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To GSA Or Not To GSA

The Regulations Encourage Competition

According to the Federal Acquisition Regulations (FAR), the purpose of the Federal Supply Schedule program (managed and directed by the General Services Adrninistration) is to provide Federal agencies with a simple process for obtaining commonly used supplies and services at prices associated with volume buying.

It is debatable whether simplified procedures actually exist within any agency of the Federal government; however, I am convinced that there is nothing "simplified" about anything associated with GSA. I am certain that buried in documents governing procurement, the regulations are set forth in minute detail. I am not certain, however, that the purchasing agents, end users, and those vendors on contract have a good understanding of the regulations. As evidence of this lack of understanding, we receive information from purchasing agents on this subject which varies dramatically depending upon when they received their last training update and, quite frankly, how hard they are willing to work for you, the researcher.

We are certainly not experts in the Federal procurement procedure, but over the years we have familiarized ourselves with some of the pertinent regulations. A large part of the frustration in dealing with GSA is centered around the difficulty in working with the bureaucrats managing these schedules, the attendant "requirements" which govern record keeping and reporting, and the overall inconsistency with which the contract seems to be applied, depending upon the purchasing agent involved. For these reasons, many vendors have decided not to participate in a GSA contract.

In April, 1988, Telonics elected not to be on GSA contract. Prior to this decision, we gathered further information governing procurement and talked to many purchasing agents. Current regulations indicate that non-participation on GSA contract does not preclude anyone from purchasing equipment from Telonics or any other vendor. The GSA classifies wildlife telemetry equipment under Telecommunication Schedule FSC Group 58, Part IX. This classification is a "Non-Mandatory Multiple Award Schedule." In fact, FIRMR Regulations, 201-40.008, 4 June 1985, state:

2) If responsible alternative sources are available, the availability of items under the GSA Non-Mandatory Telecom-munications Schedule Contract shall not preclude or waive the requirement to seek, through alternative contracting procedures, the lowest overall cost alternative to meet the needs of the government...

3) Suitable equipment or services must be considered whether or not it is on a GSA Non-Mandatory Telecom-munication Schedule Contract. The lowest overall cost alternative shall be sought. When using the GSA Non-Mandatory Telecommunication Schedule, an agency shall consider the offerings of a sufficient number of scheduled contractors to ensure that its requirements are satisfied at the lowest overall cost. Alternatively, the agency may choose to prepare a solicitation document in an effort to secure the appropriate products and related services at lower overall costs to the government.

The FIRMR Regulations are clear. You do not have to purchase from the non-mandatory GSA schedule simply because your purchasing agent does not choose to look elsewhere. In fact, even if a specified item is on GSA contract, purchases over $1,000 subject the "head of the procuring action" to the competition requirements contained in the Federal Acquisition Regulation. (See FAC Part 6, Competition Requirements, July 30 1986) Virtually any vendor can get on non-mandatory contract by simply submitting and negotiating a proposal. Unlike a mandatory schedule where competition requirements are met prior to award, there is no competition

(GS 16, under general schedule) for items over $1,000, but not in excess of $10,000. Further, if the amount of the purchase is over $10,000, justification must be approved in writing by the agency's "senior procurement executive."

If an alternative source is recommended which meets specifications and represents a lower cost alternative, the government must consider procurement outside the GSA contract. You, as the originator of the procurement process, have input into procurement alternatives. If you propose realistic specifications based on sound engineering principles and have adequate justification, including product support and warranty, it is possible to select from various products and manufacturers that meet your requirements, whether or not they are on contract. The only requirement for going beyond the contract schedule is that once the product is defined, it is then subject to regulations that it must represent the "lowest overall cost alternative" for the specified item.

Whether to utilize the GSA NonMandatory Multiple Awards Schedule Contract or not is a decision you help make. Once you have determined the exact specifications you require in the product you intend to purchase, it is essential to make your purchasing agent aware of your product specifications so that a well informed search of the market place may be made. Long term performance and reliability dictate the cost effectiveness of equipment to a study design. The Federal procurement process is complex and it often requires determination to get the specific equipment you require. In all cases, it is necessary to distinguish among the products of various manufacturers in order to assure the success of your program.

Stan Tomkiewicz

Biological Notes

Temperature Sensing With VHF Telemetry

Temperature sensing VHF transmitters have been used in biotelemetry applications for many years. Applications include monitoring body temperature to determine possible correladons with activity, ambient temperature, health, or reproductive state; monitoring temperature of specific body sites; and monitoring temperature in a den or other microhabitat. The various applications require different placement and types of sensors.

Sensor placement is determined by the specific temperature to be monitored (e.g. deep body, subcutaneous, inner ear, vaginal, package temperature when mounted on a collar, den temperature, etc.). The selection of sensor type depends on the data to be collected, precision of measurement required, permissible package size, and whether the unit can be recovered and recalibrated after the period of data collection.

In general, temperature sensors used in biotelemetry utilize pulse period modulation (often called Pulse Interval Modulation, or PIM) to encode data. Thus, pulse period (time from initiation of one pulse to inidation of the following pulse) changes predictably with changes in temperature.

In conventionally designed trans-mitters, the relationship between pulse period and temperature is approximately log linear over approximately a 10 to 20° C range of temperatures, with an increased temperature resulting in a decreased period (faster pulse rate). Other rnore complex relationships may also be utilized, if required. The specific relationship for each transmitter is established by carefully calibrating the units over the range of temperatures which could be encountered during the study, typically by using a circulating water bath.

In the simplest temperature sensing circuits, a thermistor is substituted for a fixed resistance to determine pulse period. The particular thermistor chosen, along with other circuit cornponents, determines the pulse period at each temperature. A limitation of such sensors is that pulse period may also change as components other than the thermistor are influenced by temperature, aging, power supply voltage, or other factors. With very simple circuits such as the "onestage" and "two-stage" designs originally used in wildlife telemetry, changes in pulse period as well as pulse width and frequency are common.

At Telonics, we utilize somewhat more complex circuits to provide increased stability in these basic transmission Farameters. However, even with stabillzing circuitry, component aging can cause changes in pulse period over time, and the recalibration of transmitters after data collection is always advisable. Components with improved stability may be used, but these are typically larger and more e%pensive. Drift can thus be reduced, but not necessarily eliminated, and recalibradon is still recommended.

Recently, transmitters have been designed and used in which the need for recovery and recalibration is effectively eliminated. This is possible because the unit utilizes a comparison circuit, wherein the pulse period determined by temperature is constandy referenced to a stable pulse rate determined by a precision resistance. The two pulse periods can be independendy measured in dhe field using a precision pulse period timer, and a simple formula used to result in a value which is related to temperature as defined by initial calibrations.

Another design currendy being utilized is a temperature responsive mortality sensor. This sensor provides a fixed pulse rate above a user specified temperature, and a second fixed rate below that "trigger" temperature. (Such sensors could be used to signal events other dhan mortality if those events can be defined by a change in temperature across a known value.)

Whenever temperature is used to indicate mortality, it must be reasonably certain that a carcass will cool sufficiendy to distinguish it from a live animal. This is not necessarily the case in some locations or seasons, of if dhe carcass is laying in direct sunlight. "Simpler" temperature sensors may also be used to indicate mortality (i.e. the pulse rate drops to below what could possibly occur in a living animal); however, there are drawbacks. For example, the constant variation in pulse rate (although perhaps small) affects battery life and tracking efficiency, and may have no relevance for many studies. A "trigger" between two distinct rates is very pronounced, thus easily observed, and the two fixed pulse rates can be optimized for tracking efficiency, battery life, or other concerns. *Bill Burger*

For Immediate Release

Federal Agency Funds Solar Collars For Nocturnal Animals

DATELINE WASHINGTON, D.C. - A spokesperson for a major governmental agency involved in wildlife research recendy commented dhat "...something major had been overlooked during the first 27 years of development" being actively funded by his agency. "No matter what industry says," he added, "we here at headquarrs are committed to nocturnal solar power!"

The comments were made during a report presented to a National Science Board on Physics and Astronomy.

"In my view, what we have here is a basic problem in gravity physics," continued the speaker. "The solar packages are heavy and the weight of the solar pand assembly causes the collar to rotate around the neck of the study animal (rxcoons), so that the solar panel is always pointing downward. The accumulation of mud on the panel may even be contributing to dhe technical problems we have experienced."

"By George, I believe he's got something there," commented one of the Board members. "This one rates right up there with the NASA line-of-sight transponder to be deployed on animals in mountainous terrain."

The government speaker continued his report with a detailed program of behavior modification for the raccoons under study. He proposed conditioning methodologies designed to teach the animals to rinse off their solar panels, then lay on their backs in the sun for a prescribed number of hours each day.

When study influence on dhe raccoon population as a whole was questioned by one of the waiters, dhe speaker replied, "No problem. We'll condition only the instrumented animals in order to avoid influencing the population as a whole. We are also working on sort of a reverse cloud seeding project to ensure that there will be no overcast days during the study to interfere with battery charging."

The spokesperson concluded the conference by announcing that the agency is now entertaining proposals for a study of possible detrimental effects of intensive solar exposure on nocturnal study animals. All inquiries should be addressed to dhe office of the Responsible Chief Scientist. This office is not presendy staffed, but it is reported that it will be (as soon as they find one).

Building A Smaller Transmitter

Hybrid Circuit Technology Makes It Possible

To almost everyone utilizing radio telemetry systems in wildlife research, the ideal transmitting subsystem is one that weighs nothing, occupies no volume, operates forever, has infinite range and is able to transmit biologically meaningful data. While this is obviously an impossible set of requirements, it is the driving force behind our efforts to reduce the size and weight of the transmitting part of the telemetry link. Each transmitting subsystem must have a power source, usually a battery, a set of electronic components to generate the radio frequency signal, an antenna, and more electronic components to establish timing and interface to sensors. The purpose of this article is to briefly look at the potential for size reduction in the electronic part of the transmitting subsystem.

Before the invention of the transistor, placing a transmitter on a wild animal was almost out of the question because of the large size and huge power appetite of even the smallest vacuum tube circuits. The transistor provided solutions to both of these problems. The utilization of multiple transistors on one "silicon chip" in the integrated circuit offered a means to more precisely control the transmitter, and opened countless avenues for collecting data and encoding it onto the transmitted signal. The interesting fact about the transistor and integrated circuit (IC), as well as other components used in electronic circuitry, is that the physical size of the part that does the "work" is often as small as a grain of sand and seldom any larger than a piece of rolled oats. However, the size of a transistor or IC that is ready to be installed in a circuit board can occupy 1000 times the volume and 100 tirnes the area that the "chip" by itself occupies. The major reason for this apparent discrepancy is that, without the use of highly specialized equipment, a relatively large space is required to provide a mechanical and electrical connecting interface from the "chip" to leads that can be soldered to a circuit board.

The growing popularity of "surface mount" technology (SMT), in which leadless components f; are soldered directly to conductors on circuit boards, has found application in the wildlife telemetry field. In fact, some SMT components have been used in Telonics transmitters for nearly l0 years. It has made a significant reduction in larger transmitter size possible, and has permitted the use of some automated circuit assembly. This is beginning to reduce assembly costs while maintaining a high level of reliability. However, as far as the smallest transmitters are conce ned, the effect has been minimal. Small leaded components have been available for years, but at a substantially higher cost. So in the smaller transmitters, surface-mounted parts have simply replaced the leaded parts in roughly the same physical space as before.

If further size reduction in the electronics associated with the transmitter is to be realized, one obvious point to attack is the wasted space associated with the packaging of the IC's, transistors and other components. This technology (which utilizes an unpackaged transistor, IC, resistor and other "chips" mounted on a ceramic substrate) is known as hybrid circuit technology. Conductive gold paths are printed on the substrate and the "chips" are attached at the required locations. The IC's, transistors and resistors are then connected to the gold conductors with microscopic wires. While hybrid circuit technology does provide a way to significantly reduce circuit size, it also requires a considerable amount of very sophisticated and expensive equipment. We have this equipment at Telonics and our personnel are fully trained and capable of taking a hybrid from design and testing into production. For the past eight years, thousands of our smallest transmitters have used integrated circuits which have been specially packaged in our own hybrid facility.

While the development of a hybrid circuit takes a good deal of engineering and technician time, sometimes it's the only way to package a circuit in the required size. So if your requirements indicate that these techniques may be applicable, please give us a call at (602) 892-1111. Our engineering staff is always available.

Boyd ansen

A Personal Perspective

Then And Now

When you walk through the offices and laboratories at Telonics, it's hard to imagine the humble beginnings of such a company. Nevertheless, in my eleven years here, I've seen great changes.

When I first joined the team, the company was located in one of the owner's homes. The office, stockroom, production area, testing, research and development, shipping and receiving were all housed in one 400 square foot room.

In addition to Dave Beaty, co-owner of the company, three other people worked at Telonics. I was one of four women who fabricated transmitters in our homes. We received orders by telephone and were paid piecework. I live a half-mile fm the Beaty home and made a couple of trips a week to pick up parts and turn in completed jobs. I was able to set my own hours and work around my family's schedule.

Telonics made two moves before locatinP in our present site six years ago. Our 22,000-square foot laboratory houses 65 people and was designed for us.

Not only have the number of people and the physical size of Telonics grown dramatically, but product technology has grown as well. The company's only products used to be VHF transmitters. Now we build satellite transmitters, receivers and other telemetry system components.

Since production was taken from the homes and brought into a central facility, I have been trained to build many different products. I have even been taught to build a hybrid integrated circuit that is used in smaller transmitters.

Perhaps our greatest accomplishment has been our ability to maintain a family-type atmosphere. Hours are flexible, birthdays are celebrated, and we have parties on special occasions throughout the year. Although I've seen many changes during my time at Telonics, one thing has not changed. We still have a genuine concern for each other.

Barbara Allen

Advanced Digital Data Processor

High Accuracy Processing In A Compact Package

The TDP-2 Digital Data Processor operates as a data acquisition device under both field and laboratory conditions. Its extremely low power consumption is ideal for both fully portable and fixedsite operation.

The Liquid Crystal Display (LCD) provides amplitude measurements in dB or pulse period measurements in seconds, with resolution of one millisecond. Information transmitted from an animal (such as head-body position, mortality and relative activity) can be displayed through the "period" function. Since the LCD displays each received pulse in dBvolts, the "amplitude" function is useful when taking directional bearing measurements, or observing andlor logging variations in received signal strength.

Sophisticated automatic signal-tonoise circuitry means the TDP-2 does not require acute and constant adjustments to guarantee proper triggering. The threshold control determines the noise immunitv margin with respect to random noise pulses. The higher the threshold setting, the more immune from noise the system becomes. There are continuously variable settings available to accommodate very weak, medium and strong signals. The user simply presets the signal-to-noise ratio required to trigger the unit, and acquisition of data begins. Once preset, the unit will "remember" the setting and constantly adjust its sensitivity to maintain this programmed information.

Den activity and water hole usage can be monitored by setting the threshold control to receive only the strongest signals. In such an application, only animals moving close enough to provide signal strengths equal to or greater than the established level will trigger the unit and thus be recorded. Lower threshold settings allow for the processing of signals as weak as 1 dB above background noise.

The TDP-2 is commonly used as part of a remote chart recorder data acquisition site. Its function in such applications is to interface a radio frequency telemetry receiver with a chart recorder or computerized data logger. The audio input signal from a receiver is first converted to a proportional sample-and-hold analog output by the TDP-2, and then fed to an analog recorder. While one or more transmitters can be monitored bv usinQ this system, it is necessary to deploy a rapid pulsing marker transmitter to establish the beginning of a scan sequence when monitoring several transmitters at once. The TDP-2 also provides a switchable "hold last period reading" after loss of signal capability. This feature has proven useful in the monitoring of marine mammals.

A modification can be made to the TDP-2 to convert the output from 0 to 1 mA to 0 to 1-3 VDC. This adjustment is required when connecting the digital processor to a data logger or computer for a fully automatic data acquisition system. Various power supply options are also available to meet the user's specific needs. The power consumption of the TDP-2 is unusually modest, requiring only 5-7 milliamperes for operation. The unit is compatible with most radio telemetry receivers currently available.

Brenda Milam