Payload Recovery Device User Guide

This user guide will give you all the essential information needed for interacting with, configuring, and deploying a Wildlife Computers PRD-RP (Payload Recovery Device – Remote / Pinniped).

WILDLIFE COMPUTERS

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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 where special attention should be paid.

The list below shows what is required to interact with a PRD-RP:

- A Windows® computer with Tag Agent and our USB driver installed
- A Wildlife Computers Data Portal Account
- A Wildlife Computers Communications Cable
- A magnet

Visit wildlifecomputers.com to create an account and download the required software. At the end of this document there is a list of key concepts to reference. We recommend new users review this list.

About the PRD-RP

The Wildlife Computers PRD-RP (Payload Recovery Device-Remote Pinniped) is an Argos transmitter and release device.

The PRD-RP will release from a base plate with a command from the Remote Release Controller, and the PRD-RP will transmit to the Argos satellite system. Consecutive transmissions received in a single satellite pass are used to calculate the location of the PRD-RP and its host animal. See www.argos-system.org for more information on Doppler locations.

PRD-RPs have an onboard clock that keeps track of when a transmission should be made. When it is time to make a transmission, the PRD-RP monitors its wet/dry sensors. As soon as the sensors indicate a dry condition, transmission is initiated and the receiver listens for a release command.

Anatomy of the PRD-RP

The PRD-RP has several unique elements and also many elements in common with other tags offered by Wildlife Computers (Figure 1).

The recovery platform contains all of the electronics and the battery of the PRD-RP. The base plate is attached to the animal and is left behind.

The recovery platform separates from the base plate when a release command is received. Take care to keep any epoxy or adhesive away from the interface as this will prevent the platform and base plate from separating.

The communications port is where the Wildlife Computers Communications Cable connects to the PRD-RP. 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 PRD-RP to function normally.

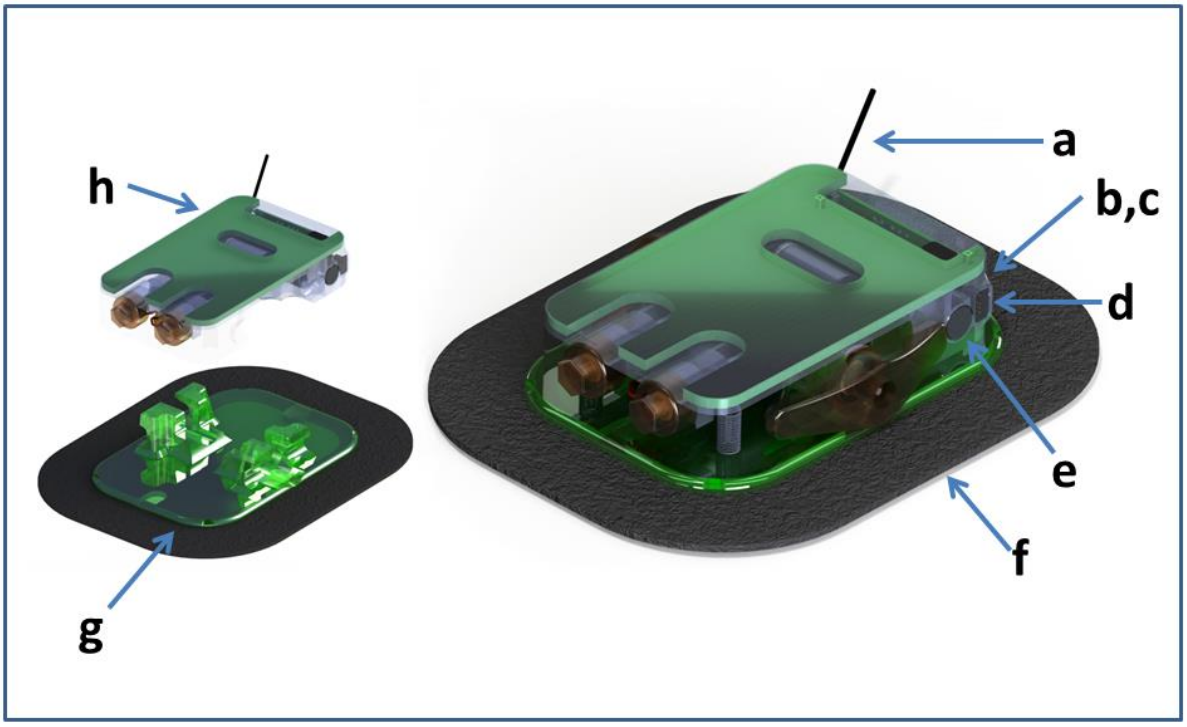


Figure 1— PRD-RP showing: (a) Argos antenna, (b) indicator light, (c) magnetic switch, (d) communications port with plug, (e) wet/dry sensors, (f) protective skirt, (g) recovery platform, and (h) base plate

Note: the magnetic switch is not visible. It is located near the base of the communication port. Swiping a magnet across the communication port will activate the switch.

The wet/dry sensor is composed of two or more metal discs on the surface of the PRD-RP. *Do not cover any of the metal discs* with anything including anti-fouling substances and/or attachment adhesives (e.g. epoxy). Sea water contact is essential for normal function.

Device States

PRD-RPs have three states—Auto-Start, Start and Stop.

Auto-Start—when in Auto-Start mode, the PRD-RP will automatically deploy when submerged in seawater.

Start—when in Start mode, the PRD-RP is running. When first deployed, the LED will blink every second. This "heartbeat" blink provides visual confirmation that a PRD-RP switched from Auto-Start to Start and is meant to prevent deployment of deactivated devices. Additionally, the LED will blink

brightly whenever the PRD-RP transmits to the satellite. The duration of both the heartbeat blinks and transmission blinks is user-programmable (see Miscellaneous Settings section). For some applications, it may be best to disable the blinks as they can draw unwanted attention to the tagged animal.

Stop—Stop mode is used for storing and shipping. In Stop mode, the PRD-RP will remain unresponsive until communicated with via Tag Agent. If storing tags, keep them in a cold place such as a refrigerator or freezer. See Tag Storage and Battery Maintenance.

Display State Using a Magnet

Passing a magnet near the communications port will cause the tag to reveal its current state using the LED.

- Two blinks and a pause repeated three times=Auto-Start mode
- Ten rapid blinks=Start mode
- No blinks=Stop mode

Change State Using a Magnet

A timed magnet swipe can be used to change the state of a PRD-RP between Auto-Start and Start modes.

First, swipe the magnet and wait for the LED to indicate its current state. At the end of the blinking pattern, 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 while the indicator light is on (Figure 2).

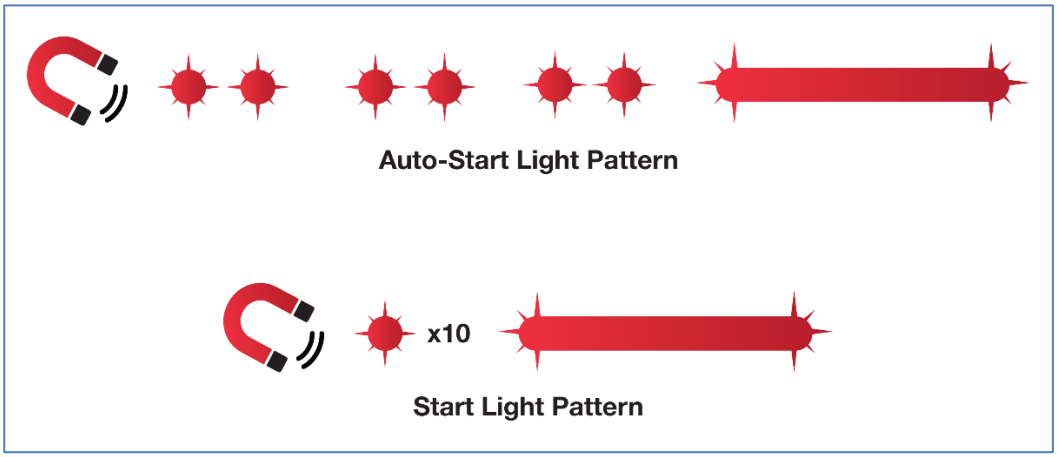


Figure 2—sample of the indicating light pattern

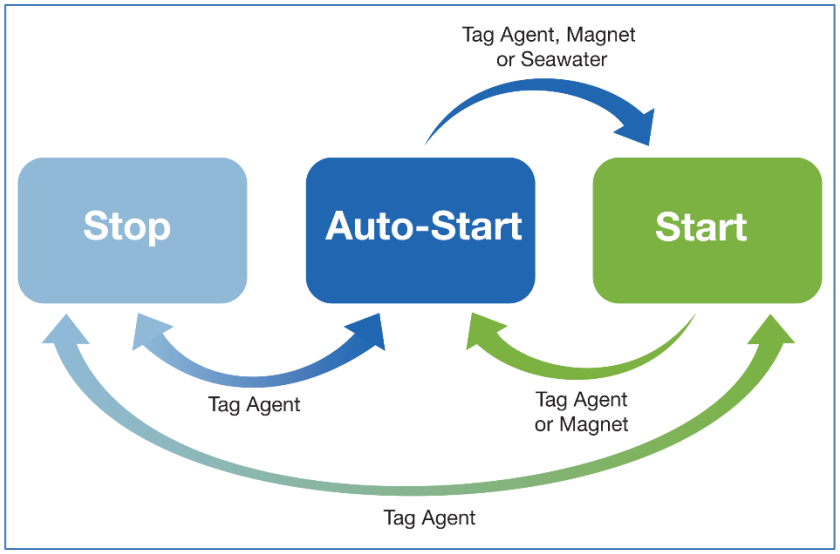


Figure 3—methods for changing states of a PRD-RP. Tag Agent can be used to put a PRD-RP in any state.

Interacting with a PRD-RP

Tag Agent

Tag Agent is used to communicate with PRD-RPs. A local copy of Tag Agent must be downloaded the first time you use it. Once installed, all updates to the PRD-RPs settings are done directly through the local copy on your machine.

The USB driver must be installed and a Wildlife Computers Data Portal account must be created prior to opening and using Tag Agent.

Each time Tag Agent is launched, you'll be greeted by a welcome screen (Figure 4). Along the bottom the Tag Status, USB Status and Cloud Status are displayed.

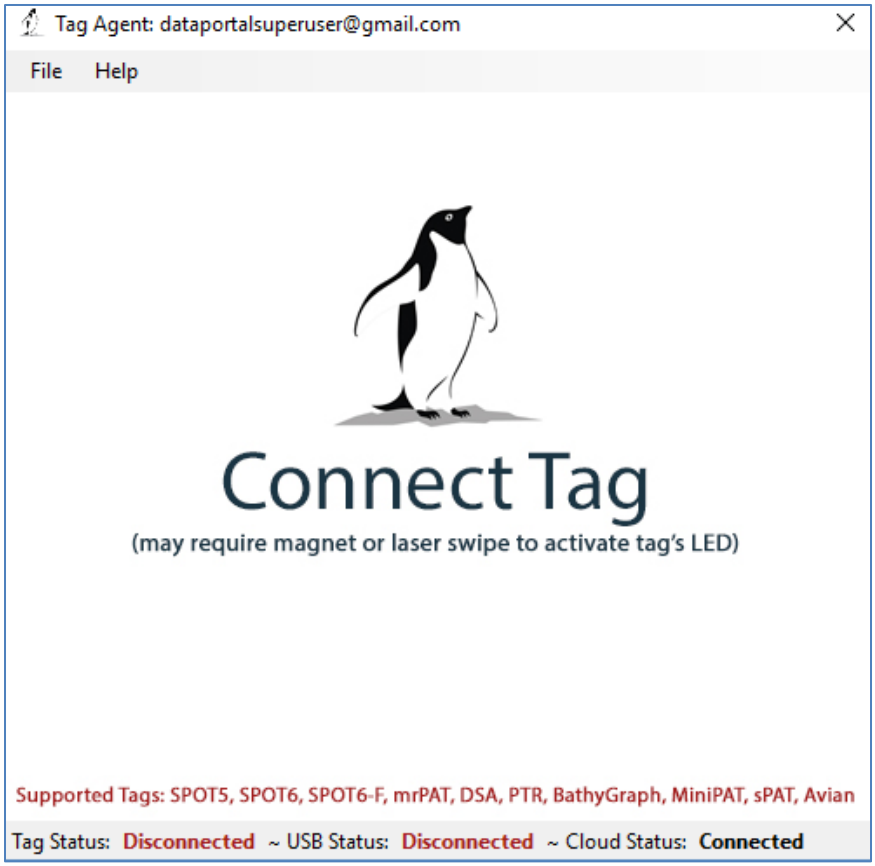


Figure 4—Tag Agent welcome screen.

Connecting to your PC

To communicate with a PRD-RP, open Tag Agent and use the USB communication cable to plug the PRD-RP into your PC. ***Make sure to align the pins properly.*** Once plugged in, swipe a magnet near the communication port to establish a connection. The Tag Agent home screen will appear with device information on the left and sensor readings on the right (Figure 5).

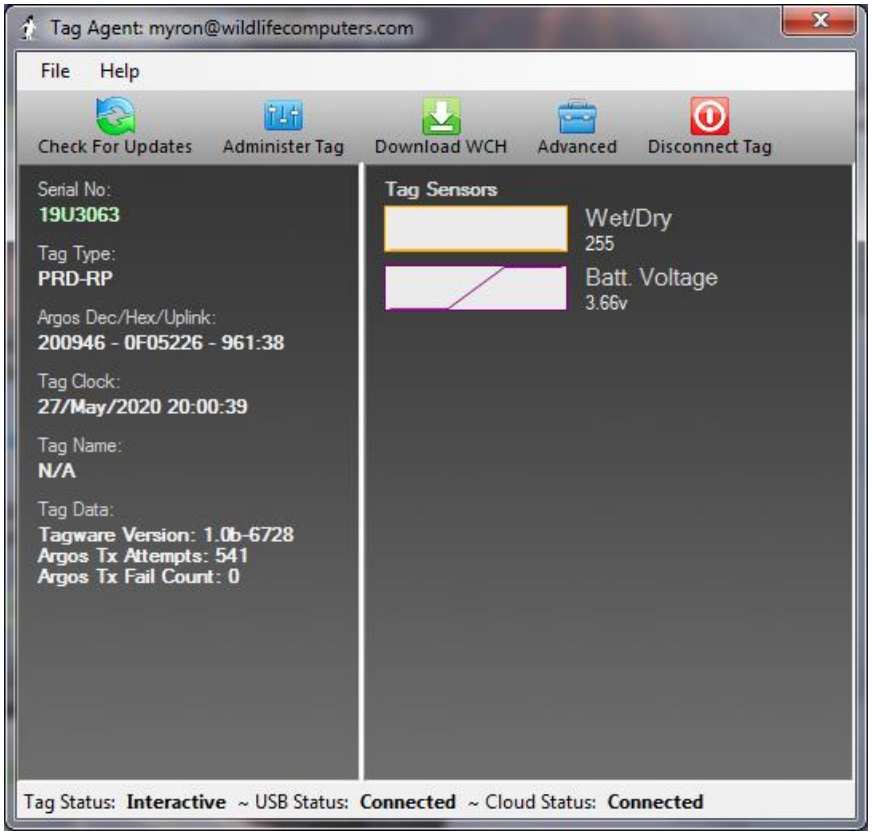


Figure 5—Tag Agent home screen.

If this is the first time you are communicating with a PRD-RP, a pop-up box will ask if you'd like to become the administrator. Selecting 'yes' will allow you to select and publish settings.

Configuring Settings

Use the Administer Tag button in the upper menu of Tag Agent to configure settings.

Figure 6—Tag Agent menu bar. Select Administer Tag to edit tag settings.

A new window will open revealing three categories—Tag Information, Data Product Settings, and Transmission Settings.

Figure 7—collapsed version of PRD-RP programming categories.

Tag Information

Tag Details

This tab includes information on administrators and Tagware version. A friendly name can be assigned to the device if desired. This can make it easier to search and filter within the portal.

Argos Settings

The PTT decimal and hexadecimal numbers as well as the Argos uplink ID are listed here. PTT numbers are a manufacturer's setting. Contact Wildlife Computers if a change is needed.

Miscellaneous Setting

PRD-RPs include an LED that blinks for a set amount of time after deployment starts. There is a faint blink every one to three seconds, and a much brighter and longer blink for every transmission and reception. The blinks are a way to visually confirm the PRD-RP is running. Consider disabling the blinks if your animal may be compromised by the flashing LED.

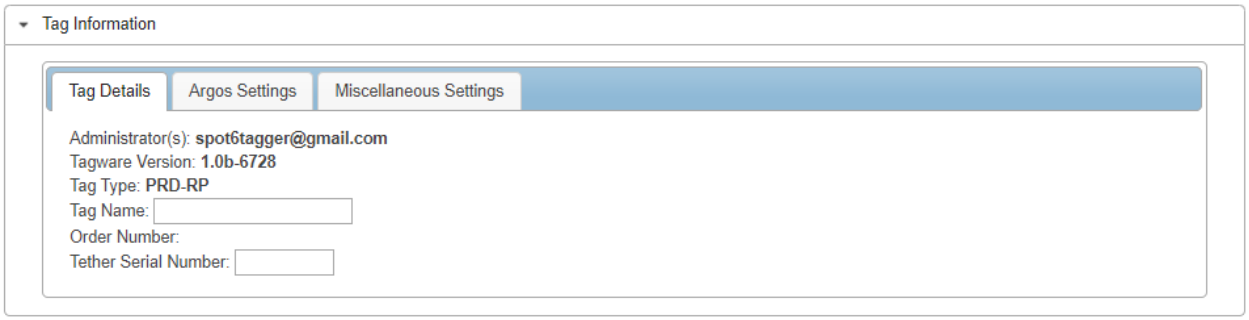


Figure 8—expanded view of Tag Details tab.

Tag Release Sequence

The preferred method of release is to use the Remote Release Controller (see separate user guide). However, the PRD-RP allows for release after a specified deployment interval or on a calendar date. You can also configure the PRD-RP to release if dry for an extended period. This might be used during a long haul out. For cases where you only want to use the Remote Release Controller, set the release interval to a large value, such as 730 days.

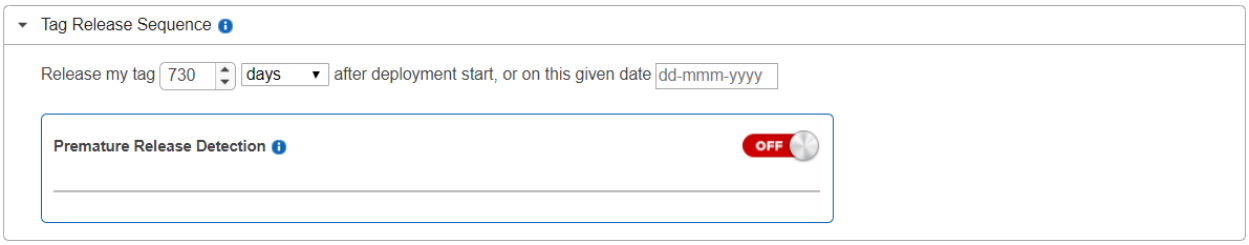


Figure 9—example of typical release settings.

Transmission Settings

The PRD-RP includes a very flexible schedule to control transmissions and the receiver. You can also synchronize the schedule to local time and select hours of Argos satellite coverage.

Transmission Modes

Independent transmission regimes can be set for when an animal is At-Sea, in Haul-Out, or when the Recovery Platform is released.

You may want to enable the receiver when the PRD-RP is on dry land or hauled out, and disable the receiver when at-sea. Disabling the receiver will save power and extend the battery's life. The Haul-Out mode entry and exit conditions are user defined. When haul out is achieved, the PRD-RP switches to its slower repetition rate (usually 90 seconds).

If tagging an animal that never hauls out, set Haul-Out mode to DISABLED to ensure transmissions always occur at the faster repetition rate.

In Released Mode, you may want the pinger enabled to facilitate recovery. You may want to leave the receiver enabled to allow for communication with the Remote Release Controller.

Transmission Patterns

Both transmission modes have a schedule that can have one or more patterns.

Patterns can start on a specific calendar date or a fixed number of days after the preceding step. This allows the PRD-RP to accommodate changing requirements during a deployment. To add steps to the pattern, select the "add pattern" tab. To configure when the pattern occurs, select the pencil icon on the tab.

Figure 10—example of a deployment with 3 transmission patterns.

Transmission Steps

Each pattern is made up of sequential steps and a loop. The pattern will run to the last step, then revert to the step designated by the loop and repeat. This can be any step in the pattern. The loop allows steps in a schedule to be used only once or all the steps to be repeated.

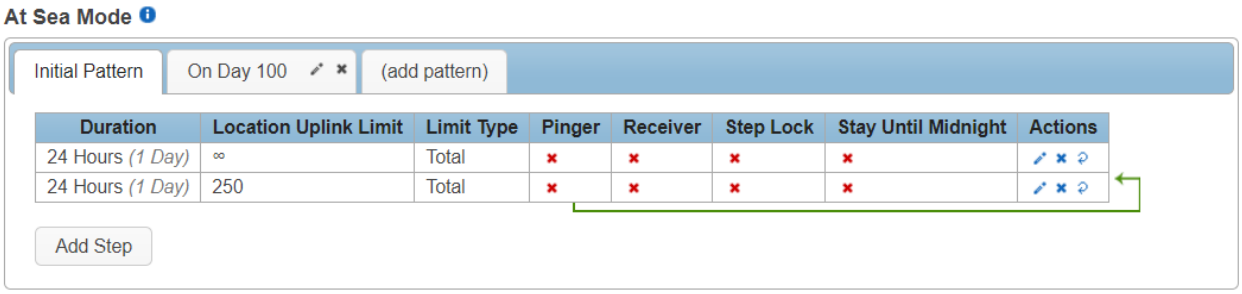


Figure 11—transmission schedule example with an initial pattern made up of steps, looping in the second step. Step one lasts for 24 hours with an unlimited number of transmissions allowed. Step two lasts for 24 hours with a limit of 250 uplinks per day and repeats indefinitely. On day 100, the next pattern is scheduled to begin. The receiver is enabled for the first 24 hours and then disabled while at-sea to conserver battery.

To configure a step, select the pencil icon under the Actions column on the far right.

1. Select the duration of the step.
2. Select the options for the step.
    - Set the Uplink Limit—the limit can be either hourly or for the entirety of the step.
    - Enable/Disable the Pinger—the pinger is used for radio tracking recovery.
    - Enable/Disable the Receiver—the receiver can be disabled to save power.
    - Step Lock—overrules the At-Sea and Haul-Out mode definitions for the duration of the step.
    - Stay Until Midnight—locks the step until the UTC midnight after the step was set to expire. It is used as a way of sync subsequent steps to UTC midnight.

The info button next to each option offers additional information.

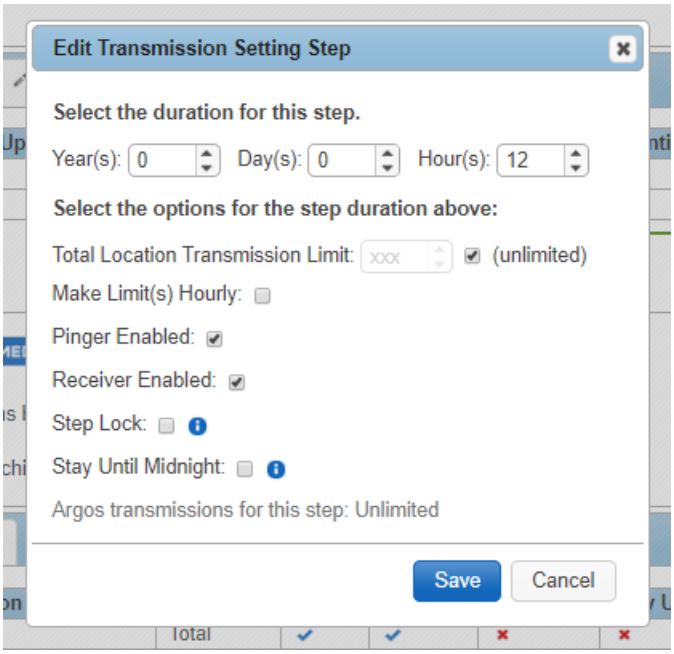


Figure 12—example of a step lasting 12 hours with unlimited uplink attempts per hour, the pinger enabled, and the receiver enabled. This is an example of a step that would help locate the PRD-RP to initiate a release.

The daily and hourly transmit settings are displayed at the bottom of the box. A caution symbol appears if fewer than 50 transmits per day are scheduled. Achieving locations from so few uplinks can be a challenge.

The Location Uplink Limit is the maximum number of transmissions for the duration of that step. It is not a daily transmission limit unless the duration is set to 24 hours.

If several steps have been set, the spiral arrow icon under the Actions column can be used to create loops.

Considerations for Location Uplink Limits and Receiver Activation

1. *Hourly limits can be used to distribute transmissions evenly throughout a step.* By default, when a step begins, transmissions occur quickly (at the set Argos repetition rate and when a dry environment is detected). Once the uplink limit is achieved, transmissions are suspended until the next step begins. If a long step duration is set, the allowable transmissions may be used before the step is complete. This can result in recurring gaps in location data. For example, in the case of a 24-hour step with a total transmit limit of 400 and a repetition period of 30 seconds, the PRD-RP could run through its allowance in the first 4 hours after UTC midnight. Alternatively, a limit of 16 uplinks per hour could be set and locations achieved throughout the day.

2. *Only a fraction of transmissions sent result in locations.* Argos locations require a perfect combination of events.
    a. A satellite must be overhead (near the equator, satellites are overhead roughly 20% of the time).
    b. The tag and animal must be at the surface.
    c. The tag must be allowed to transmit (the uplink limit must not have been met, and no mask must be on).
    d. Multiple uplinks must be received during a single satellite pass (ideally 3+).
    e. When the transmit limit is too conservative it can be difficult to achieve these conditions.
3. *Consider battery capacity and your target mission duration.* Significant power is consumed when the PRD-RP transmits and receives. Limiting the number of transmissions and reducing the time when the receiver is enabled can save battery and extend the deployment. Limiting transmissions is especially important for animals that spend ample time at the surface or haul out. For animals that surface infrequently (such as turtles and sharks) animal behavior tends to restrict transmits more than the set limit. The receiver should be enabled only when a release is desired, such as during haul outs.

Contact your Wildlife Computers Technical Consultant to discuss the battery capacity of your tag, your target deployment length, and how frequently locations are required.

Transmission Parameters

Argos Uplink Mask

In a given location there are known, consistent gaps in Argos satellite coverage. The Mask feature can be used to save battery power by preventing transmissions during hours with few or no satellite passes.

Figure 13—Argos Uplink Mask with UTC hours 6-8 and 12-13 disabled.

By default, all transmitting hours are enabled (blue). Hours which you choose to disable will turn red and appear with an X.

The best and worst satellite coverage hours can be determined using the Argos Pass Prediction Program. See Argos Pass Prediction section for instructions on how to use the program.

If you expect your animal to move more than 500 km East or West, leave all hours enabled as satellite coverage will change drastically so masking is not advised. Alternatively, you may run satellite pass predictions for the expected new locations and determine if there are appropriate transmission hours for the animals' entire migration. The Uplink Mask does not impact data collection or the pinger. The schedule only impacts when Argos transmissions are allowed.

Argos Uplink Settings

The minimum uplink interval (or repetition rate) is displayed for At-Sea and Haul-Out modes.

The typical rate for pinnipeds is 45 and 90 seconds, respectively. Turtles and sharks tend to have faster At-Sea rates (15-30 seconds) to increase the probability of multiple transmissions reaching the satellites.

Note: the repetition rate is a manufacturer setting. Contact your Wildlife Computers Technical Consultant before deployment if you wish to change the interval.

Argos uplinks can be delayed by fractions of a second once the tag is ready to transmit and becomes dry. This is typically used for large cetaceans to make sure the animal is well clear of the water and not likely to be splashed or re-submerged during an uplink. ***Note: the dry readings are attempted at 0.25 second intervals.***

Loading Settings

Once settings have been chosen use the blue Send Changes button to load settings. Tag Agent will confirm receipt of settings with a pop-up box.

Creating Templates

A template can be saved so the same settings may be applied to multiple devices. To save settings as a template, click the four horizontal lines in the shape of a square ≣ visible in the top right corner of the screen. 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.

Viewing Configuration History

You can review the programing history using the arrow icon on the left-hand sidebar menu. Clicking the arrow exposes the history of settings. Previous settings can be viewed by clicking on each date listed. The blue check mark indicates settings were applied. A date without a checkmark indicates settings were proposed but not applied.

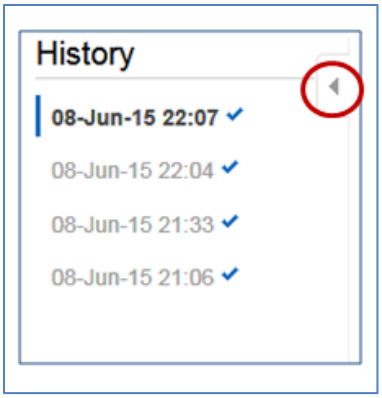


Figure 14—arrow icon exposes programing history.

Disconnect from PRD-RP

Use the Disconnect tab on the upper right of the Tag Agent home screen menu to select the device state before unplugging. If you are planning to deploy in the near future, select Auto-Start. The PRD-RP will then auto deploy upon submersion in saltwater.

Always disconnect the PRD-RP using the Disconnect button. Unplugging without setting the state could leave the device in a condition that will rapidly deplete the battery.

Check Sensor Readings

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

- Internal Temperature—this will change slowly as the entire device changes temperature. Leaving a PRD-RP in a refrigerator for a while will change the value.
- Wet/Dry—connecting a wire between a ground and active wet/dry sensor disc should change the value from 255 to less than 20.

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.

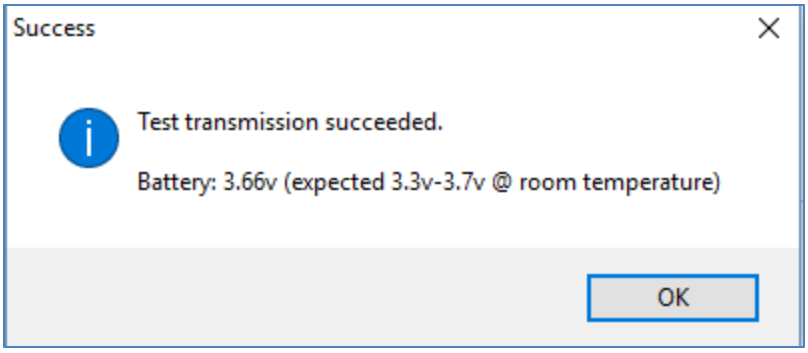


Figure 15—test transmission results.

The 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.

Using Tag Portal to Select Settings Remotely

Tag Portal is the cloud-based service offered by Wildlife Computers for remotely selecting settings. Configuring can be done without connecting to your PRD-RP. This enables project coordinators to review and select settings prior to deployment.

When logged into your portal account, a list of the tags and devices for which you have administration rights can be viewed under the My Tags tab. To select settings, click on the serial number for the device you wish to configure or use the 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 link. This will save the settings into the Cloud. The next time the device communicates with Tag Agent, a notification will appear stating 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, when they were selected, and which administrator chose the settings.

Tag Portal maintains a historical record of settings each time changes are made. The record is instantly updated so long as an Internet connection is available.

If a PRD-RP is 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 programming can be done offline, Tag Agent must be downloaded and opened with valid credentials entered while connected to the Internet. Credentials are your Wildlife Computers Data Portal login username and password.

As long as the software has been opened once and credentials entered, programming offline is possible. To program settings, select Administer Tag from Tag Agent's top navigation bar, configure the device, and click Send Changes. A dialog box will confirm when settings are loaded.

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 PRD-RPs with the same settings when working without an Internet connection, you need to create a local template. A file of the selected 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.

Payload Release

When a release is initiated, the Payload Platform will be pushed away from the base plate with springs. The PRD-RP will enter Released Mode in the transmission schedule. With the receiver enabled, you may still communicate with the tag. See the Remote Release Controller user guide for how to communicate with a tag and trigger a release.

Figure 16—Remoter Release Controller.

Refurbishing a PRD-RP

When the PRD-RP separates, the base plate remains attached to the animal. The recovery platform can be refitted with a new baseplate and cartridge. To reuse the PRD-RP, you'll need a refurbishment kit—AZ-RRDCART-001—torque wrench and sockets—AZ-TORQKIT-000, and the recovered electronics module.

The refurbishment kit contains:

- Silicon grease
- RRD base plate with replacement cartridge
- 2 x O-rings
- 2 x lock washers
- 2 x nuts
- 2 x urethane covers

The torque kit contains:

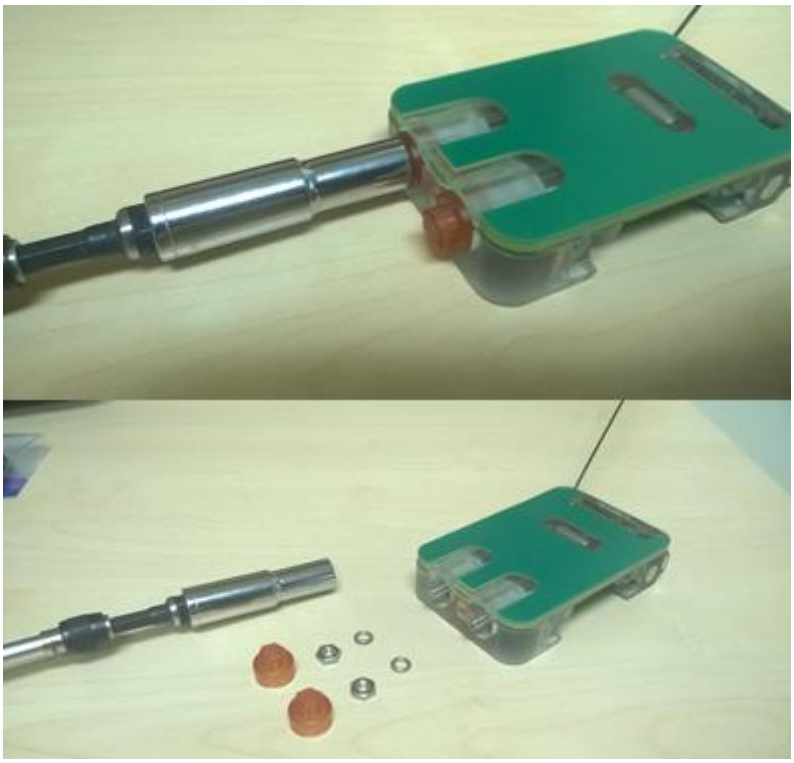
- 1 x ¼" Husky hex torque driver—micrometer adjustable, model 1000030971
- 1 x 5/16" socket (1/4" drive)
- 1 x 3/8" socket (1/4" drive)

Figure 17—refurbishment kit, torque wrench and released payload recovery platform.

Instructions for Replacing the Base Plate

Before replacing the cartridge, the PRD MUST be connected to Tag Agent and disconnected in STOP mode.

Step 1—remove urethane covers with the 3/8" socket and the nuts with the 5/16" socket. Then remove the lock washers.



Step 2—slide the cartridge from the top plate. Some force will be required as the fit is tight. There are shoulders on either side of the electronics module. Place the threads against a hard surface as shown. Use 2 hands (2 thumbs) to slide the cartridge from the green plate.

Step 3—next, liberally apply silicon grease to the threads and cartridge mating surfaces.

Step 4—replace the O-rings and spread the grease.

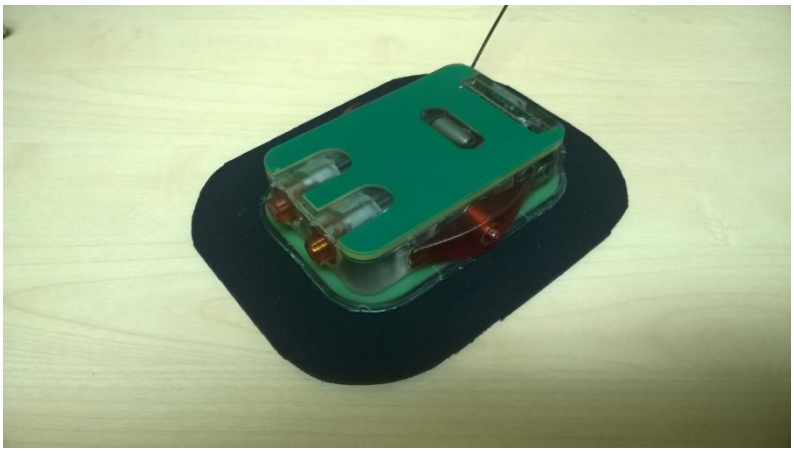
Step 5—slide the electronics module (top plate) onto the new base.

Step 6—assemble lock washers.

Step 7—assemble the nuts onto the bolts and torque 25 lbf-in using the 5/16" socket.

Step 8—add grease around the nuts. The grease will fill the cavity in the urethane covers.

Step 9—assemble the urethane covers. Tighten until fully seated with the 3/8" socket. Grease may squish out as you tighten.



Tag Storage and Battery Maintenance

Proper tag storage is important to minimize passivation and keep the batteries charged. When stored correctly, the amount of battery life lost per year is only 1-2 percent.

Tag Storage—Less Than One Month

Not much needs to be done as you will be deploying them soon. Wildlife Computers recommends storing tags in a cool, dry environment—ideally around +5° C.

Tag Storage—Longer Than One Month

If you will be storing tags longer that one month, you will need to place your tag in "Stop" mode using Tag Agent and exercise the batteries every 3 months.

Connect to each tag and login to Tag Agent. In the menu at the top, you will see the "Disconnect Tag" tab. Scroll down to "Stop." The tags can now be stored. Wildlife Computers recommends storing tags in a cool, dry environment—ideally around +5° C.

Every few months we suggest exercising the tag's batteries by sending several test transmissions. This can be done in Tag Agent. Select Advanced and then Send Test Transmission. The transmission voltage should read approximately 3.2v and the battery voltage level displayed on the main sensor screen should be around 3.5v. It may take several transmissions for the tag voltage to build up after storage.

If you receive a low voltage reading, it may be due to passivation. Turn the tag on and leave it outside for several hours. Then reconnect to Tag Agent to see if the transmission voltage level has increased.

Technical Specifications

Animal Attachment	Epoxy, glue or other adhesive
Payload Attachment	Epoxy, glue or other adhesive
Wet/Dry Sensor	Yes
Dimensions (No Payload—L x W x H)	117 mm x 86 mm x 28 mm
Weight in Air (No Payload)	343 g
Payload Platform	105 mm x 67 mm
Pressure Rating	2000 m
Operating Temperature Range	-20° to 50° C
Memory/Archive	None
Operating Life	Years*
Transmitter Frequency	401.678 MHz
Transmitter Power Output	500 mW
Receiver Sensitivity	-97 dBm
Recovery Beacon	Yes
Shipping Restrictions	None
Communication	Via USB port using Wildlife Computers USB Communications Cable

**Duration depends on device settings*

Additional Information

Glossary of Terms

- Administrator—someone who has the authority to publish 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: http://www.argos-system.org/web/en/391-faq-general-questions.php
- Argos Uplink—a radio transmission intended for the Argos satellite system.
- At-Sea and Haul-Out—device states controlled by wet/dry readings.
- Daily Data—generated from sensors over a fixed 24-hour period.
- Data Message—a message created to transmit data through the Argos system. Each data message is transmitted as payload in an Argos uplink. In order to increase the likelihood of its reception by the Argos system, each message is sent a fixed number of times.
- 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.
- Start/Auto-Start/Stop—tag states. When Started, 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 running on a tag.
- Wildlife Computers Communication Cable—the Wildlife Computers communication cable required by Tag Agent.
- Tag Portal—the cloud-based service offered by Wildlife Computers for remote tag setup. A historic record of tag settings and templates is maintained within the Tag Portal.
- Wet and Dry—the state of the tag as determined by the wet/dry sensor which measures conductivity

Argos Satellite Pass Prediction

CLS offers a satellite pass prediction program to help forecast satellite coverage at a given location. Additionally, Wildlife Computers offers a tool to graph the results and display the best hours for tags to transmit data for up to six months. The Wildlife Computers tool will display satellite pass histograms in both UTC/GMT for tag programming, and in local time for tag initialization and testing.

The following instructions outline the two-step process:

To determine when satellites will be in view, log onto the CLS website at http://www.argos-system.org and select "DATA ACCESS." Log in with your Argos username and password. Ensure that the time settings next to the login username are set to UTC. If not, then change them using the settings icon.

To run a simulation, select "Satellite Pass Prediction" on the right side of the dashboard.

- To run a simulation, select "Satellite Pass Prediction" on the right side of the dashboard.
- Set your simulation period—select today's date as the "Start Date." Then select "End Date." Use the calendar box on the right-hand side to select an end date that is six months out from today's date (the calendar will be grayed-out after six months). A shorter period can be selected for initialization testing or shorter deployments.
- Select satellites—ensure all satellites are selected.
- Enter location—select "Latitude/Longitude/Altitude." Input your deployment location coordinates. The location will display on the world map on the right-hand side. Altitude must also be set to "0" for marine applications.
- Click "Simulate"—the results spreadsheet will now appear.
- Click "Export"—select to save as a .CSV file and to save it in an easy-to-access location on your computer.
- Exit the Argos website.

Plotting the Results

- Use a web browser to navigate to the following link: http://bit.ly/argospassprediction. Adjust the UTC/GMT slider to the UTC/GMT offset of your current location, including possible daylight-saving time.

- Upload the Argos file—browse and import the pass prediction file saved from Argos. The program will display the pass prediction data for the next six months which will assist in selecting the best hours to activate the tag.

Tags must always be set and programmed in UTC/GMT time. The "Local Time" histogram is only used for identifying the best hours for tag initialization and testing.

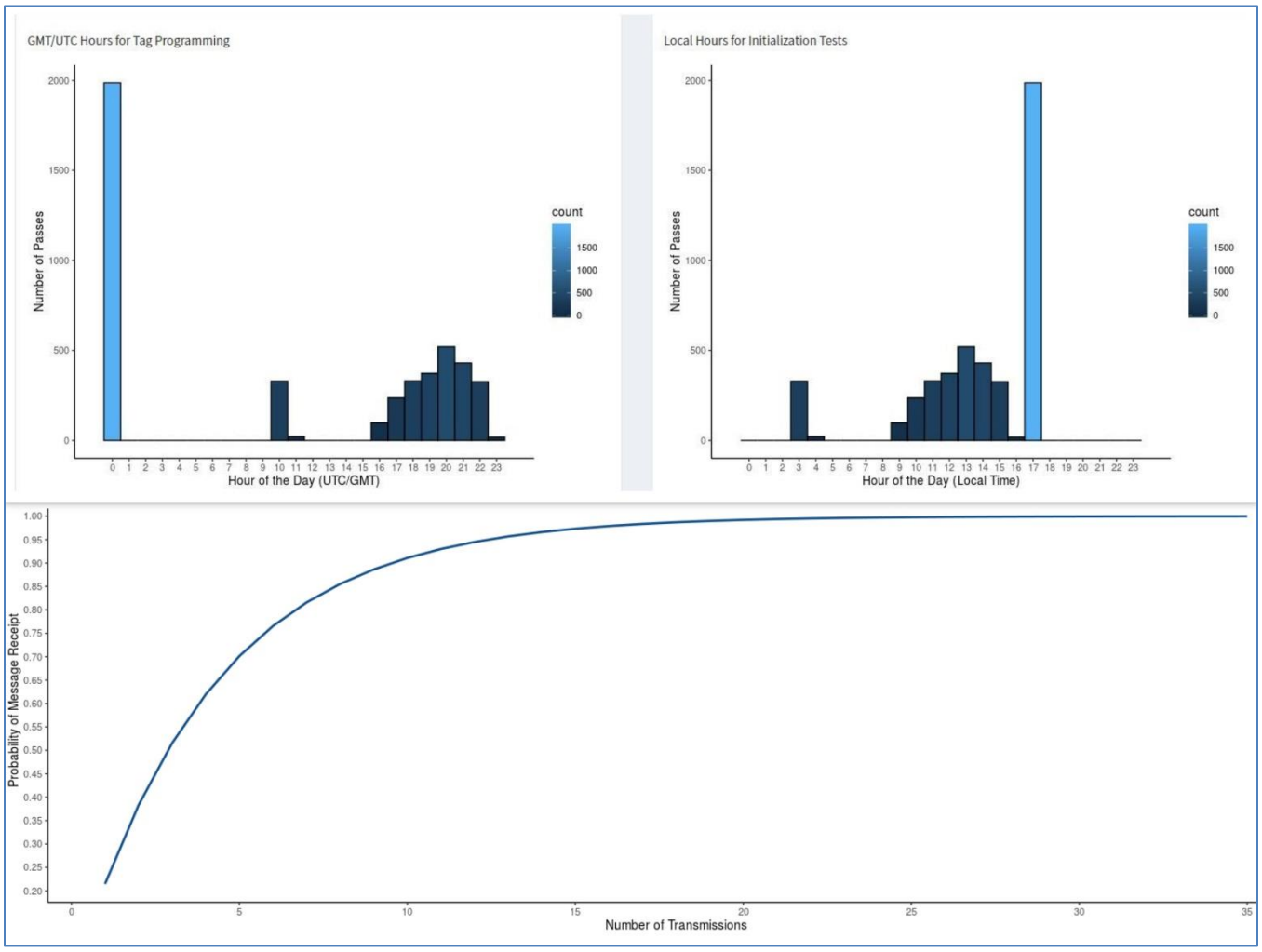


Figure 18—satellite coverage is best in UTC hours 2-4 and worst in hours 7-10 with no passes at all in hours 8 and 9.

Note: if you expect your animal to move East or West more than 500 km, leave all hours enabled as satellite coverage varies significantly East to West so the mask will not be effective.

Initializing a PRD-RP Prior to Deployment

Before deploying a PRD-RP, it is recommended to conduct a trial mission. Transmitting to Argos prior to deployment has several benefits. It provides exposure to the software and data, it allows you to evaluate the performance of the PRD-RP, and, perhaps most importantly, it enables Argos to secure a quality location at your field site prior to the animal being released. This is significant because the Kalman filtering algorithm not only uses measurements from the current satellite pass but also from prior satellite passes to calculate positions from just one or two Argos messages.

Run the trial mission for four to six hours, leaving the PRD-RP outside with a clear view of the sky. It can be beneficial to run a pass prediction via the Argos website to ensure multiple satellite passes are scheduled during the mission window.

As long as the primary purpose of the trial is to hit the Argos satellites and generate locations, the recommended settings are one step with a 250-uplink limit with the receiver enabled.

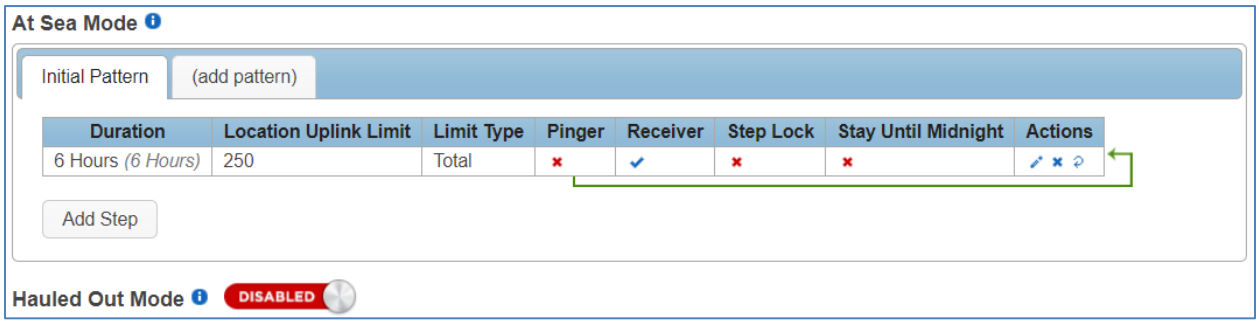


Figure 19—settings for priming Argos locations; a single six-hour step with a 250-uplink limit.

When testing multiple devices, it is important to space out the transmissions so they don't interfere with one another. Your PRD-RPs likely have different transmission intervals which will spread out transmissions (see the Transmission Parameters tab). If not, you can space out transmissions by using a magnet to sequentially begin deployments. Alternatively, it can be accomplished by starting PRD-RPs using Tag Agent, placing tags in a bucket of salt water and then pulling each device out of the bucket, ten seconds apart. Wildlife Computers recommends only testing four to five PRD-RPs or tags at a time to avoid signal collisions.

During the test, use the Remote Release Controller to confirm two-way communications with PRD-RP.

After the trial, review your results in the data portal. Use Tag Agent to change the settings and switch the state to Auto-Start or Stop.

The Pinger

The pinger is used for radio tracking recovery. When enabled, a PRD-RP sends out low-power pings every two seconds while at the surface. With an appropriate receiver and directional antenna, the PRD-RP can be located. Excess power draw from the pinger is negligible.

Antifouling

Heavily fouled tags can be hugely detrimental to tagging studies as fouling growth over critical sensors can impede the tag's transmitting performance. Especially for deployments in tropical waters, it is imperative that tags be protected against marine growth. Wildlife Computers endorses two antifouling paints, Micron and Propspeed. While we prefer Micron66, it is not available in some

countries. There are dozens of paint options available, but Micron 66, Micron77 and Micron99 are our favorites from years of testing and client feedback.

Micron66 is a copper-based antifouling paint that has a biocide which repels barnacles. For optimal protection, it is critical to use International Paints' Interprotect primer in addition to several coats of paint. Micron66 is a great choice for slow movers like sea turtles and whale sharks—http://bit.ly/Micron66

Propspeed is non-toxic and widely available. Its glossy texture sloughs off marine growth before it has a chance to bond. Constant water flow is key to Propspeed's effectiveness making it most beneficial for active swimmers.

Wildlife Computers offers an optional service to sand, mask, and paint tags with Propspeed antifouling and coat the wet/dry sensors with conductive polymer. This comprehensive antifouling service is offered at a charge of $100 per tag prior to shipping. We do not apply Micron antifouling paint due to the hazardous nature of the product.

Wet/dry sensors should never be covered or coated with antifouling paint. Seawater contact is essential to these sensors for correct operation. Use masking tape to protect the wet/dry sensors when painting.

Never cover the seam between the Base Plate and Recovery Platform. Antifouling points will bind the two parts together and prevent release.

Additional Advice

1. Once a PRD-RP is deployed, keep all magnets away from the reset position. Even though it takes two specifically timed swipes of the magnet to change modes, it is still a good idea to keep magnets away just in case.
2. Fine-grade sandpaper can be used to clean wet/dry sensors. Before deploying, ensure the wet/dry sensors are clean and free of any residual epoxy, tape residue or other contaminants. If the wet/dry sensors are covered, it will reduce the PRD-RPs ability to determine wet and dry.
3. If traveling on a commercial carrier with your PRD-RPs:
    - We recommend you place the PRD-RPs in Stop mode so they are not transmitting.
    - We suggest carrying a copy of your invoice or our product literature identifying the tag as a scientific research instrument.
4. We highly recommend that a laptop with Tag Agent and USB driver installed and a Wildlife Computers USB communications cable are brought to the field location so that communication with the PRD-RP is possible onsite if necessary.

Contacting Wildlife Computers

U.S. and International

Members of the Wildlife Computers technical sales and support team are located 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, Suite 150
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 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

Phone

+1 (425) 456 0101

Fax

+1 (425) 456 0303