

TELONICS QUARTERLY™

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The New ST-13 ARGOS PTT

The ST-13 has been designed as a low cost, high reliability, ARGOS Certified PTT for oceanographic and meteorological applications. Much of the technology utilized in the ST-13 is a direct outgrowth of the ST-5. However, the ST-13 has undergone extensive production engineering to ease assembly and test processes and thus reduce cost to the user. As a result, the ST-13 is approximately 20% lower in cost than its predecessor, the ST-5 PTT.

In addition to reduced cost, the ST-13 offers additional features beyond those available on the ST-5. Those features include an Asynchronous Serial Interface Option operating at RS232 levels in addition to the TTL Asynchronous Serial Interface Option for users who wish to control the ST-13 from their own data collection host computer. Further, the ST-13 has a wider operating input voltage range (+7.0 Vdc to +14.0 Vdc) which allows users to interface to standard lead-acid and alkaline "12.0 volt" battery technology.

The modification to the input voltage allows the user to choose from a wider range of available power packs which can be obtained commercially at reduced cost. NOTE: It is still necessary for those users who are employing rechargeable power packs to be certain that the battery charging circuit does not exceed the rated capacity for the ST-13. The basic specifications for the ST-13 are shown in Figure 1.

It should be noted that the ST-13, unlike the ST-5, is a single board

configuration with a simplified external housing. Mechanical dimensions are shown in Figure 2. One mechanical feature that many users will find very useful is an on-board BNC female connector rather than a coaxial cable emanating from the unit. This allows for easy RF (radio frequency) testing and easy connection to antenna subsystems in various applications. As with the ST-5, a DB25 connector is used to supply power and interface to various sensors and support the asynchronous serial port.

Like its predecessor the ST-5, the ST-13 has been designed around the concept of a flexible chassis capable of accepting various options as required for the application. Not all of the options need to be installed, thus allowing the user to select appropriate hardware and software to fulfill the requirements of the application.

Over the years an extensive application software library has been developed for the ST-5 which allowed the unit to operate with various sensors, accomplish various data logging functions, and provide the most appropriate ARGOS data stream for uplink to the satellite. For example, software protocols were developed for monitoring temperature and drogue status through the use of a salt water switch. A highly flexible asynchronous serial command protocol was developed to allow interface to various dataloggers. A multiplexing 0-5 Vdc analog input measuring circuit and associated software was designed for interfacing to various sensors with 0-5 Vdc analog outputs. All of these capabilities are available for the ST-13 and we are currently in the process of converting the ST-5 software applications library. Because of the large number of programs that need to be converted, the entire library will not be immediately available. Our

Figure 1

Core Unit Specifications

ARGOS CERTIFIED PTT:
Model CM 10 001-004

WEIGHT: 200 g

SIZE: See Figure 2.

FREQUENCY: 401.650 MHz
(In accordance with ARGOS specifications)

OPERATING TEMPERATURE RANGE:

Option 003 0 to +50°C
Option 004 -40 to +70°C
Option 005 -40 to +60°C

STORAGE TEMPERATURE RANGE: -60 to +80°C

HUMIDITY: 90% Non-condensing

POWER OUTPUT AND PEAK CURRENT:
2.0 W/550 ma at 14.0 Vdc DURING TRANSMISSION (50Ω LOAD)
0.7 W/400 ma at 7 vdc DURING TRANSMISSION (50Ω LOAD)

VOLTAGE:
+7.0 Vdc to +14.0 Vdc

QUIESCENT CURRENT: < 100 ua
MAXIMUM (65 ua typical)

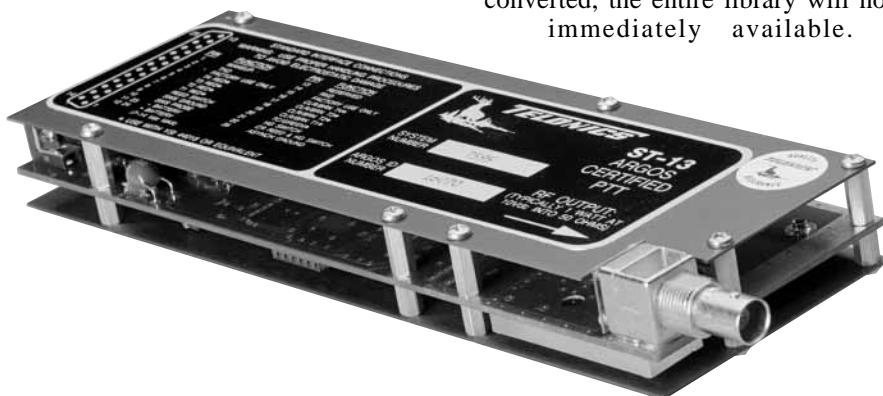
CASE POLARITY:
NEGATIVE (-) GROUND

RF OUTPUT:
BNC Female connector on unit

RF OUTPUT IMPEDANCE: 50Ω

INTERFACE CONNECTOR:
DB-25 FEMALE (FOR DIGITAL AND ANALOG SIGNALS)
Note: Inputs are static sensitive.

ON/OFF SWITCHING:
OPTION 061 - A normally open (N.O.) switch turns the PTT on.



conversion process is proceeding based on user requirements for various application programs. NOTE: For some applications, the ST-5 will continue to be used over the next year.

Although the software library covers a wide range of application approaches, as with the ST-5, it is possible to develop new software protocols and sensor interfaces with the ST-13. This can generally be done with minimal non-recurring engineering software development effort and cost to the user. The ST-13 can be customized to new applications and new customer requirements.

A new application involves interfacing the ST-13 to a GPS receiver for applications where GPS derived positions are required. Because of SA (Selective Availability) imposed by the military, GPS positions available to commercial users are only accurate to approximately 100 meters unless a technique known as differential GPS is employed. However, the position accuracy is very consistent and there are far fewer poor quality positions than inherent in a doppler measuring system such as ARGOS. GPS is also available for positioning on a 24 hour per day basis which is not available with ARGOS positioning. Unfortunately, GPS as a stand-alone system does not have a radio link to relay information to other sites. Therefore by interfacing a GPS receiver to an ARGOS PTT, a highly accurate position can be obtained at virtually any time and that position can be transmitted via a low earth orbiting satellite system. In this case ARGOS is simply used as a relay system to recover data. Position accuracy and

position updates are functions of the Global Positioning System. A protocol has been established to provide latitude, longitude, and the time the GPS position was established. This simple protocol allows up to three GPS positions to be reported in a single ARGOS uplink transmission. Other more compacted data streams may also be developed depending on user requirements.

Another new application involves interfacing the ST-13 to a barometric pressure transducer. A hardware interface has been developed for the AIR Model SB-2A sensor. Software is available to obtain barometric pressure measurements from the unit. Various data collection protocols have been considered and one protocol will be under test during 1994. As usual, application programs can be customized to meet individual research requirements, and often with minimal nonrecurring engineering costs.

Over the next year it is expected that ST-13 production will continue to increase. Ultimately, this PTT configuration will probably replace the ST-5.

As a final note, the ST-13 RF module will also be made available in the beginning of 1994 and will offer a low cost RF module option for individuals who are producing their own controllers. For users currently employing the ST-5 RF module, the electrical interface remains the same although the physical form factor of the unit has changed and the direct connection of the wiring harness to the ST-5 RF module has been replaced with a DB-25 connector on the ST-13. Finally, recertification should not be necessary for the ST-13 if you have certified your controller with the ST-5 RF module.

Stan Tomkiewicz

Refurbishing Telonics Transmitters

A commitment and a caution.

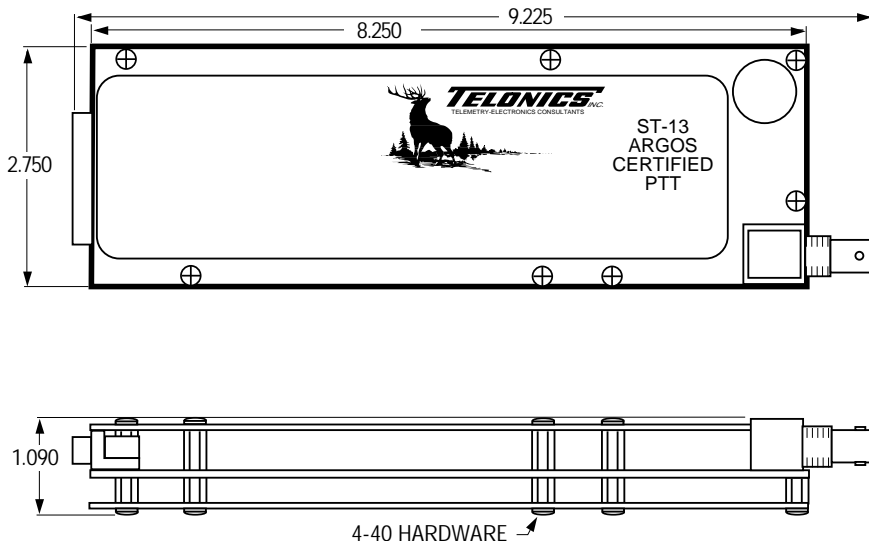
Telonics makes transmitting subsystems for a variety of environmental and wildlife applications. Many of our transmitters, particularly those used in wildlife applications, are housed in hermetically sealed containers to assure long term protection against moisture penetration. Opening and resealing canisters requires special skills and equipment to avoid damage to the units and to avoid venting batteries. The units are solder-sealed and should always be returned for any kind of repair or refurbishment, including battery replacement.

We realize the amount of time, money and effort that goes into recovering and redeploying telemetry equipment and we are committed to a high quality refurbishment of all equipment returned. We take every precaution to ensure that refurbished equipment is handled according to strict standards of workmanship. We make sure we fully understand your requirements and specifications. Refurbished transmitters are tested at several steps during the process in addition to final testing.

Researchers who have returned transmitting subsystems for refurbishment know that it's not a matter of just changing the battery, but a careful process which restores the unit to virtually new condition. The disassembly process involves carefully removing the electronics assembly from the housing to prevent electrical or mechanical damage. If pulse rate or mortality delay timing must be modified (a retrofit), removing a component from the printed wiring board requires a different technique and different equipment than that used when the component was originally installed. All electronics are inspected. The data sheets for the units are carefully reviewed. The latest update modifications are installed on the electronics. The electrical specifications are tested and verified, and appropriate batteries are installed.

Occasionally we receive transmitters which have been either electrically or mechanically damaged through unauthorized service. This can happen whenever units are handled by people who do not understand the technology

Figure 2 (in inches)



used in the transmitter. For example, the use of improper soldering tools and techniques can cause damage to components and/or power supplies. Installing the wrong batteries can cause damage or reduce performance. An accidental static discharge can damage the electronics during handling. While the damage can usually be repaired at our lab, answering the question ‘... will the telemetry equipment work according to original specifications?’ may require a complex evaluation.

In the case of static damage to a component, the failure may be latent (not show up until later). Furthermore, if one component in the circuit is damaged, others may also be damaged even though they appear to be working just fine. Unfortunately, there are no analytic or diagnostic procedures to detect parts which may fail in the future. In these cases, static damaged equipment can be repaired, but we often advise that it not be used in critical applications.

Unauthorized repairs are a particularly important issue with ARGOS certified PTT's. A damaged or mishandled transmitter could cause a PTT failure that would result in interference that prevents other PTT's from being able to communicate with the satellite system. In the case of ARGOS PTT's, any non-factory work on PTT electronics will invalidate your certification.

Most electronics manufacturers will refuse to perform repairs of any kind on equipment that has received unauthorized service. We have not taken this rigid an approach because we recognize how difficult conditions can be in the field. Under emergency conditions, do what you have to do — and then get the equipment back to us as soon as possible. We'll do everything we can to be of help.

Dan Decker

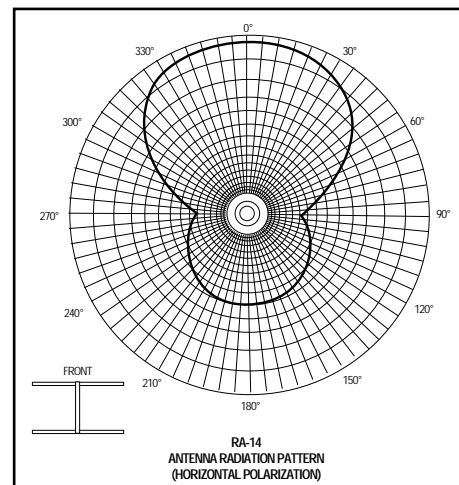
RA-14 Antenna

A more durable option for ground tracking.

Our new RA-14 receiving antenna is a two-element antenna with flexible elements designed for handheld use. First made available early in 1993, it has proven to work well in numerous applications. The basic design was patterned after our RA-2A antenna (H antenna), which has been the most popular receiving antenna used in telemetry applications for years.

The RA-2A has become the standard handheld antenna used in wildlife tracking. Used extensively in ground tracking, the RA-2A is also commonly mounted on both aircraft and ground vehicles. It has worked well in all of these applications. The only drawback with the RA-2A is that it can be damaged during rough field work, a characteristic shared with most receiving antennas.

For a number of years, we have been considering a more durable replacement for the RA-2A in ground tracking. The RA-14 is the result of this pursuit. The antenna has a center boom attached to a wooden handle. The handle can be pivoted down so that it is perpendicular to the boom when being used, and folded parallel to the boom when stored. Four screw-on element segments attach (two in front and two in the rear) to form a two-element or H-shaped antenna. The elements are flexible, thus making the RA-14 ideal for applications where users are moving through dense vegetation, climbing in rocky areas with the antenna in hand, strapping the antenna to a backpack for transport, etc.



Since the elements on the RA-14 are flexible, they could be forced back by the wind resistance on aircraft. Thus, the RA-14 is not recommended for aircraft work. Instead, we suggest continuing to use the RA-2A for such applications.

Antenna pattern, gain, and use are very similar to the RA-2A. Specifically, the antenna provides 4 dBd gain with a 10 dB front to back ratio.

RA-14 dimensions are approximately 12.5" (32 cm) boom length, with 25" (64 cm) element length. The handle extends down approximately 12.5" (32 cm) when in use. The antenna is provided with a BNC jack for connection to a suitable coaxial cable.

The RA-14 antenna can either be purchased separately or as an RA-14K kit which includes the antenna, RW-2 five foot coaxial cable with BNC connectors, and RA-14P carrying pouch for the disassembled antenna. The RA-14 is currently available in several frequency bands between 148.00 and 174.00 MHz. We think this antenna will be the future standard for handheld use in wildlife telemetry.

Bill Burger

Happy Holidays

Once again we send you our best wishes and hopes for a safe, prosperous and happy New Year. Since the holidays are a special time for family and friends, Telonics will close at end of day on December 23 and reopen on Monday, January 3.

We would like to take this opportunity to thank all of you for your support during

the past year. We appreciate your business and look forward to working with you in the future. If you are in our area this winter and have an opportunity to visit, we invite you to stop by Telonics any time. It is always a pleasure to have customers visit us here at the laboratory.

Our best to all of you and have a wonderful holiday!



Telemetry Workshop



Dates: March 2 to 5, 1994

Sponsors:

Telonics Inc.,
Intl. Wildlife Veterinary Services,
Vet Unit, Dept. of National Parks and
Wildlife Management, Zimbabwe

Topics Include:

Radio Telemetry • Conventional Telemetry •
Antenna Concepts • Receiver Technology •
Data Acquisition Systems • Satellite Telemetry •
Local User Terminals • Uplink Receivers • AVHRR Imaging •
GPS ARGOS • GPS FM • GPS Stored Data •
FM Transmitters

Special Note:

15 min. time slots will be available on Friday morning for
participant papers/talks. Must be pre-arranged.

Optional Special Events:

Gameviewing (additional charge), Hwange National Park
Field Tracking, Black Rhino and Wild Dogs

Place:

Hwange Safari Lodge
*Zimbabwe Sun Hotels is providing special rates including
room, full board and conference facilities.*

Single Occupancy Z \$349, U.S. \$58

Double Occupancy Z \$280, U.S. \$45

Note: Foreign attendees must pay in foreign currency.

Travel:

Regular flights available to Hwange National Park Aerodrome.
Rental car available in Harare, 6 hour drive to park.

Registration:

Z \$300 (Zimbabwe attendees only)

U.S. \$100 (or any foreign currency)

Deadline:

Registration closes February 15, 1994.

40 participants maximum.

For more information, contact:

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Vet Unit, Dept. of National Parks and Wildlife Management
P.O. Box 8365, Causeway Harare Zimbabwe
Phone 263-4-792783/4/6, FAX 263-4-702848

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