

# Tracker News



**Microwave Telemetry, Inc.**

**1991-2006 A Celebration!**

Dear Customers and Friends,

In Roman mythology, Janus, the god of gates, doorways, beginnings and endings was usually depicted with two faces looking in opposite directions. Janus was often used to symbolize change, transition from past to future, from one vision to another. As our company celebrates its fifteenth year, please join us in looking back and looking forward!

We hope you will enjoy going down memory lane with us as we fondly remember our humble beginnings (in the basement of my house), our first product, our first customers, and many other firsts. We have enjoyed our journey despite many difficulties along the way. We look back with gratitude to you, our customers: you have supported us, urged us on and encouraged us. To show our appreciation, we are donating transmitters for a raffle and for a school project, hoping to encourage young people to have an interest in science. We will also have some freebies in our winter newsletter.

As I mentioned in our last newsletter, our longevity has given us the opportunity of working with some customers for many years. We feature here the work being carried out in the United Arab Emirates by the National Research Avian Center, with whom we have had the pleasure of working since 1995. We especially thank Mark Lawrence for his fascinating article on tracking the Houbara bustard.

As we look ahead, we remain committed to improving our products and our customer service. We are working with CLS in resolving the interference problem most European Argos users are experiencing. To improve our customer service, we are delighted to introduce our new user friendly on-line Production Form.

We look forward to the next fifteen years while we endeavor to push the envelope of this technology. We are now working on many new developmental projects that we believe will help a lot of customers and extend the scope of satellite animal tracking into new realms. Stay tuned for our next newsletter!

Have a productive field season and a good summer.

Sincerely,  
Paul and the staff at MTI



Photo by Xavier Eichtaker

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Above:  
Houbara bustard displaying

# Celebrating Our History... A Trip Down Memory Lane

As we put together these images, we reminisced about our early days in business and were amazed by how far we had come. Flip back to 1992: we had been in business 6 months; we shared a small office with another company, had one employee and one product, our 95g PTT!

We hope that you enjoy the images below as they capture our progress through the years; THANK YOU for being part of our history, we truly appreciate our customers' support and feedback.

## Location

We now occupy almost 6,000 sq ft of custom designed space where we moved to in July 2000



Our first location with less than 1000 sq ft that we shared with another business



Our 18g solar PTT was first used to track kites in May 2000

18 gram Solar PTT-100



## Our Staff

We fondly acknowledge all past employees, especially those who contributed so much to our company: Stephanie is now a doctor, Christopher is living in Pittsburg, Jack is retired in Florida, Charis is married and living in New Zealand, and Sharon is in Oregon.



Erin, our first employee, and daughter Leila in California where they now live



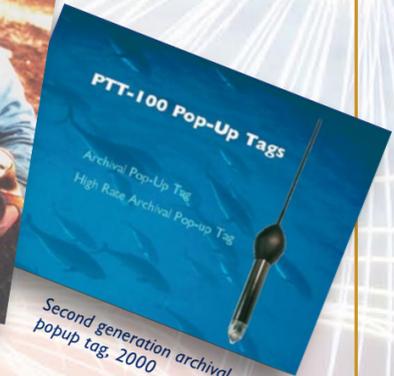
Team members at our 2005 retreat



First generation GPS transmitter, 2001



The first implantable PTT was used in 1994 to track Spectacled eiders



Second generation archival popup tag, 2000

## Products

In 1991, we concluded that making one PTT a week would be an achievement: we were poorly equipped, staffed and we could not afford advanced test equipment. We did not stray far from our estimate. We now ship over a thousand PTTs a year along with about 300 refurbishments to some 55 countries in every time zone from our custom built facility in Maryland.

We started off with our 95g PTT, followed by a 65g unit that we no longer make; further miniaturization resulted in our 45, 30 and 20g PTTs. Along the way, we introduced solar PTTs, our unique Satellite-In-View™ technology, Ground Track™ and our most popular PTTs: the solar powered GPS enhanced PTT and the battery powered LC4™ GPS PTT.



2004

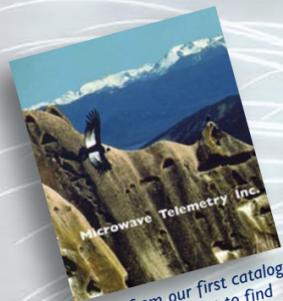


Our ground breaking (no pun intended!) Ground Track is introduced in the spring 2003

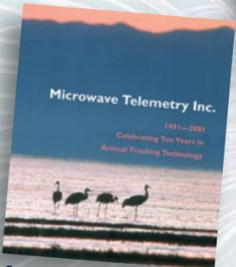
Our 20gram PTT was first used to track the Peregrine falcon in 1996



## Communication



Cover from our first catalog. We held a contest to find the photo and awarded a free transmitter, 1999



Second winner of our contest for cover of updated catalog, summer 2001



We published our first newsletter the summer of 2000. We changed to our current award winning design in 2004



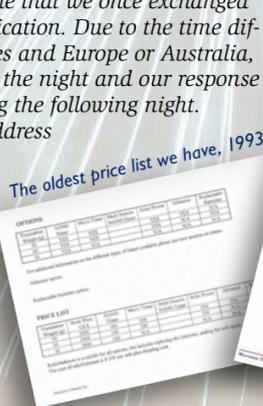
Current manuals



Our website is up and running, January 2001

In this day and age when cellular phones and email make for instant communication with customers at the other end of the world, it is hard to imagine that we once exchanged faxes as sole means of communication. Due to the time difference between the United States and Europe or Australia, our faxes would come in during the night and our response would get to the customer during the following night. It would take quite a while to address technical issues!

We now communicate information to our customers via the phone, email, our website, newsletter, brochures, and manuals. We also enjoy putting faces to voices at conferences. It's amazing how advances in technology have helped!



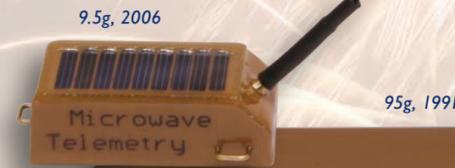
The oldest price list we have, 1999



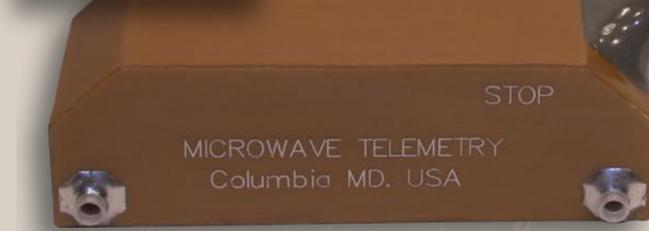
Current price list from our website



Attendees at our conference on implants, 2001



9.5g, 2006



95g, 1991



2000

# Transmitters Integral to Research of Asian Houbara Bustard

Mark Lawrence, National Avian Research Center, Environment Agency – Abu Dhabi, P.O. Box 45553 Abu Dhabi, United Arab Emirates.

The National Avian Research Center (NARC) was established in 1989 and has been in operational existence since 1993, in the Abu Dhabi emirate of the United Arab Emirates. The object of its study is the Asian houbara bustard, *Chlamydotis macqueenii*, and the reason for its existence is Arabian falconry, for which the houbara is primary quarry species. NARC aims to promote houbara conservation and reconcile the falconry with sustainable use of houbara throughout their range.

A broad international scope of operations is necessitated by the migratory nature of both the houbara, which are chiefly winter visitors to the Arabian Peninsula, and the falconers, who travel widely in search of quarry.

From the beginning it was understood that a study of houbara wintering in the UAE would benefit from information on where the birds were coming from. Our first trials to catch houbara in UAE and fit them with satellite transmitters in the mid 1990's (Osborne *et al.* 1997) have developed into a general elucidation of houbara migration routes across Asia. For the most recently published see Judas *et al.* (2006) and references listed within. The use of satellite transmitters has been an integral part of our research activities, and for > 95% of cases we have used units from Microwave Telemetry. All transmitters are fitted as backpacks using Teflon ribbon harness.

Initially we used battery powered PTTs which became exhausted and stopped transmitting after 6 months, but nevertheless allowed us to connect breeding grounds with wintering areas. Subsequently the development of solar powered 35 gram units, with the potential to work for several years, allowed a more detailed analysis of migration routes and stopover sites, along with juvenile dispersal (using expandable elasticated harnesses for birds that still have a bit of growing to do).



A male is snared using a dummy female.

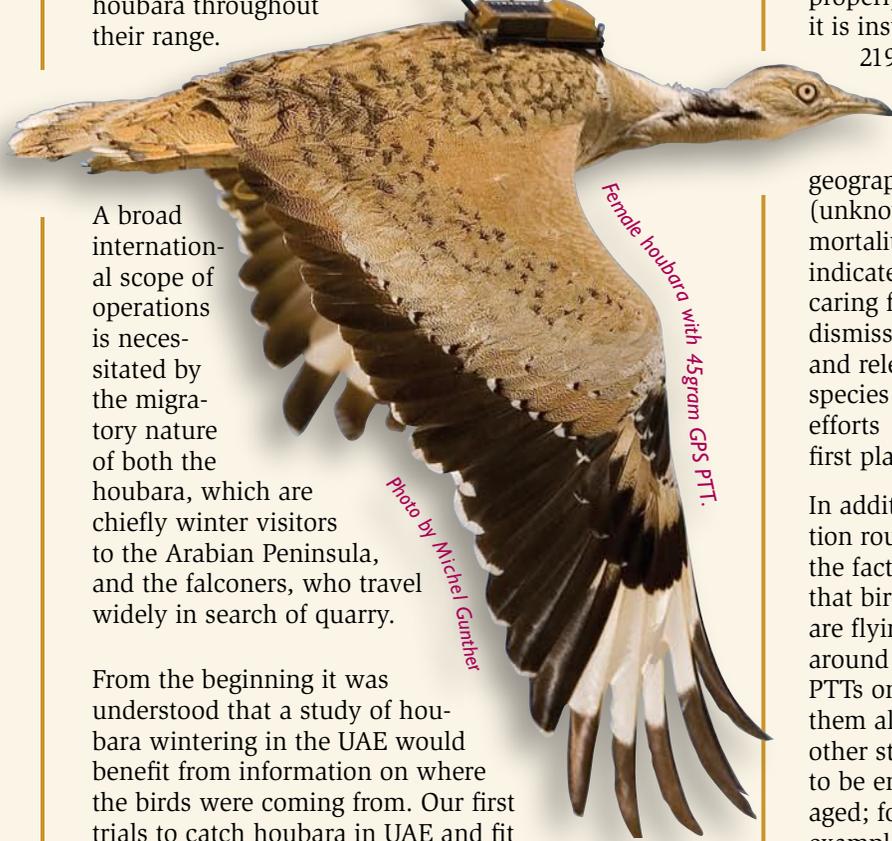
From 1995 to date we have deployed 83 PTTs on wild houbara and acquired 62 useable migration/dispersal tracks from start points in United Arab Emirates, Pakistan, Iran, Kazakhstan, China, Oman and Yemen. If the higher mortality rates in early trials and juveniles are excluded, we have 55 tracks from 65 deployed transmitters, many covering more than one annual cycle.

We have also used PTTs on houbara that we receive into our quarantine facility after having been confiscated from smugglers by UAE customs officials. After completing quarantine and rehabilitation some birds are suitable for re-release to the wild. To properly gauge the success of the rehab programme it is instructive to follow their fate post release. Of 219 houbara re-released since 1999, 23 have been equipped with PTTs. Most individuals attempt aberrant migration tracks, probably because they cannot account for the geographical translocation when smuggled from their (unknown to us) point of origin, and there is a high mortality in the first months after release. The results indicate that, whilst the public relations benefits from caring for and releasing confiscated birds cannot be dismissed and we can endeavour to improve the rehab and release procedures, a greater benefit both to the species and the individuals concerned will come from efforts to stop the illegal trade occurring in the first place.

In addition to tracking migration routes, the fact that birds are flying around with PTTs on them allows other studies to be envisaged; for example the measuring of mortality rate by deducing live-or-dead data from satellite tagged houbara.

Falconers are commonly very secretive about their success during hunting expeditions and poachers do not publicise their activities, so we used satellite tracked individuals as a way to measure mortality rate independently (Combreau *et al.* 2002). The data gathered extends across time and international borders in a manner impossible to achieve with other means.

The transmitters can be useful to us even after they may have stopped working, because the "ring return" rate for houbara fitted with a transmitter is 12 times greater than the return rate from houbara fitted with just a ring, indicating that a small box strapped on the back with a full address printed on the side is much more inductive to finders than a metal leg ring with P.O. Box number. We have over 10% of PTTs returned to us by falconers or other hunters, but less than 1% of rings where a bird has no transmitter. In one slightly annoying case a falconer caught the houbara alive, carefully removed the transmitter for returning to us, and released the houbara to continue its journey untracked.



Female houbara with 45gram GPS PTT.

Photo by Michel Gunther



Mark Lawrence outfits a male houbara with a 35g solar PTT.

Photo by NARC

Photo by NARC

Clearly not all houbara with transmitters that get hunted are returned to us, and we have cases of transmitters fitted on wild houbara in the Arabian Peninsula that have abruptly changed their behaviour



Photo by NARC

“Good wildlife management does require going outside with a telescope sometimes.”

and made high-speed movements along roads and across borders before disappearing without trace, presumably as a result of the bird in question being caught by a hunting party and the transmitter sending the last of its data from on board a vehicle.

Our information on mortality rates and breeding success has been instrumental in elevating IUCN Red List status of the houbara from ‘Low risk/near threatened’ to ‘Vulnerable’ in 2004. It is hoped that an agreement for conservation of the Asian houbara, which has been circulated to all the governments of Asian houbara range countries by Saudi Arabia via the Convention on Migratory Species (Bonn Convention) will act as a future framework for houbara conservation activities in the region. Whilst building the international cooperation necessary to implement conservation efforts under the CMS will be a challenging task, the clear evidence that can be presented from satellite tracking studies, to show that these countries do in fact share the same birds, can only help the effort.

If we can search for any negative result that using satellite transmitters has given us, it is that the use of these attractive high-tech gadgets, and the visually appealing tracking maps that can be produced from the data, result in it being harder for us to influence budget choices away from buying more transmitters at the expense of organizing field expeditions

and recruiting staff for the bread-and-butter ground truthing and data gathering that is also required. Good wildlife management does require going outside with a telescope sometimes.

For now and the future, the introduction of GPS PTTs is expanding our fieldwork options. When fitted on females, they should allow us to remotely determine, for the first time, nesting behaviour and nest locations with an accuracy useful in fieldwork situations. It is also envisaged to fit males with 45 gram GPS PTTs, to investigate male-male and male-female interactions on the display site, as a contribution to developing a scientific understanding of the houbara breeding system.

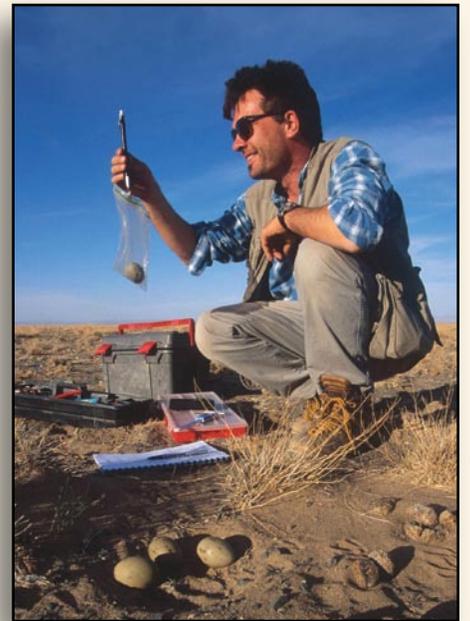
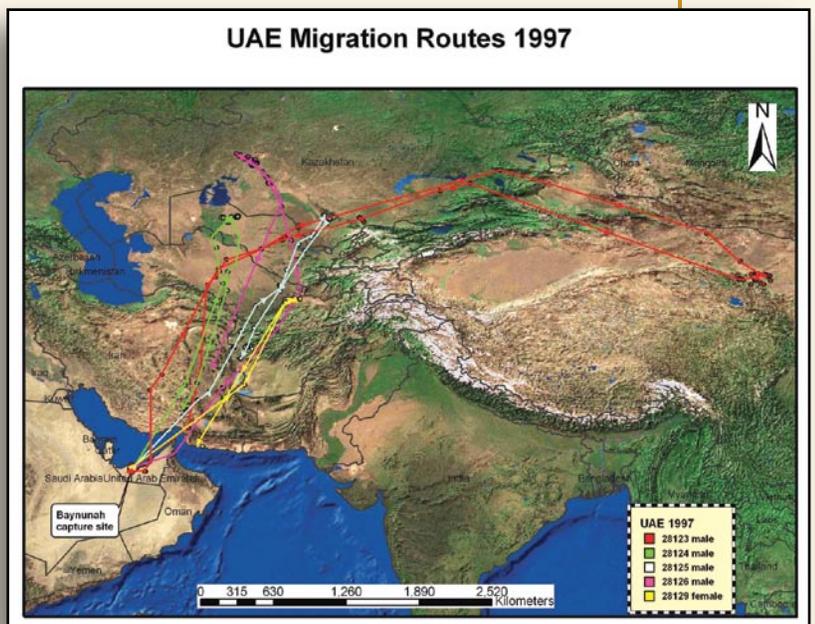
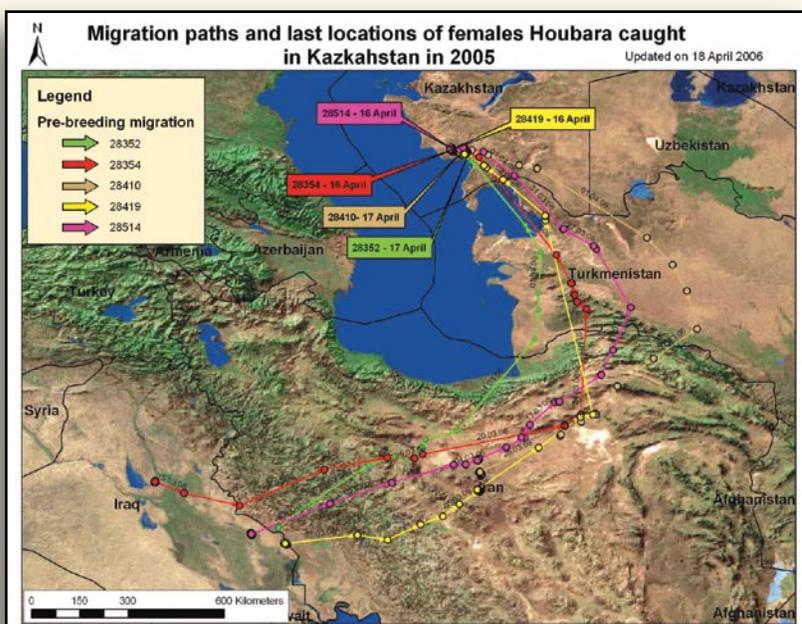


Photo by Michel Gunther

Olivier Combreau finds a houbara nest in Mongolia.



UAE 1997. This map shows the return and outward migration for five houbara caught on their wintering area in UAE during 1997. The coloured lines show the path to breeding ground and back for each individual. The track going deep into China was a big surprise for us. It extended our known range for houbara eastwards and stimulated the development of a long-term collaboration with China.



Kazakhstan GPS PTT females. This map shows the return migration for five female houbara caught last year in Kazakhstan, as they return to their breeding ground from wintering sites in Iraq and Iran.

Combreau, O., Launay, F. & Lawrence, M. (2002) As assessment of annual mortality rates in adult-sized migrant Houbara bustards (*Chlamydotis [undulata] macqueenii*). *Anim. Conserv.* 4: 133-141.

Judas, J., Combreau, O., Lawrence, M., Saleh, M., Launay, F. & Xingyi, G. (2006) Migration and range use of Asian Houbara Bustard *Chlamydotis macqueenii* breeding in the Gobi Desert, China, revealed by satellite tracking. *Ibis* 148: 343-351.

Osborne, P.E., Al Bowardi, M. & Bailey, T.A. (1997) Migration of the Houbara Bustard *Chlamydotis undulata* from Abu Dhabi to Turkmenistan: the first results from satellite tracking studies. *Ibis* 139: 192-196.

# FREE Transmitters

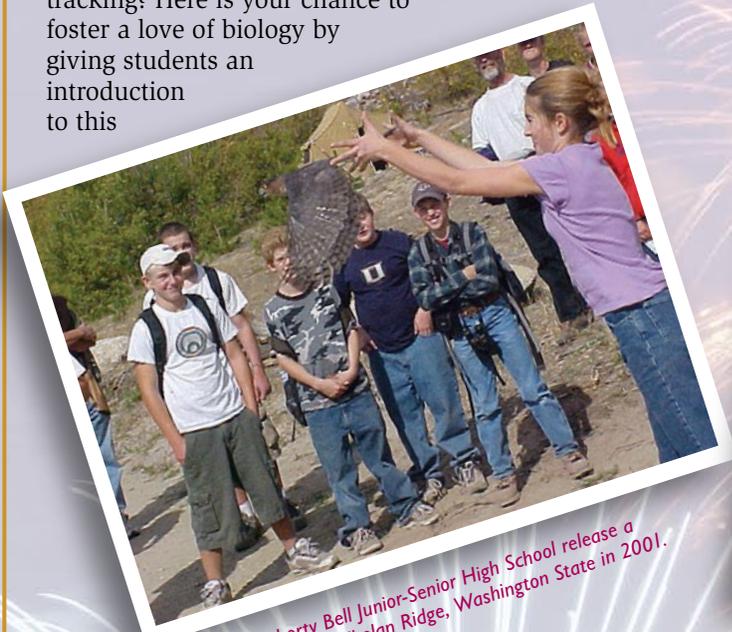
Over the last fifteen years, we have really enjoyed working with several researchers who carried out projects involving school children. In 2001, as part of our tenth anniversary celebration, we sponsored four schools by donating free transmitters for the kids to carry out a project. Below are some photos from our archives.

Are you involved with your local middle or high school and wish to involve the students in bird tracking? Here is your chance to foster a love of biology by giving students an introduction to this

state-of-the-art technology and an opportunity to experience field research firsthand.

As part of our fifteenth anniversary celebration, we would like to donate a couple of transmitters for you to carry out a school project. The selection of the recipient will be based upon the scope of the project, the degree of student involvement and the benefit to the children.

The rules and application will be posted on our website on June 1, 2006. The deadline for application is September 30, 2006. The winner will be announced in our winter newsletter.



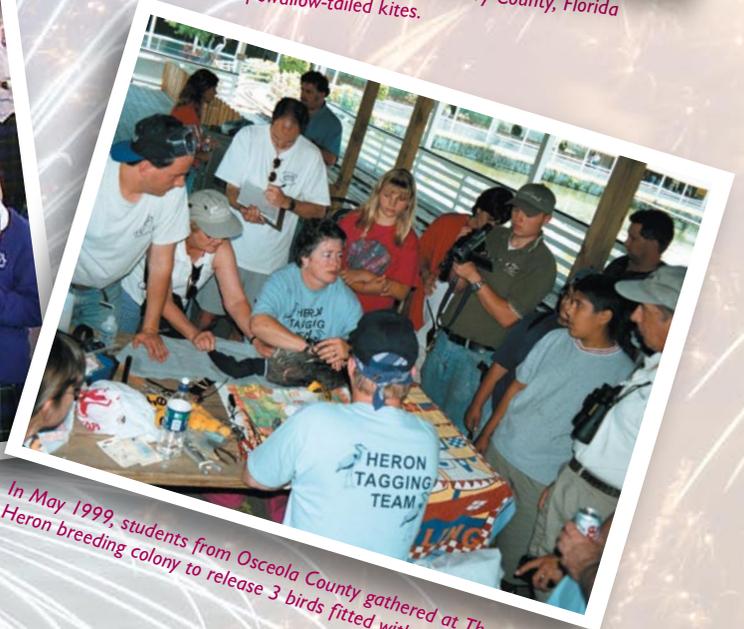
Students of Liberty Bell Junior-Senior High School release a Cooper's hawk from Chelan Ridge, Washington State in 2001.



Students at Yankeetown Middle School, in Levy County, Florida map the travels of swallow-tailed kites.



Students from Palmerston North Girls High School, New Zealand, studied the New Zealand falcon in 2001.



In May 1999, students from Osceola County gathered at The Great Blue Heron breeding colony to release 3 birds fitted with satellite transmitters.

## 15th Anniversary Drawing

Enter our drawing for a free GPS PTT or a 9.5 gram Solar PTT!

### Entry Rules

Entries must be postmarked no later than October 31, 2006 (entries from abroad should be airmailed).

Send entries to: **Microwave Telemetry, Inc.**  
8835 Columbia 100 Parkway  
Suites K & L  
Columbia, MD 21045 USA

**One entry per customer**—entry forms may be photocopied from this newsletter  
Drawing will be made at our Holiday Party  
Winner need not be present to win  
Winners will be notified by email  
All decisions are final  
Winners will assume Argos costs  
Employees or family members of our competitors are disqualified!



### Free GPS PTT

Name \_\_\_\_\_

Address \_\_\_\_\_

Email \_\_\_\_\_

### Free 9.5 gram Solar PTT

Name \_\_\_\_\_

Address \_\_\_\_\_

Email \_\_\_\_\_

# Online Production Form

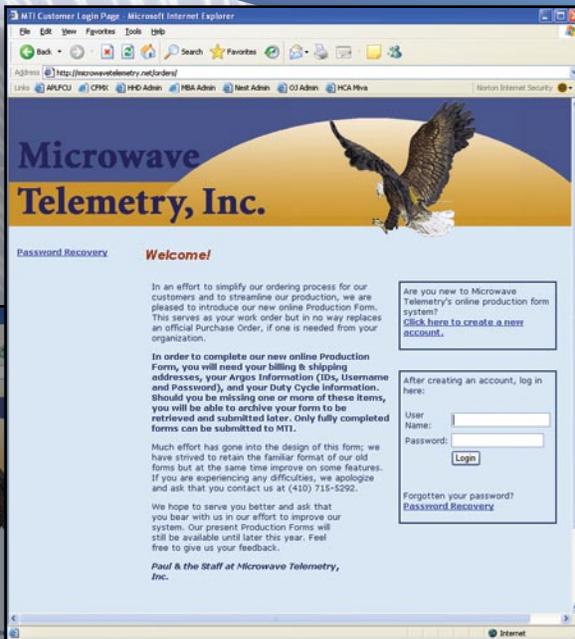
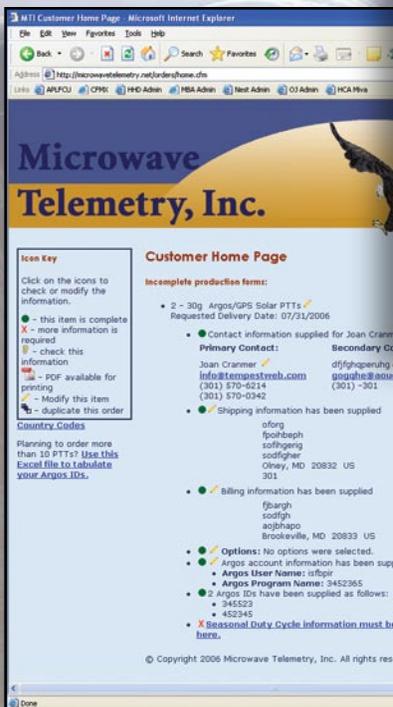
In an effort to simplify our ordering process for our customers and to streamline our production, we are pleased to introduce our new online Production Form available June 15. This will serve as your work order but in no way replaces an official Purchase Order, if one is needed from your organization.

In order to complete our new online Production Form, you will need your billing & shipping addresses, your Argos information (IDs, Username and Password), and your Duty Cycle information. Should you be missing one or more of these items, you will be able to archive your form to be retrieved and submitted later. Only fully completed forms can be submitted.

Much effort has gone into this form; we have strived to retain the familiar format of our old forms but at the same time improve on some features.

We hope to serve you better and ask that you bear with us as we transition into our new system.

Feel free to give us your feedback.



Screen captures of our new Customer Homepage and Customer Login page on our updated website: [www.microwavetelemetry.com](http://www.microwavetelemetry.com).

## A First!

On March 3, 2006 "Trasgu", a Eurasian Woodcock (*Scolopax rusticola*) set off on its spring migration wearing a 12g solar PTT backpack. Trasgu is a young bird, weighing a mere 315g at the time of deployment. This bird's behavior presents a challenge for a solar powered PTT, as it is a ground dwelling woodland bird, which is active at dawn and dusk and may also forage throughout the night. This is the first time that this species is being tracked by satellite telemetry.

The track of Trasgu's progress shows that in the 10 weeks since launching, this little bird has traveled approximately 3,000 km from Navarre, Spain to Russia, where it should soon settle down to nest.

Congratulations to the Navarrese team from the Club de Cazadores de Becada, some of whom are shown below, celebrating. This project is sponsored by the governments of Navarre and Catalonia.



Photo by Mikel Arrazola

Eurasian woodcock.



This map shows Trasgu's journey from its launching site in Etxarri-Aranatz, Navarre, Spain to potential nesting grounds in Russia.



Photo by CCB

Navarrese Tracking Team celebrating. From left to right: Zarbo Ibarrola, Joseba Felix Tobar-Arbulu, Joakin Anso and Raul Migueliz.

# Argos Performance in Europe

## Part 2

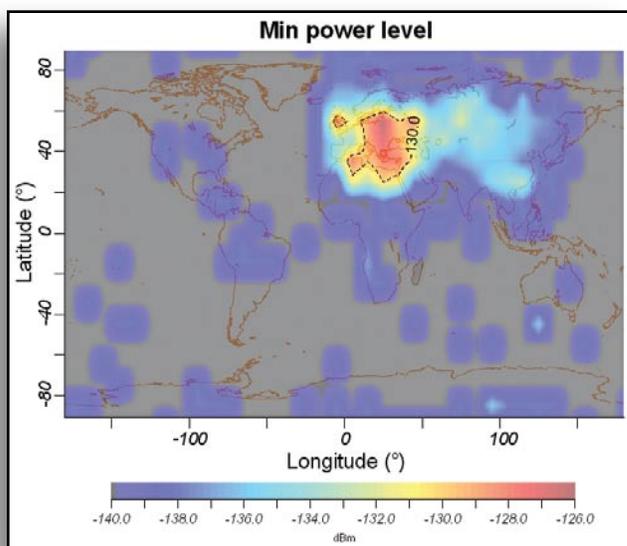
Philippe Gros and Jean-Pierre Malardé – CLS, Toulouse  
Bill Woodward – CLS America

In “Tracker News” of winter 2005, Volume 6, Issue 2, an article spoke of the Argos performance in Europe. In the article below, the CLS group, operator of the Argos system, describes the status of investigations on this topic. Two main points are emphasized: first, estimating the mean level of noise in the European Region and, second, seeking discrete noise sources.

### Estimating the mean level of noise in Europe

This study takes advantage of the message dating and reception power level measurement (in dBm) capabilities of the Argos system. By combining this information with the precisely known satellite orbits, it is possible to link a date to a geographical position on the ground track for each Argos message received and produce a map (see figure below) of the minimum power levels received over the earth.

A specific set of measurements was made in late 2005. The results clearly show that, in the European region, the Argos instruments onboard the satellites are receiving a broadband noise with significant amplitude covering the total Argos frequency range. This noise makes it difficult to demodulate Argos messages that are reaching the satellite at a level of about -130 dBm or less. We are currently investigating the source of this noise.



Geographical distribution of the minimum power level of the messages received by the Argos satellite.

Recall that the transmission power of your PTT is typically specified as the power at the amplifier output. Losses occurring in the link to and through the antenna will generally cause the actual radiated power to be less than the amplifier output. In general, Argos

signals are received at the satellite at levels from -105 dBm (for high power PTTs) to -140 dBm (for very low power PTTs). The test results show that in the European Region, the lower power Argos signals are hidden by the noise.

The tests also indicated that some 0.5 watt PTTs are sometimes received by the satellite at -122 dBm, and sometimes at -130 dBm. Thus, the transmission conditions, including, for example, the quality of the antenna, position of the PTT on the Argos platform, etc. have a big effect on the signal level actually received at the satellite.

The test results suggest that currently, Argos transmissions in the European Region at 0.5 W or more will result in a higher probability of better reception by

the satellite. It is still possible, nevertheless, that good results can still be obtained, under certain conditions, at 0.25 W assuming the antenna is well adapted and the PTT is situated in places offering good transmission conditions.

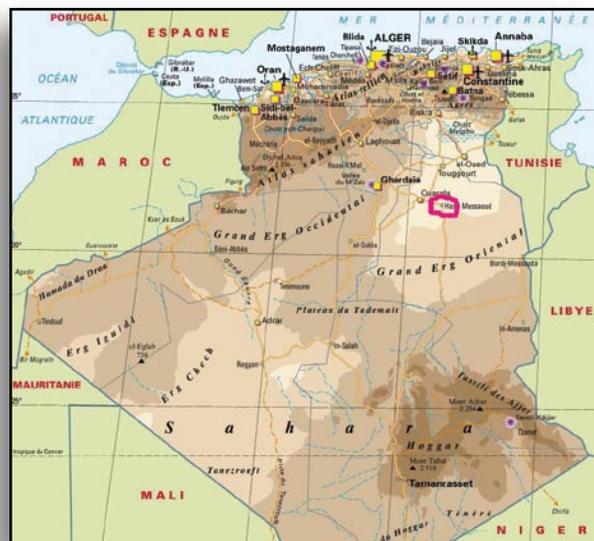
### Seeking discrete noise sources

The Argos-2 instrument on the satellites can also detect discrete noise sources in the Argos frequency band and downlink the measured signals via a “pseudo-message” feature.

Using this technique a discrete noise source has been located near an airport in Algeria (see map below). An additional noise source has been located in Italy but the specific location is currently uncertain. The specific impact of these noise sources on Argos transmissions is also unknown. Consequently these measurements are still under way.

### Summary

The CLS approach to addressing problems of potential “interference” in the European Region and elsewhere is both technical and administrative. On the technical side, in addition to the investigations described above, CLS has also developed some analytical tools that are now available to help Argos users optimize their PTT communications through careful selection of parameters such as transmission frequency, output power and, transmission protocol as a function of the deployment area. Since the performance of the Argos System depends on many parameters, it is recommended that you contact CLS to discuss your specific requirements and take advantage of the new tools to help define optimum transmission strategies.



Raw estimate of the location of a noise source in Algeria, close to Hassi Messaoud.

Administratively, CLS has started actions via their parent organization, CNES, the French Space Agency, to resolve specific sources of interfering noise already identified and documented.

### MTI's Comments:

We are pleased to see that the map we plotted from observed performance of PTTs in Europe fits remarkably well with the data from the satellites. The area most affected falls between the two observed sources of interference. Unfortunately until new advances in battery technology are made, the power output of bird-borne PTTs will be limited by the need to keep the devices lightweight and transmitting long enough for a meaningful study. We can presently increase the power output of our PTTs; however, this must be traded against battery life and/or weight. Ultimately, improvement in Argos performance in Europe will probably only come about by you, the world's scientists, pressuring the authorities in Europe (CEPT, ERO and the ITU in Geneva) to enforce the international agreed band plan.