'Summary Messages', and 'Histogram Bin Limits'. Each section contains radio buttons for 'Always Generate', 'Generate On Schedule', and 'Never Generate', along with other controls like a toggle for 'Calculate Daily Light Attenuation Constants' (set to ON) and a dropdown for 'Summary Period' (set to 24 Hours). The 'Histogram Bin Limits' section contains a table with 12 columns for temperature and depth measurements.

Bin #	1	2	3	4	5	6	7	8	9	10	11	12
Temp	3.0 °C	6.0 °C	9.0 °C	12.0 °C	15.0 °C	18.0 °C	21.0 °C	24.0 °C	27.0 °C	30.0 °C	33.0 °C	45.0 °C
Depth	10.0 m	20.0 m	40.0 m	70.0 m	100.0 m	200.0 m	300.0 m	400.0 m	500.0 m	700.0 m	1000.0 m	2,000m

The tag will generate 9.25 message(s) per day, for a total of 1,665 message(s) based on a 180 day deployment.

Figure 14—The Data Product settings.

The Data Product settings shown in Figure 14 are for a 180-day deployment. 9.25 messages are generated each day. These include:

- 1 x Light-level message
- 0.25 x Daily Data message
- 6 x Time Series messages
- 1 x Profile of Depth and Temperature (at Low Resolution)
- 1 x Histogram (TAT and TAD) message

## Transmission Settings

This category displays the Argos interval, which is how often the tag will test for dry conditions and try to transmit after pop-off. The transmission interval for pop-up tags is 60 seconds. This parameter is set by Wildlife Computers.

### Loading Settings into a Tag

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 setting updates are available.

### Save Settings to PDF

To save a copy of your settings in a separate file, click on Save to PDF in the top right of the Administer Tag section of Tag Agent. This will save a PDF on the computer. Send changes to the tag prior to saving the settings.

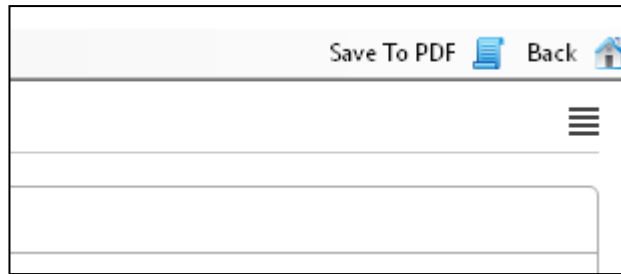
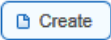


Figure 15—Save settings to PDF.

## Creating Templates

Once tag settings have been configured a template can be saved. Templates allow configuring of multiple tags with the same settings. Select the ☰ icon in the upper right corner of the screen to reveal the Template Manager. You have the option of creating an online template or a local template file of the current settings selected. Local templates are used when no internet connection is available.

To create a temple, select  and give the template a name.

## Viewing Configuration History

A tag's configuration history can be viewed using the arrowhead icon on the left sidebar menu. Clicking the arrowhead will expose the tag history and once viewed, clicking on the arrowhead again will hide the History. Previous tag settings can be viewed by clicking on each date listed.

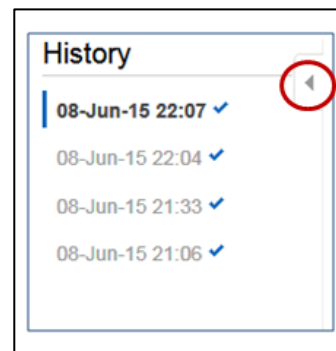


Figure 16—Tag configuration history can be viewed using arrowhead icon.

## Disconnecting from MiniPAT

Use the Disconnect tab on the upper left of the Tag Agent Menu to select the tag state before unplugging. If you are planning to deploy soon, select Auto-Start mode. Tag will then auto deploy upon saltwater submersion.

Always disconnect the tag using the Disconnect button. Unplugging without setting the tag state could leave the tag in a mode that will rapidly deplete the battery.

## Clearing the MiniPAT Memory

The memory archive is cleared automatically when a new deployment is Started (Tag set to Start, then put into Standby or Stop, and then Started once again). The LED will indicate that the tag is clearing the archive with many rapid blinks.

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 Start mode.

## 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 Figure 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 Figure 2) with your fingers should drop the value by 20 to 40 counts.

## Testing Transmissions

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.

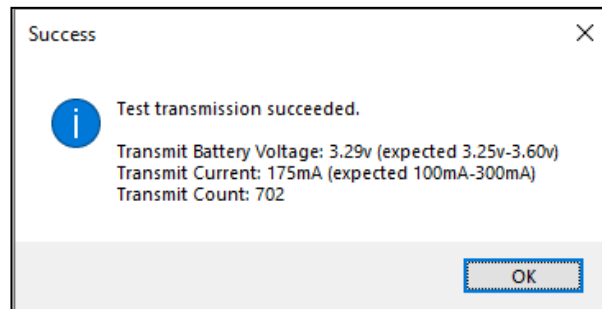


Figure 17—Test transmission results.

- 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, resulting in a deployment seed location. After completing the test, **the tag will be in STOP mode, and you will need to communicate with it again prior to deployment.**

**Pop-up tags do not need a deployment seed location (initialization) prior to deployment, like other satellite tags.** If you want a reassurance test before deployment that the tags are transmitting to the satellites, click on the Advanced Tab and then Argos Transmitter Test.

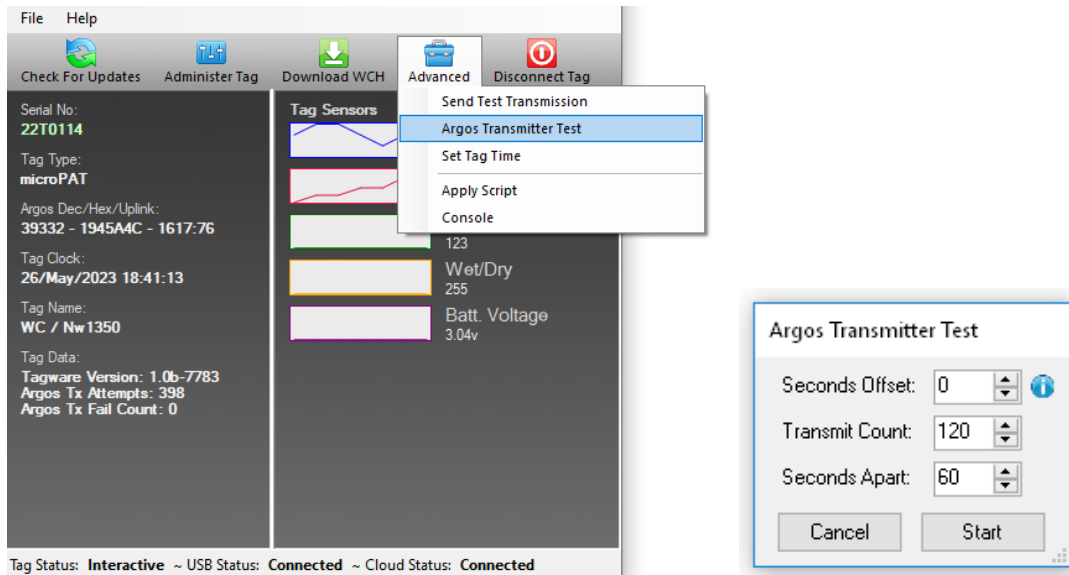


Figure 18—Argos transmitter test.

- 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 using the Argos website prior to beginning the test.
- Seconds Apart: The time between each transmission. The usual repetition rate for a MiniPAT is 60 seconds.

When all tags have started the Argos Transmitter Test, take them outside where they have a full view of the sky. For the best results, float the MiniPATs 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 before 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 that 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
spot6tagger@gmail.com	MiniPAT	13P0569	91966	2.4q	ETP 2014
spot6tagger@gmail.com	sPAT	16P0239	39332	2.4q	Heather sPAT 2.4q
spot6tagger@gmail.com	sPAT	16P2040	39332	2.4q	
spot6tagger@gmail.com	MiniPAT	13P0544	39332	2.4n	

Figure 19—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 you 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 programmed 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 programming can be done offline, Tag Agent must be downloaded **and opened with valid credentials entered** while connected to the internet.

So long as the software has been opened once and credentials have been entered, programming offline is feasible. To program settings, select Administer Tag from Tag Agent's top navigation bar, choose settings, and click Send Changes. A dialog box will confirm settings have been loaded into tag.

The next time an internet connection is established, and Tag Agent software is open, the historical record will be updated in Tag Portal.

Online templates are not accessible when working offline. To program a group of tags with the same settings when working without internet connection create a local template. A file of the selected tag settings will be saved onto your local machine. Local templates can be created and applied in the Template Manager. Expose the Template Manager with the ☰ icon in the upper right corner of the screen. The Internet connection status is displayed at the bottom of the Tag Agent home screen.

## MiniPAT Recovery and Data Download Instructions

If the MiniPAT 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 MiniPAT 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 MiniPAT full of valuable deployment data, there are several steps to perform before attempting to connect it to the USB communication 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 MiniPAT with a paper towel.
  2. Remove the rubber communications port protection plug.
  3. Gently clean the pins with a small brush—like a toothbrush—and isopropyl alcohol or acetone to remove the silicone grease from the pins.
  4. 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 MiniPAT which has saltwater in the communications port will cause the pins to corrode very fast!**

5. 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 MiniPAT to Wildlife Computers, and we will download your data.
6. Examine the pins in the communications port. If they are rusty or corroded, send the MiniPAT back to Wildlife Computers for downloading.
7. If all four pins look clean and golden in color, you can continue and attempt to establish communications.
8. 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 tab on the Tag Agent top navigation bar to download MiniPAT archival data (Figure 20). You will 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.

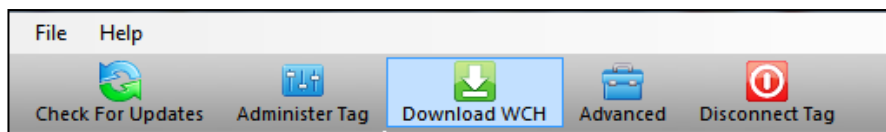


Figure 20—Tag Agent menu bar. Select Download WCH to download archived data.

## What's In the Archive

The channels stored in the archive will differ if the ATS or Orientation data products are enabled. Refer to the table below to see what will be stored in the archive.

<b>ATS</b>	Off	<b>On</b>	Off	<b>On</b>
<b>Orientation</b>	Off	Off	<b>On</b>	<b>On</b>
Depth	X	X	X	X
Temperature	X	X	X	X
Light	X	X	X	X
X-axis	X		X	
Y-axis	X		X	
Z-axis	X	X	X	X
Dry	Present but invalid		X	X
Aux (knockdown events)			X	X
Mobility		X		X
Wet/Dry				

Figure 21—What appears in the archive.

## 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, MiniPAT 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.

### MiniPAT 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.

### MiniPAT 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.

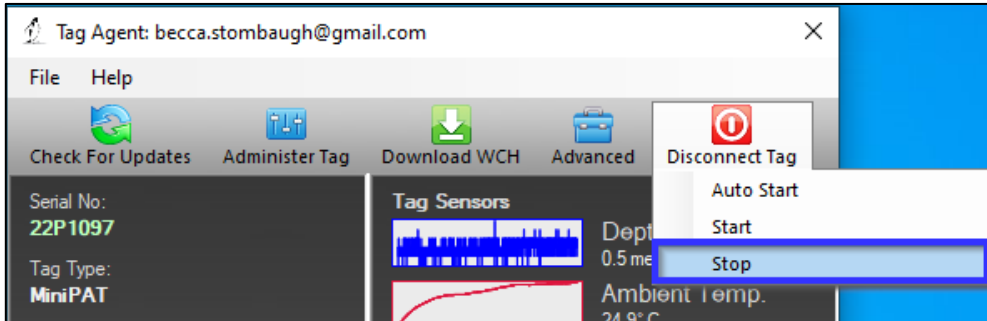


Figure 22—Example of how to put tag in Stop mode in Tag Agent.

### Special Considerations for Longer-term Storage

MiniPAT 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 before 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.



**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](mailto:tags@wildlifecomputers.com)) to coordinate the return.**

#### Exercising Tags with Tagware Versions Before 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.



Figure 23—Location of Tagware version on Tag Agent main screen.

## 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 underwater. For this reason, a good angle and height orientation for the Sending Test Transmissions is shown below.



Figure 24—Optimal orientation of pop-up tag for Test Transmission.

Connect to each MiniPAT 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.

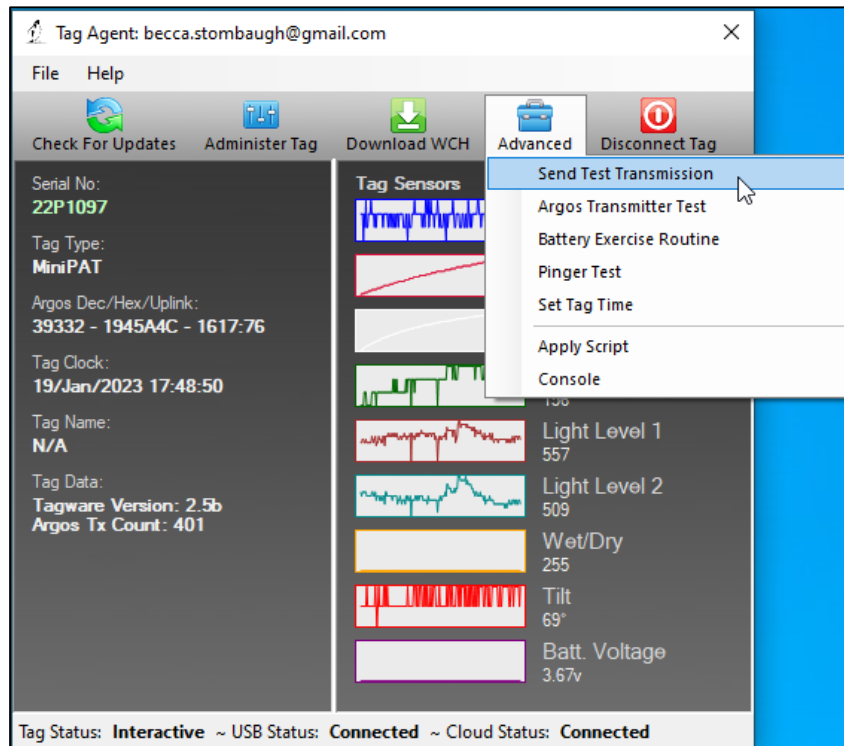


Figure 25—Example of Send Test Transmission.

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.

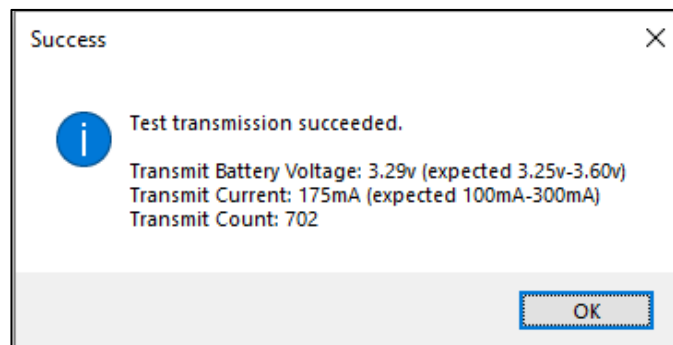


Figure 26—Example of acceptable transmit battery voltage and acceptable transmit current.

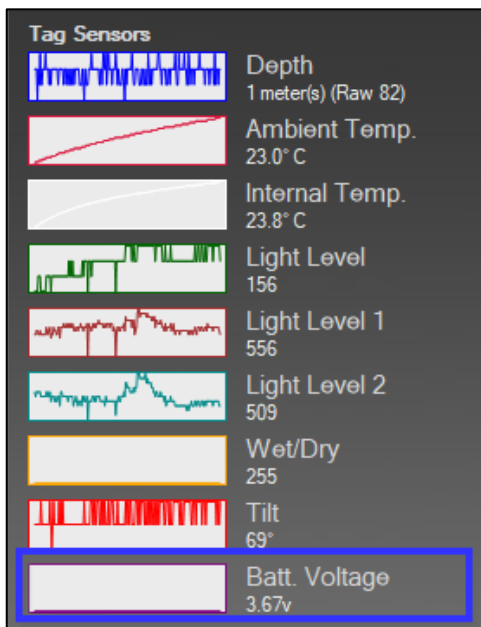


Figure 27—Example of acceptable battery voltage and normal readings for all sensors on the main screen of Tag Agent.

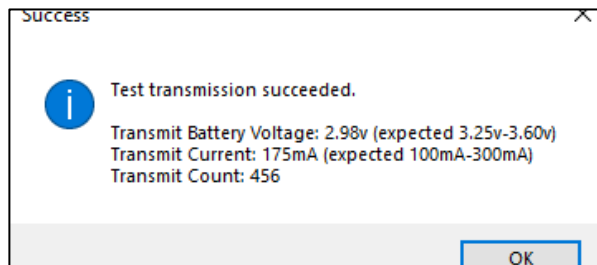


Figure 28— Example of low transmit battery voltage and acceptable transmit current.

If you see a lower-than-acceptable voltage, it may be due to passivation forming during storage. If the tag does not pass the test transmission, we recommend contacting your technical sales consultant.

## Technical Specifications

Sensors	Wet/Dry, Depth, Temperature, Light, Accelerometer
Depth Sensor Range	0-1700 m, 0-2000*
Depth Sensor Resolution	0.5 m, 1m*
Depth Sensor Accuracy	± 1% of reading
Temperature Sensor Range	-40° C to 60° C
Temperature Sensor Resolution	0.05° C
Temperature Sensor Accuracy	± 0.1° C
Light Sensor	$5 \times 10^{-12} \text{W.cm}^{-2}$ to $5 \times 10^{-2} \text{W.cm}^{-2}$
Accelerometer Resolution	4 mg
Accelerometer Accuracy	± 0.15 g
Accelerometer Range	± 2 g
Dimensions	118 mm (length) x 41 mm (diameter)

Weight in Air	68 g
Maximum Deployment Length	730 days
Memory	64 MB
Attachment Type	Towed
Operating Temperature Rating (° C)	-20° C to 50° C
Optimal Storage Temperature Range (° C)	0° C to 5° C
Pressure Rating	2000 m
Conductivity Operational Limits	0.1 to 5 S/m
Communication	Via USB port using Wildlife Computers communications cable

*\*Meters of freshwater. To convert to dBar, or an approximation for meters of seawater, multiply the reported value by 0.9804*

## Additional Information

### Glossary of Terms

- Administrator—someone who has authority to publish and change tag settings.
- Argos PTT (ID)—uniquely identifies a transmitter for the Argos system. The ID consists of a decimal number and a hexadecimal (base 16) number.
- Argos Subprogram—subdivision of a primary Argos account. Each subprogram has separate login credentials.
- Argos Location—a location generated by Argos from uplinks received during a satellite pass. Multiple uplinks are required to generate a single location. Get more information about how the Argos system works here: <http://www.argos-system.org/web/en/391-faq-general-questions.php>
- 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 various types of data available from Wildlife Computers tags
- Deployment—the period when a tag is attached to an animal and started.
- 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 will test for dry conditions and try to transmit. This value is programmed by Wildlife Computers.

- Start/Auto-Start/Stop—tag states. When started, the tag will initiate a scheduled release. 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 program Wildlife Computers tags.
- Tagware—the software running on a tag.
- Wildlife Computers communications cable—the cable required by Tag Agent
- Tag Portal—the cloud-based service offered by Wildlife Computers for data viewing and remote tag setup.
- Wildlife Computers Spark Cable—the Wildlife Computers communications cable which is required by Tag Agent to interface with a Wildlife Computers tag.
- 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 Prospeed.

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. MiniPAT 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 MiniPAT 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**

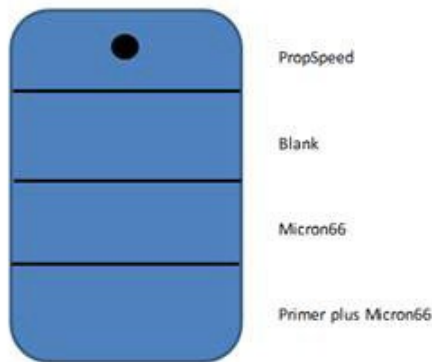
Wildlife Computers have been undertaking tests on antifouling paint in various parts of the world.

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:





## Battery Exercise Routine

**Only applicable for MiniPAT models before 430. You must be connected to the Internet to run the 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.”

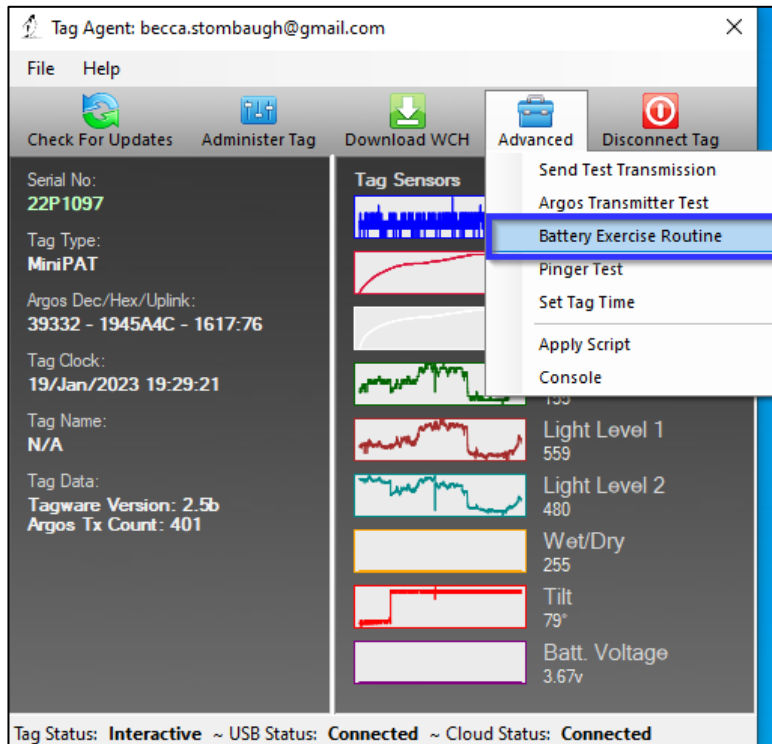


Figure 29— Battery Exercise Routine location in Tag Agent.

The following box will appear:

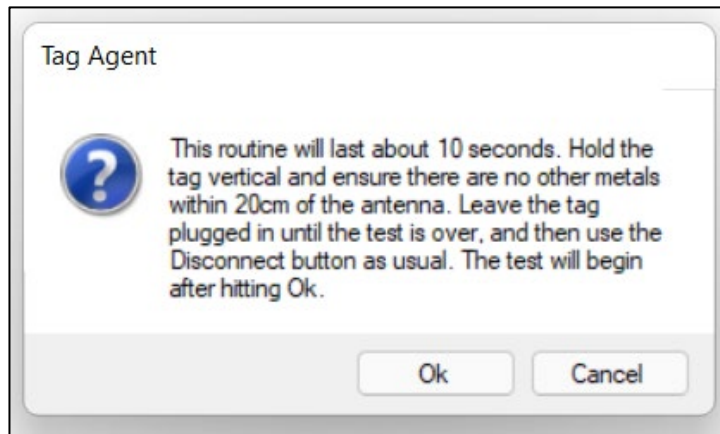


Figure 30— Battery Exercise Routine prompt.

- To run the test, click “OK” to exercise the battery. The test will perform 10 transmissions very quickly.
- To exit test, click “Cancel.”

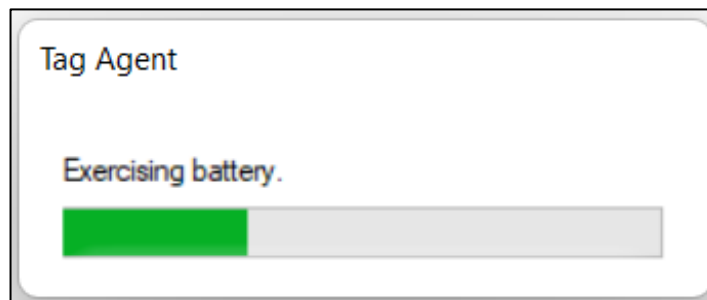


Figure 31— Example view of ongoing Battery Exercise Routine test.

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.*

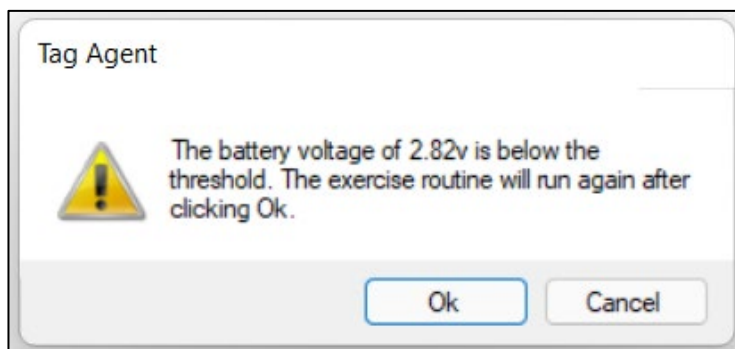


Figure 32— Low voltage output. Prompt to rerun test.

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

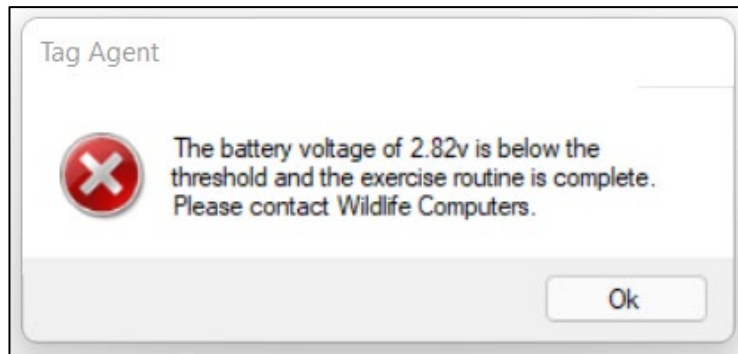


Figure 33— Low voltage output. Prompt to contact Wildlife Computers.

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

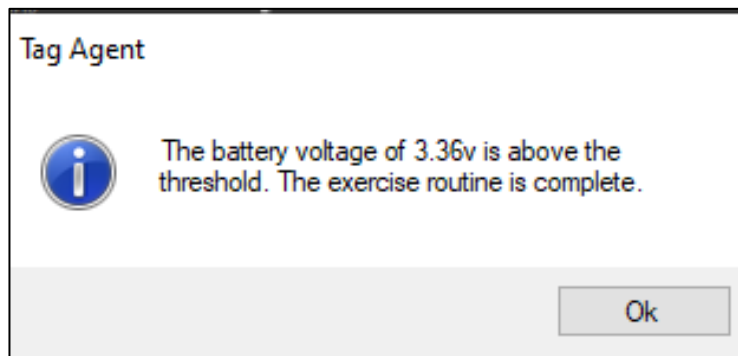


Figure 34— Acceptable voltage output prompt.

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 35— 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  $169 \text{ BV} / 51 = 3.31 \text{ v}$ .**

## 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  
8310 154th Avenue NE,  
Suite150  
Redmond, WA 98052 USA

### Email

Sales, Quotes, and Inquiries: [tags@wildlifecomputers.com](mailto:tags@wildlifecomputers.com)  
Technical Support: [support@wildlifecomputers.com](mailto: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 main office in Redmond, WA.

Yong Huang  
Enfotran Corporation  
816 Evergreen Point Road, #217  
Medina, WA 98039  
USA

### Email

[yong.huang@enfo.us](mailto:yong.huang@enfo.us)

### Phone

+1 (425) 456 0101

### Fax

+1 (425) 456 0303

