TELONICS QUARTERLY™

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The Latest Word in Ursine Accessories

One of Mr. Larsen's cartoons in "The Far Side" Calendar a few years ago had a bear returning to its den, having been darted, radio collared, and marked on the side with a huge number 9. The mate, obviously very upset, was standing in the doorway; the caption read "Late again!! This better be a good one." I don't remember whether these were Polar Bears, but assuming they were, it should be clear that it was the female that was late again. In males, the neck is almost always larger than the head, and attempting to install collars on males is generally considered poor practice among polar bear biologists.

Over the years, various attempts have been made to give the male polar bear equal opportunity to be adorned with some of these electronic accessories. They have met with varying degrees of success. Implants have been tried but with limited success. These units typically have internal antennas and, as a result, they have an inherent limited range. Because a surgical procedure is required, they also are more difficult to deploy.

Another technique that's been tried is to attach the transmitter to the fur of the animal with a polymer. Some manufacturers have also tried special harnesses—almost always with very poor results.

The ears of a bear seem to offer a natural attachment point and several different designs have been created to mount a transmitting device there. This is an option that continues to hold a good deal of interest and possibility for a functional design.

Early Telonics eartag transmitters were made using hermetic metal housings with metal brackets. The brackets contained a mounting hole on either side of the transmitter. Not wanting bare metal to come in contact with the ear, attempts were made to coat the metal mounting bracket with a polymer. The completed transmitter was then attached to the ear by inserting two plastic studs through two matching holes punched in the ear. Press-on washers similar to those used to attach identification eartags to cattle secured the unit.

Another design used the same type of hermetic transmitter with threaded brass stand-offs to mount through holes in the ear with plastic plates and washers to keep metal from touching the ear—all secured in place by either nuts or screws. To maximize transmitter range, long but unfortunately droopy antennas were attached to the transmitters, sticking outward from the ear. Because of the area required for the two attachment points and the associated casting, the units tended to be heavier and bulkier than desired. Many of these approached 100 grams and the two mounting holes were often very close to the edge of the ear. The long antennas tended to flop around a lot and probably irritated the animal. In trying to rid itself of the irritant, the bear was usually successful in breaking off the antenna. These and other similar problems have prevented the widespread use of eartag transmitters.

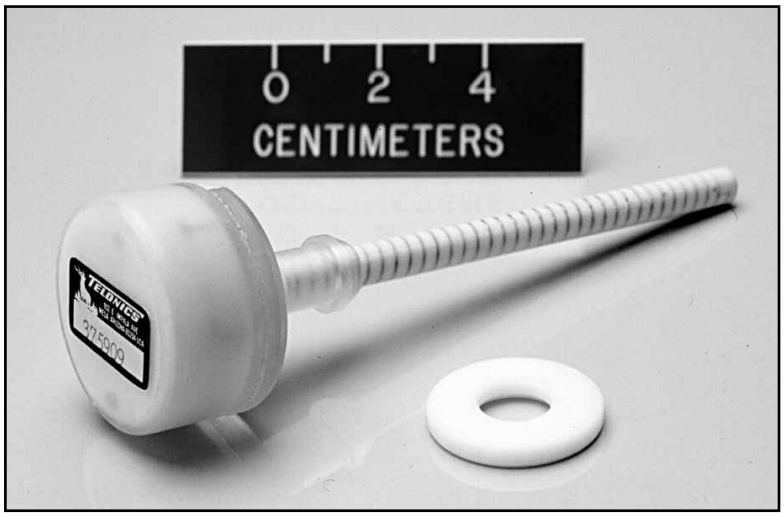
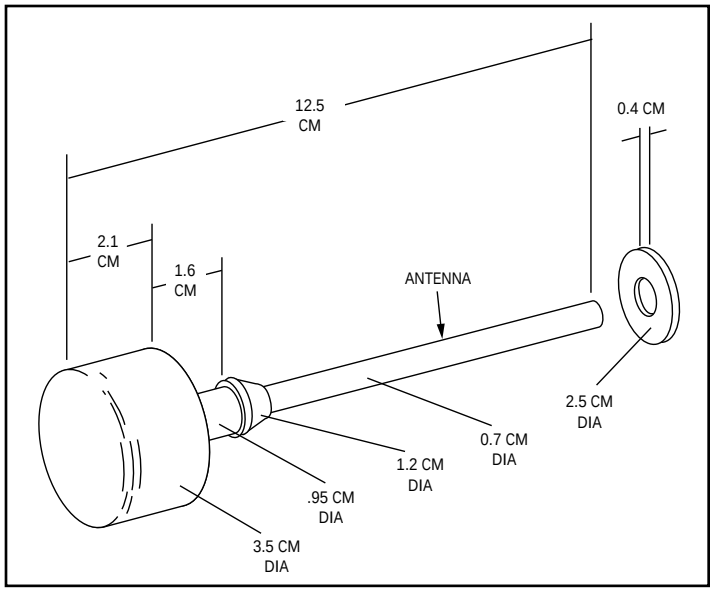


Figure 1. Telonics prototype eartag transmitter for male polar bear.

From time to time, new production techniques emerge and new manufacturing capabilities are acquired. Feedback and suggestions from researchers in the field often shed new light on how problems might be solved. New technology often makes it worthwhile to re-examine old approaches. New production capabilities allow the manufacturer to develop solutions that are economically feasible. This is what has happened at Telonics with the development of a new eartag transmitter. Customer feedback, better machine shop capabilities, improved methods of polymer use, and a few innovative ideas have all been combined to create a viable ear-mounted transmitter.

The solution evolved out of work Telonics is doing in other areas. Over the past few years, we have developed several satellite transmitter packages for marine biologists to use on deep diving animals. While a hermetically sealed metal housing might at first seem to be the best choice, we have found that a solid cast, high impact plastic housing performs as well, even at pressures of up to 40 or 50 atmospheres. The housings can be produced in a wide array of form factors which are easier to assemble and adapt to a particular species. This new production capability led to the idea of making ear tag transmitters in high impact plastic housings which would be much more reliable than the simple cast polymer used in some eartags.

Figure 1 is a photograph of our prototype VHF transmitter which uses these techniques, designed specifically for male polar bears. The completed transmitter weighs approximately 38 grams and is designed to operate for three to six months. It is sealed and solid cast in a tough plastic housing with a short (9 cm) helix antenna exiting to the rear, through a single mounting stud. The plastic eliminates the metal to ear contact problem while the round design with single mounting hole will permit the transmitter to rotate freely, hopefully minimizing any irritation and infection. While the shortened antenna will result



in some loss of performance, the shorter length and better location may provide enough benefits to offset the range reduction.

The transmitter is attached by piercing a single 1 cm hole through the ear, inserting the antenna/attachment stud through the hole, secured by a retaining washer. The washer is pressed onto the stud with a relatively simple attachment tool. Figure 2 gives detailed size information.

We are anxiously awaiting the results of the first field deployment. While the first units were made specifically for polar bears, there are certainly many other species where this transmitter type could be used to advantage. If you have a potential use, please let us know. The physical and operating parameters are certainly not cast in concrete (or polymer) at this point in time. *Boyd Hansen*

Figure 2. Dimensions of CM-004797 VHF Eartag Transmitter.

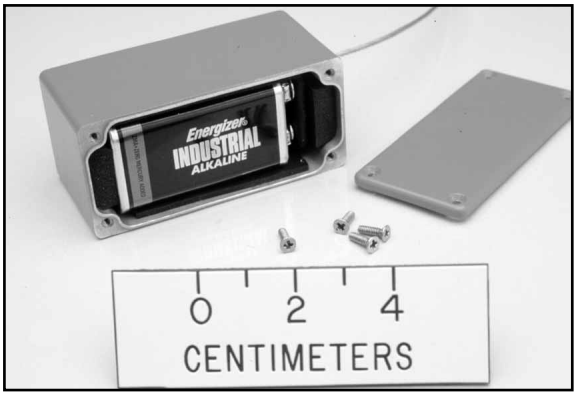
RB-10 User Replaceable Battery Transmitter

For many years, Telonics has produced a variety of VHF transmitting systems. Most of them have been housed in hermetically sealed canisters that contain both the transmitter and power supply. Hermetic canisters, with glass to metal feedthrus and soldered lids, provide the ultimate protection against the environment. When compared to polymeric and other types of enclosures, hermetic canisters have proven superior and provide the best protection against the harsh conditions that many of these units encounter. However, it also means that the transmitter has a limited operational life in the field before the unit either has to be retired or returned to the factory for refurbishment with new batteries. Occasionally, customers have indicated that their main requirement is for a unit that accommodates battery replacement in the field. This capability, along with requests for an extremely small and lightweight transmitter, have resulted in the development of the RB-10 user replaceable battery transmitter.

The main design criteria for the RB-10 was that it house one 9 volt transistor battery that is user replaceable, and yet still provide adequate environmental protection. The goal was also to provide a unit that accommodates many of the different VHF transmitters that Telonics produces while remaining as small as possible. The resulting design has been optimized for both size and weight.

The enclosure is constructed from a lightweight alloy with a specialized coating. The entire unit—including battery, transmitter (MK6) and antenna—weighs only 129 grams. Overall dimensions of the enclosure are 2.66" x 1.25" x 1.46" (6.75 cm x 3.18 cm x 3.71 cm)—slightly bigger than a couple of 9 volt batteries stacked up!

The unit's lid is attached with stainless steel screws and has an integral gasket. A TA-5MT 1/4 wave stainless steel flexible whip antenna is connected to a sealed feedthru. The antenna is strain-relieved (secured) in the end of the enclosure. *Note: Other antenna options are available.*



With the lid properly fastened, the RB-10 is virtually leak proof. Units have been tested to a pressure greater than 25 feet of water with no sign of failure. As with all gasketed or o-ring sealed enclosures, every precaution should be taken to ensure a clean seal and mating surface.

A standard 9 volt alkaline transistor battery has been the battery of choice on production units thus far—primarily because of availability. It offers an operational life of approximately 60 to 120 days at 75 to 35 pulses per minute (@ 25°C) and remains operational to temperatures of -20°C. A lithium 9 volt cell is also available which provides approximately two times the current capacity. The battery is connected to a standard 9 volt clip and is held tightly in place.

Initial production of the RB-10 incorporated the MK6 VHF transmitter with a mortality switch and high shock capability. However, the RB-10 enclosure design will accommodate all Telonics VHF transmitters with any of our available options. They include low, standard, and high power versions with power output of 10mW to 30mW. All other Telonics options, including mortality/motion sensing, temperature sensing, and activity sensing are also available. In addition, the microprocessor controlled MK7 transmitter adds such capabilities as duty cycling, I.D. coding, etc. The unit can be powered up by simply plugging in a battery or using an optional internal on-off switch that is activated by an external magnet.

The RB-10 transmitter has many possible applications. One ideal use for the unit is as a marker beacon transmitter, which can be used to test receiver and antenna systems and also for identifying specific locations. A new configuration will combine the RB-10 enclosure with a collar attachment for use on animal collars. This would allow researchers the luxury of simply changing batteries in the field rather than returning the units for refurbishment.

With its many available options and

possible configurations, the RB-10 should be able to fill most applications requiring a user replaceable battery transmitter. *Andy Saum*

RB-10 Mechanical Specifications

Dimensions:
2.66 L x 1.25 W x 1.46 H in
6.75 L x 3.18 W x 3.71 H cm
(not including antenna)

Weight:
Approximately 129 g (including battery).

Construction:
Enclosure and lid: lightweight alloy with catalyzed coating.
Hardware: Stainless steel

Sealing:
Lid with integral gasket, sealed antenna feedthru.
Water tight to 25 feet.

RB-10 Electrical Specifications

Power Supply:
User replaceable 9 volt battery with an operational life of approximately 60 to 120 days.

Transmitter:
Any Telonics VHF transmitter, including all available options.

Antenna:
1/4 wave stainless steel flexible whip (other antenna options available.)

Bears! and a Visit to the Great Land

The 10th International Conference on Bear Research and Management was held July 16-20 in Fairbanks at the University of Alaska. Stan Tomkiewicz and I were fortunate to be among the attendees at this conference along with approximately 400 other "bear people". Things got off to a great start on the 16th with a mixer at the University of Alaska Museum, where folks were able to gather and renew old friendships, and possibly make some new ones, as well as admire the fantastic displays of the museum.

The conference started in earnest on Monday the 17th with a greeting to conference attendees from Joan K. Wadlow, Chancellor of the University of Alaska at Fairbanks. With the formalities taken care of, everyone was ready for the presentations and discussions of bear biology, use, and conservation. Some of the topics included Conservation and Recovery of Bear Populations, Bear-Human Interactions, Genetics of World Bears, Population Management, and Habitat Management. Other reports dealt with bear populations and management worldwide, ranging from brown bears in Bulgaria and the Balkans to protected areas for the Andean bear in South America.

Besides the desire to learn more about bear biology, our goal at the conference was to support our telemetry equipment and those who use it. It often helps to be on site, and face to face, with people so that we can be sure correct communication has taken place and everyone understands the intricacies of both the technology and the science. This is especially important in providing support to researchers from countries where other languages are spoken. The Alaska conference gave us an opportunity to discuss issues and help many scientists with both support of ongoing research and planning for future projects.

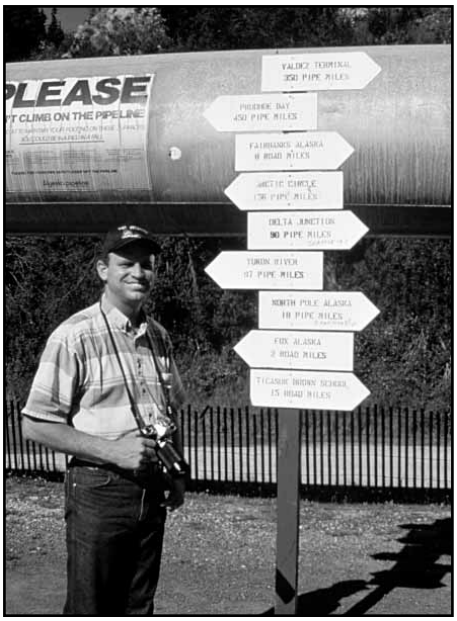
One of the highlights was a panel discussion with representatives from the various native groups and associations in Alaska on the topic of "Attitudes of Alaskan Natives Towards Bears and Bear Management." The session was well attended and discussion was animated to say the least. Several Native representatives stated their positions and expressed their feelings, and conference attendees were able to ask questions related to specific areas of concern.

One of the questions posed to the panel of Native representatives, "What can be done to minimize the impact of radio telemetry on the bears?" Their responses ranged from "Don't even touch them..." to "Treat the bears with the respect they deserve." The responses varied depending on the bear species and the cultural and religious associations of a people with a particular species.

These issues are complicated and were certainly not resolved during the course of the discussions in Fairbanks. From our perspective, they emphasize the need to understand the multi-faceted aspects of making telemetry equipment which has minimal impact on the species being instrumented. We have always been sensitive to the needs of investigators for reliable data. But we also try to manufacture equipment that presents the smallest and least invasive approach for the species. In many cases we have redesigned an attachment harness or collar to better suit the animal. Finding the best method is an interactive partnership among scientists, engineers and other responsible parties, such as the Native community.

While the presentations were taking place, there were also poster sessions in the gathering areas outside the halls. Individuals were able to display posters with information on specific topics with "hands on" experience in some areas. Folks could handle samples of used radio collars or see photo documentation of traffic kills of brown bears in Croatia. Viewing this poster made us wonder if the unfortunate bear had the foresight to order high shock crystals for his collar.

High shock crystal technology was implemented at Telonics as we learned about the incredibly high shock levels experienced by radio collars on different animals. Some of the first instances involved Bighorn Sheep rams "butting" heads. Another instance involved Bobcats smashing their radio collars against rocks while in pursuit of their prey. We went through a process of



discovering first, the need, and then finding a suitable solution which included high shock crystals that survive in situations like those listed above. However, it must be understood that some accidents are catastrophic enough to destroy a high shock crystal.

Another interesting display included a couple of culvert traps that people could get into and test for themselves. These sophisticated commercial traps were a far cry from the homemade traps of yesteryear. Even so, nobody (including a bear) wants to spend much time in a trap. Telonics does supply trap site transmitters so that the researcher will

know right away if there is a "guest" in the trap. This technology has caught on overseas as well as here in the States.

Finally, on Wednesday evening, after three days of being as serious as bear biologists could possibly be, the conference picnic was held at Gold Dredge #8. This was an opportunity for everyone to get together, have some fun and discuss things in an informal setting. The folks at the Gold Dredge provided good food and informative tours of the dredge and the surrounding support buildings. This was an excellent treat for those of us who had never seen the machinery and implements of the Alaskan gold industry. And for those who were willing to get wet and a little dirty, there were places set up where people could try their luck with a gold pan. A couple of people were fortunate enough to find a nugget!

After the conference, we left Fairbanks bound for Anchorage by train through Denali National Park. The scenery was at least as good as all the travel brochures said. Actually, it was breath-taking. Denali (Mt. McKinley) is bigger than imagined and, consequently, we were only able to see about 80% of the mountain due to cloud cover.

In March 1996, Denali National Park will be the site of an ambitious project to instrument wolves with our GPS position fixing collars. The position data taken by the GPS receiver will be logged to an on-board storage device. When the study is finished, the collar will be removed and the data extracted—at which time the collars will be refurbished and ready to go out in the field again.

On arriving in Anchorage, we visited a few folks at the National Biological Survey and checked on the progress of a walrus satellite transmitter project that utilizes a new housing design. The project uses our smallest satellite transmitter (ST-10) with a pressure transducer—all in a tusk mount!

After these visits, we went to Exit Glacier on the Kenai Peninsula where we worked with a glaciologist for the Kenai-Fiord National Park. Scientists want more information about the rate of travel of the ice 300 feet down inside the glacier, and our telemetry may provide some interesting answers.

Finally, with all of the visiting behind us and the temperature at Anchorage a cool, rainy 60°F, we got on the plane and flew back to Phoenix with memories of the great state of Alaska and her good people still fresh in our minds. When we got off the plane here at "home", it was 117°F and hot as a furnace outside. Thank heaven for air conditioning to bring a little bit of Alaska back to mind.

Thanks to everyone who made this trip such a wonderful experience.

Gary Jones

A Holiday Greeting

We can always tell when the holidays are approaching—the air temperature drops to about 75 here in the desert. The weather is perfect for getting together with family and friends. So, as usual, Telonics will close at end-of-day Friday, December 22 and reopen on Tuesday, January 2.

We would like to take this opportunity to thank you for your business this past year. It is our pleasure to provide you with the finest service and products we can deliver.

May the magic of the season be with you and your families. Peace, happiness and prosperity to you all!

TELONICS INC.
TELEMETRY-ELECTRONICS CONSULTANTS
932 E. IMPALA AVE. • MESA, ARIZONA 85204-6699 U.S.A.
(602) 892-4444, FAX (602) 892-9139
E MAIL: 75052.1563@compuserve.com

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