UNITED STATES SPECIAL OPERATIONS COMMAND

Proposal Submission

The United States Operations Command's (USSOCOM) missions include developing and acquiring unique special operations forces (SOF) equipment, material, supplies and services. Desired SOF operational characteristics for systems, equipments and supplies include: lightweight and micro-sized; reduced signature and low observable; built-in survivability; modular, rugged, reliable, maintainable and simplistic; operable in extremes temperature environments; water depth and atmosphere pressure proof; transportable by aircraft, ship and submarine, and deplorable by airdrop; LLPI/LPD jam resistant C3I, electronic warfare capable of disruption and deception; near real-time surveillance, intelligence and mission planning; highly lethal and destructive; low energy/power requirements; and compatible with conventional force systems. USSOCOM is seeking small businesses with a strong research and development capability and understanding of the necessity for consideration of these SOF operational characteristics for systems. The topics on the following pages represent a portion of the problems encountered by SOF in fulfilling its mission.

USSOCOM invites the small business community to **send proposals directly to the following address**:

United States Special Operations Command
Attn: SOAC-KB/SBIR Program, Topic No. SOCOM 97-00__
2408 Florida Keys Avenue, 2nd Floor
MacDill Air Force Base, Florida 33621-5316

The proposals will be distributed to the appropriate technical office(s) for evaluation. **Inquires of a general nature or questions concerning the administration of the SBIR program should be addressed to :**

United States Special Operations Command
Attn: SOSB/ Ms. Karen L. Pera
7701 Tampa Point Blvd.
MacDill Air Force Base, Florida 33621-5316
Tel (813) 828-9491
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General/routine correspondence being dispatched by overnight delivery should use the following address:

United States Special Operations Command
ATTN: SOSB/Karen L. Pera
Building 143
2600 Pink Flamingo Avenue
MacDill AFB, Florida 33621-5316

USSOCOM has identified 5 technical topics for the FY 97.2 solicitation to be released to which small businesses may respond. The topics listed are the only topics for which proposals will be accepted. The topics were initiated by USSOCOM technical offices that manage the research and development in these areas. Scientific and technical information assistance may be requested by using the DTIC SBIR Interactive Technical Information System (SITIS).

Firms are encouraged to submit a proposal for an optional task which would be performed during the period between Phase I completion and Phase II contract award. The optional task provides the opportunity to reduce the gap between Phase I and II. The maximum amount of SBIR funding used for an USSOCOM Phase I award is $100,000. Proposals that include the option task shall not exceed $70,000 for Phase I and $30,000 for Phase I Option. Any option proposal must be submitted at the same time and place as the basic Phase I proposal and not be included in the basic Phase I proposal page limitation. The basic Phase I proposal shall be evaluated exclusive of the option task and must be proposed and priced separately. The option portion of the proposal shall not exceed 10 pages, not exceed $30,000, not exceed three months in duration, and be evaluated using the same evaluation criteria as Phase I proposals. The transition option work shall be included as an option in the Phase I contract and evaluated for USSOCOM unilateral exercise at any time after Phase I award through the conclusion of the basic Phase I contract. Exercise of any option shall be at the sole discretion of USSOCOM and shall not obligate USSOCOM to make a Phase II award.

Selection of proposals for funding is based upon technical merit and the evaluation criteria included in this solicitation. As funding is limited, USSOCOM reserves the right to select and fund only those proposals considered to be superior in overall

technical quality and most critical. As a result , USSOCOM may fund more than one proposal in a specific topic area if the technical quality of the proposals are deemed superior, or it may fund no proposals in a topic area.

USSOCOM
FY 1997 SBIR TOPIC INDEX

Biomedical/Human Systems Interface

SOCOM 97-005 Helmsman's Neck Collar

Clothing, Textile and Food

SOCOM 97-007 Very Lightweight Body Armor (Plates)

C3/Electronics

SOCOM 97-004 Ultra Low Power SATCOM Receiver

C3/Electronics/Sensors

SOCOM 97-006 Man Personal Dual Band Miniature Beacon (Active/Passive/IFF)

Air Vehicles/Space Vehicles and Electronics

SOCOM 97-008 Advanced Planar (Digital) Antenna for USSOCOM Aircraft

SUBJECT/WORD INDEX TO THE SOCOM SBIR SOLICITATION

SUBJECT/WORD	TOPIC NR
Black Tip	007
Body Armor Plate	007
Cervical Collars	005
Conformal	008
Dual Band Beacon	006
Duplex Mode	004
Flat Plate Drag	008
Front Face Laminate	007
Global Positioning System	006
Global Wireless	004
Green Tip	007
Hellmsman	005
IFF	006
Inertial Navigation System	006
MHz	008
Minimum Power	004
Muscle Fatigue	005
Navigational Aids	006
Neck Support Collar	005
NIJ	007
Nonconformal	008
Planar Antenna	008
Radar Cross Section	008
SATCOM Receiver	004
Titanium	007
Transponder	006
Travel Pillow	005

USSOCOM

FY 97.2 TOPIC DESCRIPTIONS

SOCOM 97-004 TITLE: Ultra Low Power SATCOM Receiver

KEY TECHNOLOGY AREA: C3/Electronics

OBJECTIVE: Design, develop and field test a SATCOM receiver that has the following characteristics:

1. Operates in one of the current or near future SATCOM bands
2. Needs a very small antenna with a large field of view
3. Uses a minimal amount of power
4. Maintains near 100% availability
5. Is frequency agile
6. Will support at least a 1200 baud data rate with a low error rate
7. Can operate in the presence of strong, nearby, inband transmitters
8. Can operate with Military and/or Commercial Satellite Systems
9. Small

DESCRIPTION: Design and demonstrate a small size, low power, modest cost receiver that is capable of worldwide SATCOM reception for receipt of information in austere environments. The receiver must be capable of operation on a small battery for more than 30 days with near 100% availability. The receiver must operate on the same frequency as several other units. It must support an addressable protocol. It can be remotely tuned to one of several frequencies in the SATCOM band. It must contain enough firmware that it can find a command data stream if it becomes lost (off frequency). The design of the receiver must be such that a very small antenna can be used (processing gain, error correction etc.). The receiver must be able to operate in the presence of nearby in-band transmitters (full duplex mode). The unit must be rugged and able to withstand physical extremes of temperature and humidity.

PHASE I: Perform systems analysis of current and future SATCOM systems that may be used for remote autonomous surveillance systems. Perform design trades of cost, size, power consumption, operational utility that optimize the receiver design. Propose a design that will use a minimum of power while maintaining a maximum availability and meet all of the above requirements.

PHASE II: Build a prototype(s) receiver (brassboard) that demonstrates the operation of the unit. Do on-the-air testing to provide confidence that the receiver will support the remote surveillance systems requirements. Develop the communications protocol firmware that will allow multiple receivers on the same channel. Do detailed cost analysis of unit production price for various quantities.

PHASE III DUAL USE APPLICATIONS: Advances the current trend in global wireless communications. Provides commercial application as worldwide pager. Military application as a secure voice/data receiver for extended field use in logistically austere environments.

SOCOM 97-005 TITLE: Helmsman's Neck Collar

KEY TECHNOLOGY AREA: Biomedical/Human Systems Interface

OBJECTIVE: Develop an advanced neck support collar or new components for existing systems to provide Special Operations Force (SOF) Helmsman/crew members with a device to decrease neck muscle fatigue caused by the dynamic response of the crew members' heads and necks during extended, high speed boat operations.

DESCRIPTION: The operation of new high speed surface craft accompanied by the use of new night vision goggles and helmet mounted display systems is increasing the weight supported by the heads and necks of the Special Operations Combatant Craft Crew Members (CCCM). This increased weight results in higher level of neck muscle fatigue during missions. A neck collar will provide the CCCM with added neck support to decrease neck muscle fatigue when operating at high speeds on rough seas. The neck collar will include oral-inflation and deflation (if an inflatable system is selected), ballistic neck protection equivalent to current body armor systems, and face-up in the water life preserving properties. Technologies related to this requirement include inflatable life jackets, head and neck travel pillows, ballistic armor vests and medical cervical collars.

PHASE I: Characterize accelerations associated with high speed boat operations in sea states 1-3. Investigate technologies and devices suitable for use in a Helmsman's Neck Collar, and identify a test protocol for this device.

PHASE II: Develop and test prototype Helmsman's Neck Collar.

PHASE III DUAL USE APPLICATIONS: Maritime applications in commercial recreational and race boating industry and military high speed boat operations to decrease neck muscle fatigue for boat operators and crews.

REFERENCES: Human and Manikin Head/Neck Response to + Gz Acceleration When Encumbered by Helmets of Various Weights: John R. Buhrman, Chris E. Perry; Aerospace Medical Association, Alexandria, VA; Aviation, Space, and Environmental Medicine, December 1994.

SOCOM 97-006 TITLE: Man Personal Dual Band Miniature Beacon (Active/Passive/IFF)

KEY TECHNOLOGY AREA: C3/Electronics/Sensors

OBJECTIVE: Build and provide a light weight, small (1.5"X3"X5" estimated size) dual band beacon (I&K band).

DESCRIPTION: SOF tactical and support aircraft require navigational aids to assist in locating and positively identifying austere assault zones, verify enroute check points, update inertial navigation systems and require positive reference points for close air support operations to prevent fratricide. Capitalize on a Phase I Small Business Initiative Research (SBIR) project sponsored by Army CECOM. As a part of that SBIR, a small business designed and built a low power I-Band beacon transponder that was successfully tested with the AC-130 H and U model gun ship. The SBIR beacon has single, double, triple pulse and an active pulse (passive for the aircraft) capabilities. The proposal will take this project an additional step further to integrate a K-band transponder into the existing I-band module, incorporate agile automatic gain control (AGC) and a smart receiver. Adding a K-band transponder module will enhance aircraft radar interrogation capability. Investigate the potential and incorporate a RS-232 data interface, GPS chip and a reprogramable select call (SELCAL) code for information friend or foe (IFF) mode of operation. The proposed beacon will automatically detect the proper interrogation band (I or K) and respond in kind with a predetermined or selected code pulse. Automatically adjusts its internal AGC to respond to weak as well as strong interrogations (multiple aircraft at varying ranges). Has a capability to transmit active pules (no interrogations from the aircraft required) to limit high powered emissions from aircraft radar. Can act as an IFF with a reprogrammable SELCAL and global positioning system (GPS) location data displayed on a standard military weather radar set (APN-59) and fire control radar (APQ-150 and APQ-180). As a goal, operate 24 hours on a standard 9 volt or AA type battery.

PHASE I: Determine feasibility of meeting desired criteria based on review of past work, assessment of current technology, and an initial design concept.

PHASE II: Design, build and bench test prototype system(s). Field test most promising alternative. Prepare manufacturing cost analysis.

PHASE III DUAL USE APPLICATION: The potential for commercialization of the outputs from this program is high. The military employs a variety of pulsed frequency sources to perform functions such as aircraft tracking, missile tracking, personnel detection and off-set target designation to name just a few. In most of these functions, the technology employed in the systems still rely on the use of magnetron or vacuum tube triodes as the RF signal generation sources. This older form of technology requires and dissipates high power, requires long warm-up times to obtain frequency stability, and has a short mean time between failure. This program intends to make available high peak power solid state sources that consume less power, have a quick frequency stability set-on time, are of small size, lightweight and extremely reliable. Thus, this program will provide additive capabilities, as well as, improve cost and effectiveness of present capabilities. Another advantage of the desired technology is immediate compatibility with existing radar systems. Immediate military applications for SOF include, in all weather day/night conditions, assisting SOF aviation platforms to precisely locate austere assault zones and infiltration/exfiltration points, providing en-route aviation navigational aids, and preventing fratricide during close air support and maritime operations through positive identification and geolocation. More general military applications include providing positive identification and accurate location for combat search and rescue, joint and coalition operations, and humanitarian relief. Potential commercial applications include enhancing the visibility, and positive identification/location of aircraft and watercraft (and/or their crews), thereby ensuring their safety during routine operation or in emergency situations, which are most often characterized by foul weather and poor visibility. Present survival aids are insufficient for these situations when exact time-to-locate is critical to survival. In addition, law enforcement agencies, multinational corporations, and transportation companies could take advantage of this technology for positive tagging/tracking of high value facilities or cargoes.

REFERENCES: Joint Chief of Staff Joint Pub 3-09.2, Joint Tactics, Techniques and Procedures for Ground Radar Beacon Operations, describes employment of surface located radar beacons in conjunction with aircraft and naval surface fire support ships. In addition, to providing specific joint combat employment procedures, the publication delineates radar beacon mission planning and coordination responsibilities and addresses the capabilities and limitations of radar beacon capable aircraft and naval surface fire support ships.

SOCOM 97-007 TITLE: Very Lightweight Body Armor (Plates)

KEY TECHNOLOGY AREA: Clothing, Textile and Food

OBJECTIVE: Certify high-threat body armor plate inserts of advanced materials and processes.

DESCRIPTION: Current body armor consists of three elements, including flexible armor (4-6 sq ft, .45 cal/9mm ball), hard plate inserts (front and back 0.7 sq ft each, up to 5.56x57 A059 ("green tip")/7.62x51 M193 ("black tip")/7.62x39 ("CHICOM pin"), referred to as "NIJ level III+"), and a carrier vest. These plates weigh between 6-10 lb and cost $200-800, each, depending on materials used. A common alloy of titanium (specially heat treated) has demonstrated excess capability to fully defeat these threat rounds at weights less than 3.5 lb and costs in the vicinity of $200 per plate.

PHASE I: Determine the minimum thickness and material properties required to defeat the NIJ Level III+ threat rounds at muzzle velocity, appropriate front-face laminate to defeat spall (traveling parallel to the face of the plate into the chin and arms), and appropriate back-face laminates required to assure a multi-hit capability. It will also analyze the cost-effectiveness of alternative designs compared to existing designs.

PHASE II: Complete formal NIJ certification, documenting required capability prior to commercial or military deployment.

PHASE III DUAL USE APPLICATIONS: Direct replacement by backfit or new sales of all police and military wearable armor. Lightweight cost-effective armor for vehicles, aircraft, boats, and buildings.

SOCOM 97-008 TITLE: Advanced Planar (Digital) Antenna for USSOCOM Aircraft

KEY TECHNOLOGY AREA: Air Vehicles/Space Vehicles and Electronics

OBJECTIVE: Develop an Advanced Planar Antenna (APA) that can be easily installed on airborne platforms. The APA must be capable of being applied to an exterior aircraft surface and perform as well or better than current antennas. This development should, at a minimum result in a multiple use, combat survivable, reconfigurable digital antenna with a frequency range no less than 2 MHz to 1 GHz.

DESCRIPTION: All USSOCOM aircraft have a multitude of surface mounted single and multiple use antennas. These antennas are either conformal or nonconformal. The existing conformal antennas provide reduced signature, but have poor performance ratings. The current nonconformal antennas have increased performance, but increase flat plate drag and radar cross section. Additionally, because of location they are susceptible to ground contact and ground handling damage, and if mounted on the underside of the aircraft, must be removed or folded prior to an air transport on a C-141, C17, or C-5. Both conformal and nonconformal antennas are susceptible to flying debris and a single shot combat kill. Finally, because of limited useful exterior surface space on helicopters and the increased avionics requirements of USSOCOM aircraft there are antenna interference problems caused by placement and proximity.

PHASE I: Investigate materials, adhesives and techniques for application on to the various types of materials available on USSOCOM aircraft. Design and optimize antenna design to utilize present locations, to maximize the use of existing wiring, and minimize installation costs. Determine the weight savings, reduction in flat plate drag, and estimated aircraft performance improvements from these changes. Finally, evaluate reliability and maintainability improvements.

PHASE II: Develop prototype Advanced Planar Antennas for each of the identified avionics systems and test on USSOCOM helicopters.

PHASE III DUAL USE APPLICATIONS: This development would have a significant impact on the commercial communications industry. Applications of the Advanced Planar Antenna could be made to commercial aviation, law enforcement and emergency vehicles (air and ground), communication sites (to replace multiple, tall antenna arrays). However, the most significant potential application would be in the demand for antenna technology to enhance personal wireless communications.