



Microwave
Telemetry, Inc.

SOLAR ARGOS/GPS PTT-100

FIELD MANUAL





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Cover Pictures courtesy of (from left to right)
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TABLE OF CONTENTS

GENERAL INFORMATION

What is the Argos/GPS PTT - 100?....	5
Unpacking.....	10

TESTING

Testing.....	12
Attachment.....	16

DATA

Data Formats.....	18
Data Retrieval.....	19
Data Decoding.....	20
Parsing.....	26

QUESTIONS

Troubleshooting.....	35
Storage.....	37
Returning Your PTT.....	39
Contact Information.....	41
Glossary.....	42
Notes.....	45

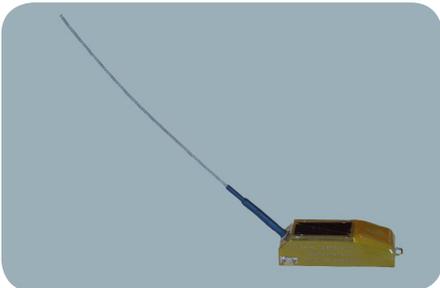


Thank You For Your Order!

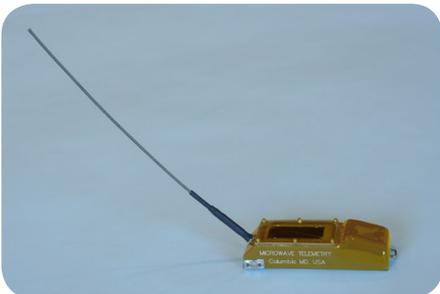
We are happy to provide you with our state-of-the-art Argos/GPS PTTs.



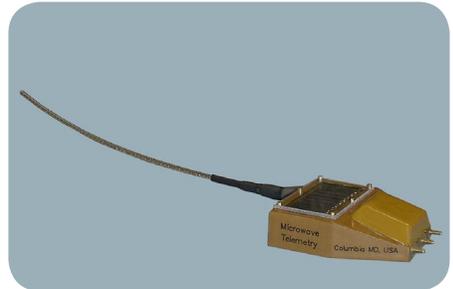
22 gram Solar GPS PTT



30 gram Solar GPS PTT



45 gram Solar GPS PTT



Solar GPS PTT configured for Patagial Mount



70 gram Solar GPS PTT



Solar Argos/GPS PTT-100

This revolutionary PTT is the result of years of research and development. It takes advantage of the unique ability of the Argos system to receive data from low-powered PTTs and the capability of the Global Positioning System (GPS) to accurately position a tiny receiver anywhere on the surface of the earth.

We have combined the technology of our solar-powered PTTs with a tiny parallel sixteen channel GPS receiver and a micro-powered data logger/system control microprocessor. Depending on the state of the battery charge, the system control microprocessor collects data from the GPS receiver at hourly or other pre-programmed intervals — storing in the data logger: position, altitude, heading and speed readings, together with data from the conventional temperature and activity sensors. Knowing its own GPS position, the microcomputer, using our unique SiV™ technology, computes the best times for the Argos PTT to transmit these stored positions and sensor data when satellites are in view above the horizon.

The information in this manual applies to all four models of Argos/GPS PTTs available, the 22, 30, 45 and 70 gram backpack mounted units and the 50 gram patagially mounted unit, unless otherwise stated.



Solar Argos/GPS PTT-100

Features:

- + Internal sixteen channel micro power GPS receiver
- + GPS accuracy ± 18 m
- + Solar powered
- + Microprocessor controlled battery charge management to allow the PTT to charge during the day and collect data and transmit at night
- + Temperature & Activity sensors
- + SiV™ transmission schedule optimized for the new JTA schedule: the PTT transmits only at times when the likelihood of a satellite pass is greatest, and to contain Argos costs is programmed to transmit data during 2 Argos billing quadrants on the transmission day
- + Programmable for up to 5 duty cycles seasons (defined by mm/dd calendar dates)
- + Programmed to take GPS fixes at user-specified hours, and to transmit at user specified intervals
- + GPS parsing software that outputs locations into easily manageable data files and kml maps that can be viewed in Google Earth™
- + Can be equipped with optional Ground Track™ feature (additional charges apply)
- + Up to three years operating lifetime
- + One year warranty against electronic failure



Solar Argos/GPS PTT-100

Physical Specifications

Dimensions:

22 gram: L 65 x W 23 x H 16.5 mm
 30 gram: L 66 x W 23 x H 21.6 mm
 45 gram: L 83.5 x W 28.8 x H 21 mm
 50 gram: L 58.5 x W 54 x H 20.6 mm
 70 gram: L 98 x W 38 x H 25 mm

*Antenna and harness mounting tubes not included in these dimensions.

Antenna: Hard nylon coated flexible stranded marine grade stainless steel, 7.0" (180 mm) long, protruding from the back edge of the transmitter 45 degrees to the bottom face.

Construction

The housing is constructed from an epoxy glass reinforced lightweight composite material, plated on the inside with a contiguous metal coating. The final seal is metal to metal solder. The unit is therefore hermetically sealed and remains so during changes in temperature and humidity.

General Electrical Specifications

Operating frequency: 401.650 MHz \pm 36 kHz
 Power output: 22 dBm \pm 2 dB
 Output impedance: 50 ohms
 Modulation Tri Phase PSK: \pm 1.1 Rad \pm 0.1 Rad
 Quiescent current: $< 3\mu$ A
 Spurious emissions: -45 dB
 Transmission interval: 45 to 120 sec**
 Supply Voltage: 3.6 to 4 volts
 Operating temperature range: -15 to 45 Deg C

**This can be optimized for your requirements at the time of manufacture.

Sensors

The GPS solar transmitter comes complete with sensors to measure temperature, its own battery voltage and animal activity, as well as a sixteen channel GPS receiver that senses position, altitude, heading and speed.*

GPS accuracy with "Selective Availability" switched off:

Lat/Long: \pm 18 m

Altitude: \pm 22 m**

Speed: \pm 1 kt., only at speed of > 40 kts.

Course: $\pm 1^\circ$, only at speed of > 40 kts.

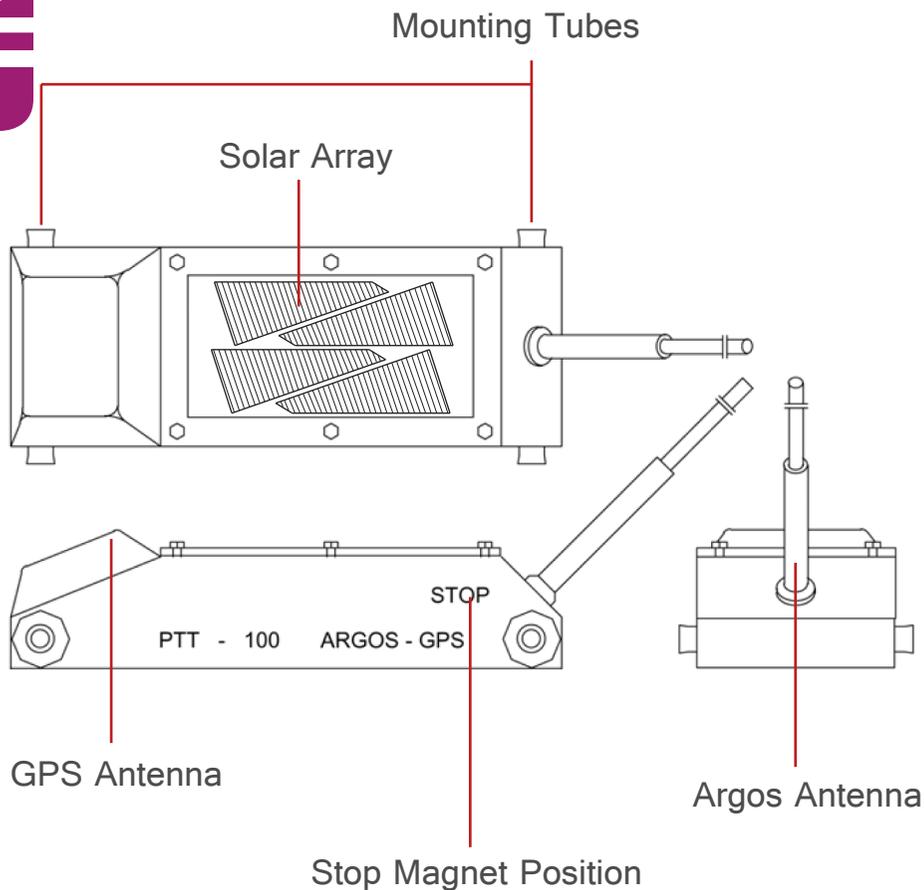
GPS Datum: WGS-84

*PTTs equipped with optional 2D firmware transmit lat/lon coordinates only.

**Transmitted at 10 meter resolution



Solar Argos/GPS PTT-100



70 gram Argos / GPS PTT
(other models similar)



Solar Argos/GPS PTT-100

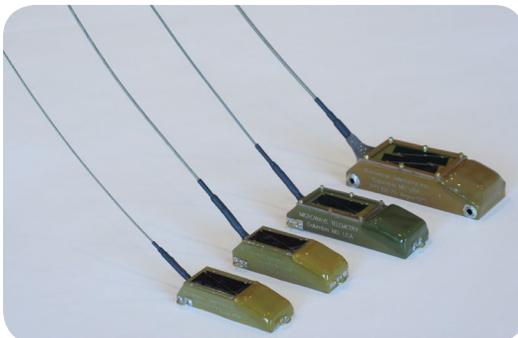
Basic Operation

The Argos/GPS PTT obtains hourly GPS fixes (assuming full battery charge) during the programmed “window”, saves the fixes and transmits the stored data to Argos on an SiV™ schedule. GPS receiver windows and SiV™ windows are based on local time as determined by the PTT; transmission of data to Argos occurs during 2 x 6 hour Argos billing slots on a single GMT day (to keep Argos costs down).

The Argos/GPS PTT can be programmed for up to five seasons of differing intensity of data gathering and transmission. In all of our GPS PTTs, GPS fixes are acquired at the hours specified in the customer supplied Production Form.

GPS Receiver Operation

After the testing period, the Argos/GPS PTT will take fixes each day. The 3D GPS PTT takes the first fix on the receiver start hour then takes each successive fix after the specified step interval until the receiver end hour is reached. The 2D GPS PTT takes fixes at the programmed hours.



UNPACKING

1 Please keep the original box.

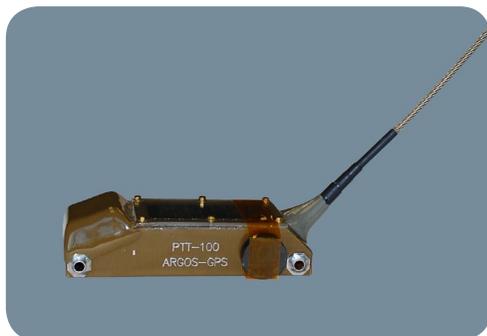
Your PTT-100 has been packaged in special antistatic packaging to provide maximum protection during shipment and storage. In the event that you need to return the PTT to us, it will be necessary to ship it in the original box (See [Returning Your PTT on page 39](#)).



2 Do not remove the magnet indoors.

When you remove the PTT from the box, you will notice a magnet taped to the side of the unit (See photo below). The PTT is activated by removing the magnet from the side of the unit. Once it is activated, the PTT will immediately switch on its internal GPS receiver, which is the major power consuming component of the unit. The GPS receiver will remain on for up to five minutes to take the initial fix; if it does not detect the GPS signals from the GPS satellites, this may drain the battery.

The Argos/GPS PTT must be outdoors with the GPS antenna facing the sky to quickly find and lock onto the GPS signals. Once it obtains a GPS fix, the receiver is switched off to conserve power.



TESTING

DO NOT DEPLOY YOUR PTT WITHOUT TESTING THE DEVICE AND VERIFYING THAT IT IS OPERATING CORRECTLY

Magnet must be removed when PTT is outside for testing

1 Place the PTT outside in the open for testing.

The PTT should be placed in an open area where the horizon is not obstructed by buildings, away from metal enclosures (including cages), with the GPS antenna in a horizontal position and with the solar array facing towards the sun; facing south in the northern hemisphere and north in southern hemisphere (see photo). A fence post, a wooden pole or the apex of a roof may provide good locations for this. If **multiple PTTs** are placed outside for testing, they should be placed at a relative distance of **at least one meter**.

Before deploying your PTT, it must be tested through the Argos system. (Save the test results). Do not deploy unless the tests are successful. Warranty is null and void unless instructions are followed.



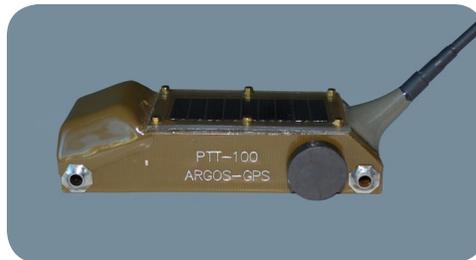
TESTING

2 Be careful not to cover any area of the solar array with tape or any other fastening material.

Covering any part of the array will not allow for proper charging of the battery.

3 Be sure the magnet has been in the STOP position for at least 70 seconds.

This ensures that when the internal microcomputer “wakes up”— which it does approximately once every minute (the transmission interval)—it will sense the timer reset condition and start at the beginning of the test period when the magnet is removed.



TESTING

4 Remove the magnet from the STOP position.

The SiV™ timer within your Argos/GPS PTT commands the transmitter on and off. The GPS receiver and PTT timer are restarted whenever the magnet is removed from the STOP position.

Assuming the PTT is at least partially charged, removing the magnet will initiate data recording by the GPS receiver and transmission to Argos. After magnet removal, a 3D PTT will immediately try to obtain a GPS fix, and will then attempt to get hourly GPS fixes, while transmitting to Argos continuously for eight hours. After obtaining the initial fix, a 2D GPS PTT will take GPS fixes at its programmed hours while transmitting continuously for 8 hours.

If the PTT is left out with the magnet off, after the initial 8 hour test transmission the PTT will collect data and transmit according to its programmed duty cycle.



Photo by Duane Noblick



TESTING

5 Leave the PTT outside for one complete duty cycle.

If it is not possible to leave the PTT outside for the duration of a complete duty cycle, at a minimum, allow it to remain in the proper test position for the initial 8 hour Argos transmission period. A successful test is contingent on adequate battery charge. We recommend you begin your test period in the morning hours of a sunny day so that the unit's solar array can recharge the battery throughout the transmission period.

6 Log into the Argos System to retrieve data.

SEE SECTION ON DATA RETRIEVAL ON PAGE 19

7 Reset the timer again by replacing the magnet.

The magnet must be in place for at least 70 seconds to reset the timer before deployment.



ATTACHMENT

- 1** Be sure that a pad is attached to the bottom of your PTT.

We normally ship our PTTs with a neoprene pad already attached unless you have requested that we leave it off. The pad serves as a cushion for the bird and as a platform to elevate the PTT above the feathers.

- 2** If the pad is not in place, glue it to the PTT.

Use a solvent-based contact adhesive such as “Weldwood” or “Bostik”. Attach the pad with the fabric side toward the bird.

- 3** Take care that the solar array is not even partially covered by the bird’s feathers.

You may need to trim some feathers from around the transmitter to ensure proper placement.



ATTACHMENT

If you have never attached a satellite transmitter to a bird before, please contact us and we will be happy to provide you with some resources (see Contact Information on page 41).

It is imperative that you seek training in attaching the PTT to the bird. We are not responsible for improperly attached PTTs.

Do not modify the PTT in any way!

Many researchers choose to custom-make their harnesses from tubular Teflon ribbon. As a courtesy to our customers, we occasionally provide Teflon ribbon at cost. However, you can obtain it directly from the manufacturer:

**Bally Ribbon Mills
23 North 7th Street
Bally, PA 19503-1004
USA
Phone (610) 845-2211
Fax (610) 845-8013**



Photo by Urmas Sellis



DATA FORMATS

Solar Argos/GPS PTTs can be programmed with 2D or 3D software. The 2D GPS message contains five accurate fixes for the same hour of the day from the five preceding days. The 3D GPS message contains 3 fixes including altitude, latitude, longitude, and even heading and speed when the bird is flying.

1 Argos should format your sensor data with the “MTI LC4” sensor template for a 2D GPS PTT and the “MTI GPS 2” sensor template for 3D GPS PTT.

We have provided Argos with both templates to simplify sensor formatting for our Solar Argos/GPS PTTs.

2 It is important you receive your data in both DS and DIAG formats.

DS format is essential to get all GPS messages, whereas DIAG data is a useful backup for location if at any time GPS fixes are unavailable.

Do not download your data in the “tx” or “com” format!



Photo by Patrik Olofsson



DATA RETRIEVAL

Even if you receive your data via Argos ADS, it is useful to know how to log in and check it for yourself. Occasionally, ADS fails; should that happen, you may want to log into the Argos system* directly and retrieve your data.

1 Log into Argos via the Argos website:
<https://argos-system.clsamerica.com/cwi/Logon.do>

2 Click “Data Access” followed by “Most recent messages”

3 If you have a transmitting PTT click on “Download COM/PRV/DIAG”, then click the arrow to the left of the “PRV/A DS” selection.

4 For “platform” select “all” and then select “ten days”. Download the data and save to a folder on your computer.

5 Repeat this procedure, this time selecting the arrow to the left of the “DIAG” selection.

An Argos user can log in and access the prior ten days of data; after ten days the data is archived and no longer easily accessible. You need to retrieve your data in both DS and DIAG formats.

*See your Argos manual for more details.



DATA DECODING

To decode your data, please use the free parsing software on the CD-ROM shipped with your Argos GPS/PTT. Although you can read your data without parsing, we recommend using the parsing software as it includes a checksum (error filtering mechanism). Please consult the directions included with the parsing software for step-by-step instructions.

FOR 3D PTTS

Below is a sample of 3D GPS sensor data in DS format, followed by an explanation of each individual sensor:

```
2003-05-09 19:25:11 1 09 14 00 39
                      1364 01 76 4939
                      62 285 112 15
                      00 39 1441 01
                      76 5033 68 272
                      119 16 00 39
                      1411 01 76 4977
                      16 39 1911 29122
```

Sensor #	Length	Description	Example
1	5 bit	day of the month	9th
2	5 bit	hour	14 hrs GMT
3	1 bit	latitude quadrant (O-N, 1-S)	00 (north)
4	7 bit	latitude degrees	39 degrees
5	13 bit	latitude minutes/ decimal minutes	13.64 minutes*
6	1 bit	longitude quadrant (O-E, 1-W)	01 (west)
7	8 bit	longitude degrees	76 degrees
8	13 bit	longitude minutes/ decimal minutes	49.39 minutes*
9	7 bit	speed (knots)	62 kts.



DATA DECODING

Sensor #	Length	Description	Example
10	9 bit	course	285 degrees
11	11 bit	altitude (meters)	112 meters
12	6 bit	hour	15 hrs GMT
13	1 bit	latitude quadrant (O-N, 1-S)	00 (north)
14	7 bit	latitude degrees	39 degrees
15	13 bit	latitude minutes/ decimal minutes	14.41 minutes*
16	1 bit	longitude quadrant (O-E, 1-W)	01 (west)
17	8 bit	longitude degrees	76 degrees
18	13 bit	longitude minutes/ decimal minutes	50.33 minutes*
19	7 bit	speed	68 kts.
20	9 bit	course	272 degrees
21	11 bit	altitude	119 meters
22	6 bit	hour	16 hrs GMT
23	1 bit	latitude quadrant (O-N, 1-S)	00 (north)
24	7 bit	latitude degrees	39 degrees
25	13 bit	latitude minutes/ decimal minutes	14.11 minutes*
26	1 bit	longitude quadrant (O-E, 1-W)	01 (west)
27	8 bit	longitude degrees	76 degrees
28	13 bit	longitude minutes/ decimal minutes	49.77 minutes*
29	7 bit	speed	16 kts.
30	9 bit	course	39 degrees
31	11 bit	altitude	1911 meters
32	16 bit	checksum (crc-16)	29122

*Minutes and decimal minutes are included in the same sensor. To get the minute value for your data divide by 100. For example, a sensor value of 907 becomes 9.07 minutes.



DATA DECODING

FOR 2D PTTs

Below is a sample of 2D GPS sensor data in DS format, followed by an explanation of each individual sensor:

```
2005-03-21 16:19:07 4 03 16 00 00
                      39 1380 283 1099
                      00 39 1386 283
                      1104 00 39 1386
                      283 1104 00 39
                      1386 283 1104 00
                      39 1386 283 1104
                      46481
```

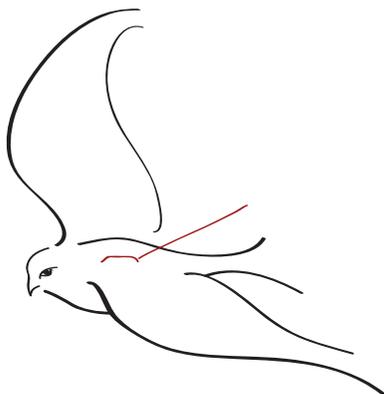
Sensor #	Length	Description	Example
1	4 bit	Month	03(March)
2	5 bit	Day	16th
3	8 bit	Transmission Increment	
		00=5days, 128=10days	5 days
4	1 bit	Lat hemisphere (0-N, 1-S)	00 (north)
5	7 bit	Lat deg	39 deg
6	13 bit	Lat mins/decimal mins	13.80 mins*
7	9 bit	Long deg	283 deg (east)
8	13 bit	Long mins/decimal mins	10.99mins*(east)
9	1 bit	Lat hemisphere (0-N, 1-S)	00 (north)
10	7 bit	Lat deg	39 deg
11	13 bit	Lat mins/decimal mins	13.86 mins*
12	9 bit	Long deg	283 deg (east)
13	13 bit	Long mins/decimal mins	11.04 mins*
14	1 bit	Lat hemisphere (0-N, 1-S)	00 (north)
15	7 bit	Lat deg	39 deg



DATA DECODING

Sensor #	Length	Description	Example
16	13 bit	Lat mins/decimal mins	13.86 mins*
17	9 bit	Long deg	283 deg (east)
18	13 bit	Long mins/decimal mins	11.04 ins*(east)
19	1 bit	Lat hemisphere (O-N, 1-S)	00 (north)
20	7 bit	Lat deg	39 deg
21	13 bit	Lat mins/decimal mins	13.86 mins*
22	9 bit	Long deg	283 deg(east)
23	13 bit	Long mins/decimal mins	11.04 mins*(East)
24	1 bit	Lat hemisphere (O-N, 1-S)	00(north)
25	7 bit	Lat deg	39 deg
26	13 bit	Lat mins/decimal mins	13.86 mins*
27	9 bit	Long deg	283 deg(east)
28	13 bit	Long mins/decimal mins	11.04 mins*(east)
29	16 bit	Checksum (crc-16)	46481

*Minutes and decimal minutes are included in the same sensor. To get the minute value for your data divide by 100. For example, a sensor value of 907 becomes 9.07 minutes.



DATA DECODING

3D Engineering Frame:

2011-03-03 00:56:48	1	11	26	01	16
		199	00	92	12
		118	128	768	08
		00	08	2506	01
		170	4902	31	00
		19	24	00	02
		8109	00	137	1309
		77			

2D Engineering Frame*:

2011-02-22 00:14:32.000	1	06	01	13	00
		03	1793	385	3158
		00	79	7694	120
		7294	00	70	7238
		146	7281	01	11
		165	326		

*During the initial test period the 2D PTT transmits engineering messages only.



Photo by Carmen Calero



DATA DECODING

Every eighth message sent to the satellite is a special Engineering Frame (see sample data).

The Engineering Frame includes data about temperature, activity, and battery voltage as well as satellite use and internal clock readings. When parsing with the provided parsing software, use the “Output Engineering Data” option to output the engineering data. To label each column use the “Column Titles in File” option. You may find it helpful to copy and paste the parsed data into an Excel worksheet for analysis of the basic sensor data (the temperature, battery voltage, and activity readings).

During the initial test period the 2D PTT transmits engineering messages only. These messages contain the last GPS fix recorded by the PTT; however, these locations are not mapped in the kml file. The kml file is generated from the GPS data messages and Argos locations.



Photo by Charlie Volz



PARSING

Parsing software is provided free of charge with our Solar Argos/GPS PTTs on a CD included with this manual. It can also be downloaded from our website.

Installing

When you insert the software CD, an offline webpage will appear. To install the software, click “Install Parsing Software (setup.exe)”. An information box will appear and you will be asked what you want to do with the file; click “Open” or “Run” to run the installer.

If the webpage does not appear, then use Windows Explorer to find your CD drive, and run the “setup.exe” program in the root directory.

Follow the on screen instructions to install the program.

Running

By default, the parsing software will be installed under the “Microwave Telemetry, Inc.” program group in your Start Menu. Click on “MTI GPS Data Parser”.

The software will open a window that will allow you to select options and run the parsing software.

In the options window, you need to choose the file(s)/ directory which contains your PTT’s DS format Argos data (which you should have previously downloaded), and an output directory, where your parsed data will be placed.



PARSING

You can choose the parsing options for your PTT, which determine the type and format of data which the parser outputs (see next section for details). However, we have preset the options to those most useful for most applications.

When you are satisfied with the options you have selected, click the “Run” button to begin parsing. Status messages for the data processor will be shown in the MS-DOS window.

Choosing Input/Output Files

You can choose one or several files, or a single directory, as input to the parsing program. If you choose one or more files, the parser will output and collect all the data in those files. If you choose a directory, the program will parse all the files in the selected directory.

For output, you designate a directory where the data will be output. By default, the parser will place a number of files for each PTT in the selected directory. If you choose the “Output files in separate directories” (see the following page), the parser will output data to subdirectories denoted by the PTT’s Argos ID.



PARSING

Processing Options

- + **Reverse sign of latitude:** Switches sign of both GPS and Argos latitudes
- + **Reverse sign of longitude:** Switches sign of both GPS and Argos longitudes
- + **Split Date and Time into two columns:** Puts into separate columns the date and time of day that fixes were taken.
- + **Column titles in File:** Puts a header line at the top of each file with descriptions of each column.
- + **Show attempted (failed) GPS fixes:** Outputs data for all hours when the GPS unit attempted to take a fix, even if it failed due to low battery or some other reason.

Output Options

- + **Output Engineering data [*e.txt]:** Outputs a file with the engineering data for the PTT (every 8th transmission); includes temperature, battery voltage, and other values.
- + **Output Argos locations [*a.txt]:** Outputs a file with the locations calculated by Argos, as well as the calculated frequency and the transmission interval.
- + **Output files in separate directories:** By default, the parser puts all the files in the output directory selected, but with this option, it will put all of the files for each PTT in a separate subdirectory. This subdirectory will be named after the PTT's Argos ID.



PARSING

+ **Output Raw (uncalculated) Values:** By default, the parser calculates the temperature, in deg C, and battery voltage from the engineering data message. If this option is selected, the parser will output the raw decimal sensor values instead.

Argos IDs

List all Argos IDs you want to process, separated by commas and/or spaces. Ranges are also accepted (e.g., "01000-01003, 01005 01008,01010"). If left blank, the program will process data for all PTTs with DS format data.

Run

Click run when you are finished selecting options. The program will parse the selected files and output status messages in the DOS window, which opened when you ran the program.



Photo by Alastair Franke / Arctic Raptors



PARSING

Interpreting the Data

The Argos data parser outputs text files. These are tab-delimited; copy and paste into Excel for columns to line up, or view in Notepad or other text viewer.

<PTTID>g.txt file

The <PTTID>g.txt file contains the GPS locations as determined by the PTT's GPS receiver. They are transmitted to Argos with a checksum, so erroneous values in this file are virtually impossible.

FOR 3D PTTs

The <PTTID>g.txt file for 3D PTTs contains the following columns:

Date/Time: The date and time of the GPS fix. The time stamps in your data are all in GMT (UTC). If you chose to split the date and time into separate columns in the parsing, this will be two separate columns labeled "Date" and "Time"

Latitude*: The decimal latitude in degrees. By default, north is positive.

Longitude*: The decimal longitude in degrees. By default, east is positive.

Speed: The speed of the PTT in kts.

Course: The direction of travel, in degrees east of N.

Altitude: The altitude in meters.

*GPS Datum: WGS-84



PARSING

FOR 2D PTTs

The <PTTID>g.txt file contains the following columns:

Date/Time: The date and time of the GPS fix. The time stamps in your data are all in GMT (UTC). If you chose to split the date and time into separate columns in the parsing, this will be two separate columns labeled “Date” and “Time”

Latitude*: The decimal latitude in degrees. By default, north is positive.

Longitude*: The decimal longitude in degrees. By default, east is positive.

*GPS Datum: WGS-84

Hours Without Fixes

Sometimes, the GPS receiver fails to get a fix on an hour when it was supposed to. To find out why, choose the “Show attempted (failed) GPS fixes” option in the parsing software.

FOR 3D PTTs

When this option is selected, the hours without fixes will be shown with zero Lat, Long, and Speed values.

The Course will contain the battery voltage level when the PTT stopped trying to get a fix.

In the place of Altitude there will be a code as follows:

+ “**no fix**” : Receiver turned on to get a fix, but timed out (~2 minutes).



PARSING

- + **“batt drain [x]”** : Receiver turned on to get a fix, but the battery voltage dropped too low to continue after $\sim 15 \times x$ seconds.
- + **“low volt”** : Battery voltage was too low before trying to get a fix, so receiver did NOT turn on.
- + **2D fix**: latitude and longitude only; still a valid fix just lacking altitude speed and course.

FOR 2D PTTs

In 2D messages without a fix, battery voltage is displayed in place of latitude, and the code for “no fix” appears in place of longitude.

The longitude value will contain a code, as follows:

- + **“no fix”** : Receiver turned on to get a fix, but timed out (~ 2 minutes).
- + **“batt drain [x]”** : Receiver turned on to get a fix, but the battery voltage dropped too low to continue after $\sim 15 \times x$ seconds.
- + **“low volt”** : Battery voltage was too low before trying to get a fix, so receiver did NOT turn on.

In both 2D and 3D PTTs, engineering packets, like GPS data packets have a checksum, and data that does not pass the checksum will be thrown out. If these data are wanted, choose “Show attempted (failed) GPS fixes” option in the parsing software.



PARSING

Engineering Data (<PTTID>e.txt file)

The <PTTID>e.txt file contains the battery voltage, temperature, and activity counter sensor data, as well as other debugging information.

The <PTTID>g.txt file contains the following columns:

TX Date/Time: time of the transmission, as determined by Argos.

Int Date/Time: time of the transmission according to the PTT's internal clock.

Satellite ID: the NOAA satellite which received the packet, as listed in the Argos data.

Activity: activity counter value. This value increments when the PTT is moving while it is transmitting. If the activity counter is constant for two or more transmission periods (and the GPS locations are unvarying), you should consider the possibility that the PTT has become detached or the bird is down.

Tx Count: transmission counter value. Increments by one every time an engineering packet is transmitted.

Temperature*: temperature in deg. C.

Battery Voltage*: battery voltage in V.

GPS Fix Time: time (in seconds) required to obtain the most recent GPS fix.

Satellite Count: number of GPS satellites used to obtain the most recent GPS fix.

*Converted values are the default setting for the parser. If you are seeing raw sensor values in your output file unselect the "output raw values" option when running the parser.



PARSING

Hours Since Reset: the number of hours since the receiver was most recently reset. (maximum value 255)

Hours Since GPS Fix: number of days since the PTT obtained a good GPS fix. (maximum value 255)

Season: current season of the GPS PTT's operation. Ranges from 1-5, 1 being the first season of the year, 5 being the last. (Ignore if PTT is not programmed with multiple seasons).

Shunt: 0 for normal operation, 1 if the battery is highly charged and the shunt is on.

Mortality GT: value of 1 indicates the PTT is in Mortality Ground Track™ mode

Seasonal GT: value of 1 indicates the PTT is currently in Seasonal Ground Track™ mode.

Latest Latitude: most recent GPS fix location (Latitude Deg.).

Latest Longitude: most recent GPS fix location (Longitude Deg.).

Passed Checksum: if "Show attempted (failed) GPS fixes" option is selected, indicates whether a message has a valid checksum value (1=passed, 0=failed)



Photo by Tim Roth



TROUBLESHOOTING

QUESTIONS

Problem	Explanation	Action
No results received from CLS when testing your PTTs	CLS may not be sending the results to you by ADS.	Contact Argos, check that the PTT ID is on the ADS list.
	Shielding by metal enclosures interferes with the signal.	Remove the bird and PTT from the metal cage. Elevate above metal roof.
	No satellite overpasses during time of test.	Reset and test again for a longer period or contact us for an optimal test period.
	Solar PTT is not transmitting during the test because the battery voltage is lower than cutoff voltage.	Place the PTT in full sun for several hours with the magnet on, then retest.
	Most satellite passes over any given spot are close to the horizon. Tall buildings can prevent the satellite from “seeing” your PTT.	Test your PTT in a wide-open space, free of obstructions, with a clear view of the horizon.
	Looking in the wrong place on the Argos web for your data.	Follow the instruction on page 19 to download your data.
	Logging in too soon for data. It can take several hours for data to be received and processed.	Wait a few hours and log in again.



TROUBLESHOOTING

Problem	Explanation	Action
PTT will not switch off	The wrong type of magnet is in use (magnetic field at 90° to switch).	Use only the button magnet supplied.
Activity sensor reading stays the same (+/-1)	PTT is not sensing movement; bird is dead or the PTT has become detached.	Try to locate and retrieve the PTT.
Some of the PTTs seem to be transmitting in storage	PTTs are too close together and their magnets are canceling each other out.	Separate the PTTs. Leave at least 2 inches between each PTT.
Sensor data contains letters as well as numbers (e.g., A7)	Sensor data is being processed in hexadecimal rather than decimal format.	Ask Argos for A1 (decimal) processing of sensor data.
GPS receiver did not get a GPS fix for an hour when it should have.*	The receiver is turned off because the battery voltage is too low resulting in a LOW VOLT message.	No action required, GPS fixes will resume when there is sufficient power.
	The GPS antenna on the PTT is obscured from the sky resulting in NO FIX message.	If this occurs during testing, move the PTT to an open area, otherwise, wait for the bird to move.

Please do not hesitate to contact us at 410-715-5292 or by email at support@microwavetelemetry.com if you are having a problem that is not listed in the troubleshooting guide.

* See the description of the Show attempted (failed) GPS fixes option in the parsing section of this manual.



STORAGE

1 Turn it off.

Place the button magnet over the word STOP located on the side of the transmitter and make sure that it is taped securely in place.

2 Do not store in complete darkness.

A minimal charge should be maintained in the battery; for this reason the solar charged PTT should not be stored in complete darkness. Periodic exposure to direct sunlight (at least 4 hours per week) will maintain the battery charge. When not charging outside, a sunny windowsill is ideal for storage.

3 The magnet should remain on the PTT while stored indoors in indirect sunlight.

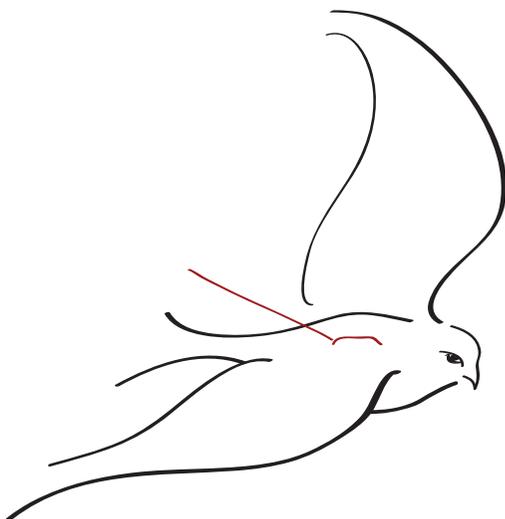
Remember that nothing (e.g., tape) should be allowed to cover the solar array (see photo).

IF THE PTT IS STORED FOR MORE THAN ONE MONTH, IT SHOULD BE RETESTED BEFORE DEPLOYMENT.



STORAGE

4 After storage, the PTT should be allowed to run for one complete cycle before being attached to a bird to verify that it is functioning properly and data are being received and processed correctly by Argos (see section on Testing on page 12).



RETURNING YOUR PTT

1 Notify us that you will be returning the PTT.

If you are returning PTTs for refurbishment, giving us advanced notice allows us to make room on our schedule.

2 Package PTT securely—in its original box.

Remember that the packaging used to ship your PTT to you will also ensure a safe return to us!



3 Use FedEx (Federal Express)

FedEx is our preferred carrier*, but we also accept packages shipped via U.S. Priority Mail. Should you ship via a different courier, we cannot guarantee that we will be able to supply the necessary paperwork to clear your package!

*We have an agreement with FedEx that allows them to clear incoming packages without additional charges and added paperwork.



RETURNING YOUR PTT

1 International Customers need to include a “Declaration for Free Entry of Returned American Products Form” with paperwork on the box. Contact us for a form to include with the returned PTTs.

In the past, we have been levied duties and taxes because the paperwork accompanying the PTTs did not state that the goods were manufactured in the United States by us. Dealing with the Customs Clearing department wastes a lot of valuable time. Please be aware of this when shipping the PTTs back to us or the package may be returned to you.

ANY PACKAGE CONTAINING PTTs BEING RETURNED TO US WITHOUT THE PROPER PAPERWORK WILL BE RETURNED TO THE SENDER AT THE SENDER'S EXPENSE!

2 Use Federal Express (FedEx)

When returning a used PTT, please indicate a depreciated value on the “Declaration for Free Entry of Returned American Products Form” and any other Customs documents affecting the shipment.



CONTACT INFORMATION

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GLOSSARY

A1 processing: A Service Argos term for decimal processing.

A2 processing: A Service Argos term for hexadecimal processing.

ADS: Automatic Distribution Service (Argos).

Argos: The satellite based system which collects, processes and disseminates environmental data from fixed and mobile platforms around the world. For more information visit www.argosinc.com.

attachment: A harness, collar or leg-band used to deploy a PTT on a bird.

CLS: Collecte Localisation Satellites is the operator of the Argos system in Toulouse, France. Its main subsidiaries are Service Argos Inc. and North American CLS, Inc., both in the USA.

COM: One of the on-line commands to an Argos processing center. This data format is antiquated and we do not recommend its use for GPS transmitters.

DIAG Data: A data format which provides supplemental information on your transmissions, e.g. received signal strength, rejected locations (see Argos manual for details).

DS Data: A data format used to present results on line and off line. Provides all the messages (i.e., all sensor data) from each satellite pass. (See Argos manual for details.)

duty cycle: A schedule of transmission times and rest periods used to extend the study interval by budgeting the PTT's battery life.



GLOSSARY

engineering frame: Every eighth message sent to the satellite from the PTT that includes data about temperature, battery voltage, satellite use and internal clock readings.

fix: The location of the PTT derived from the GPS satellites.

GMT: Greenwich Mean Time (the same as UTC [Coordinated Universal Time]).

GPS: Global Positioning System.

GPS Antenna: The antenna at the front of the PTT used to collect the signals from the GPS satellites. (See page 8.)

GPS Receiver: The radio receiver used to detect and decode the GPS signals to calculate a position.

harnessing: Attachment of a backpack configured PTT to the bird being tracked.

hexadecimal: A base-16 data format (1 to 9 and A to F, where A is 10 and F is 15) used to represent sensor data. A byte (eight bits) is represented by two characters.

hex-code: The Argos ID encoded in hexadecimal number.

housing: The fiberglass box that encloses the PTT.

hyperterminal: A Telnet program included with Windows which can be used to download Argos data.

microprocessor: The tiny internal computer which controls the PTT's operation.



GLOSSARY

parsing software: The software that organizes the raw data in a user-friendly form.

Production Form: Our customer information form for the PTT-100 models. The completed production form serves as the work order to initiate production.

PTT: Platform Terminal Transmitter.

season: A period of the schedule of the PTT's ON/OFF times.

selective availability: Built-in variable error that the US military makes the GPS satellites transmit for security purposes.

sensor data: Part of an Argos message containing data collected by a sensor.

sensor decoding: Interpreting the sensor values.

CLS America: A subsidiary of CLS.

SiV™ (Satellite-in-View): Special software which allows for more efficient use of battery ON time. It activates the PTT when there is the greatest chance of satellite overpass.

solar array: The external portion of the solar PTT that charges the internal battery.

Telnet: An internet protocol used to connect to Argos and view downloaded data.



NOTES

QUESTIONS



QUESTIONS

NOTES



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QUESTIONS





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Telemetry, Inc**