UNITED STATES SPECIAL OPERATIONS COMMAND
14.1 Small Business Innovation Research (SBIR)
Proposal Submission Instructions

Introduction: The United States Special Operations Command (USSOCOM) seeks small businesses with strong research and development capabilities to pursue and commercialize technologies needed by Special Operations Forces (SOF). The USSOCOM Program Executive Officers (PEOs) submitted the topics to the USSOCOM SBIR Program Manager (PM) as topics that may transition to an acquisition Program of Record or Concept of Operation. In turn, the USSOCOM SBIR PM submitted the topics to the Department of Defense (DoD) for the DoD 14.1 SBIR solicitation.

Contact with USSOCOM: During the pre-release period of this DoD 14.1 SBIR solicitation, any technical inquiries must be submitted in writing through sbir@socom.mil. All inquiries must include the topic number in the subject line of the e-mail. During the solicitation open period, all questions must be submitted through the SBIR Interactive Topic Information System (SITIS) at www.dodsbir.net/SITIS. See Section 4.15.d of the DoD 14.1 SBIR Program Solicitation instructions for additional information on SITIS. During the source selection period, e-mail is the only method of communication that will be used by the Government Contracting Officer to notify the submitter/proposer if they have or have not been selected for an award.

For additional information about electronic proposal submission, including uploading your Technical Proposal, refer to the instructions in the solicitation and the on-line help area of the DoD SBIR/STTR Submission site, or call the DoD SBIR/STTR Help Desk at 1-866-SBIRHLP (1-866-724-7457).

Phase I and Phase II Proposal Submission: USSOCOM will accept Phase I proposals for the topics included in this solicitation, and select and fund for a Phase I award only those proposals considered to be superior.

Small business concerns awarded a Phase I contract may choose to submit a Phase II proposal not later than thirty (30) calendar days following the end of the Phase I contract. The USSOCOM SBIR Contracting Officer will provide additional instructions to each of the Phase I awardees before the end of their respective Phase I contract completion dates.

Potential offerors shall submit all Phase I and Phase II proposals in accordance with the DoD Program Solicitation at www.dodsbir.net/solicitation. The Technical Volume submission, exclusive of the Company Commercialization Report and the Cost Proposal, shall not exceed 20 pages. Pages submitted in excess of the twenty (20) page limit will not be reviewed.

Offerors must complete the cost proposal using the Cost Proposal form posted on the USSOCOM section of the www.dodsbir.net/solicitation site.

All proposal information must be received electronically via the DOD SBIR/STTR Submission site. To submit, proceed to http://www.dodsbir.net/submission. Once registered, a company must prepare (and update) their Company Commercialization Report Data, prepare (and edit) Proposal Cover Sheets, complete the Cost Proposal form, and upload corresponding Technical Proposal(s).

Paper copies will be deemed non-responsive and will not be considered. A complete electronic submission is required for proposal evaluation. An electronic signature is not required on the proposal. The DoD SBIR/STTR Submission site will present a confirmation page when a Technical Proposal file

upload was received. The upload will be available for viewing on the site within an hour. It is in your best interest to review the upload to ensure the server received the complete, readable file.

Site Visits: Site visits will not be permitted during the pre-release and open stages of the solicitation.

Security: All of the topics in the solicitation are UNCLASSIFIED, and only UNCLASSIFIED proposals will be accepted.

Phase I Awards: USSOCOM's SBIR Program is small compared to the other participating DoD Components and on average awards three Phase I contracts per topic. The maximum amount of SBIR funding for a Phase I award is $150,000 and the period of performance is typically six months. USSOCOM does not include options in the resulting Phase I SBIR contracts. Phase I SBIR contracts are Firm Fixed Price contracts.

Phase I Kick-Off and Out-Brief Meetings: USSOCOM conducts Kick-Off and Out-Brief meetings during the Phase I period of performance. Firms selected for a Phase I SBIR contract shall have the ability to participate in the Kick-Off and Out-Brief meetings via electronic media mutually agreed upon by the firm and the Contracting Officer Representative.

Phase I Evaluation: USSOCOM conducts a formal source selection process to determine which offerors should be awarded Phase I SBIR contracts. USSOCOM evaluates Phase I proposals using the evaluation criteria specified in Section 6.0 entitled "Phase I Evaluation Criteria" of the DoD SBIR Solicitation.

Phase II Awards: A Phase II award typically has a period of performance between 12 to 24 months and an award amount of approximately $750,000 to $1,000,000. USSOCOM may elect to increase or decrease the Phase II award amount when it is deemed to be in its best interests. Proposals should be based on realistic cost and time estimates and not on the maximum time (months) and dollars budgeted. In preparing the proposal, offerors should consider that USSOCOM's workload and operational tempo will preclude extensive access to Government and military personnel beyond established periodic reviews.

The Federal Acquisition Regulation mandate to compete federal procurements is satisfied during the Phase I source selection process. Only those companies awarded Phase I contracts are allowed to submit Phase II proposals.

USSOCOM considers each Phase I feasibility study as a separate and distinct study that does not compete against each other. The feasible solutions that result from the Phase I studies are considered technology options that can be applied when needed to solve SOF capability shortfalls. Phase I feasibility options not immediately pursued after the conclusion of Phase I may move forward to the Phase II demonstration effort to satisfy future capability shortfalls.

Phase II Evaluation: Each contractor's Phase II proposal received will be assessed as an independent technology pursuit, and will be judged on (1) how well it meets USSOCOM requirements, and (2) considerations of programmatic risk. Factors to determine programmatic risk include but are not limited to:

- The contractor's performance during Phase I
- Scientific and technical merit and feasibility
- Contractor's Qualifications

- Commercialization potential (based on the Commercialization Achievement Index and the Business Plan the company submitted during Phase I)

The timing of selection for a Phase II award will be dependent upon USSOCOM's current requirements and available resources.

Technical Data Rights: The Small Business Innovation Research Program Policy Directive (hereinafter "Directive") and various Public Laws provide for protection of SBIR data rights under SBIR Phase III awards. Per the Directive, a Phase III SBIR award is any work that derives from, extends or completes effort(s) performed under prior SBIR funding agreements, but is funded by sources other than the SBIR Program. Thus, any contract or grant where the technology derives from, extends or completes a Phase I or a Phase II SBIR/STTR contract and is awarded to the company that was awarded the Phase I/II SBIR is a Phase III SBIR contract. This covers any contract/grant issued as a follow-on Phase III SBIR award or any contract/grant award issued as a result of a competitive process where the awardee was a SBIR company that developed the technology as a result of a Phase I or Phase II SBIR funding agreement. USSOCOM will give SBIR Phase III status to any award that falls within the above-mentioned description, to include according SBIR Data Rights to any noncommercial technical data and/or noncommercial computer software delivered in Phase III that was developed under SBIR Phase I or II funding documents.

Use of Non-Government Personnel: All proprietary material should be clearly marked and will be held in strict confidence. Restrictive notices notwithstanding, proposals may be handled for administrative purposes by support contractor personnel who are bound by appropriate non-disclosure requirements. Input on technical aspects of the proposals may be solicited by USSOCOM from non-Government consultants and advisors who are bound by appropriate non-disclosure requirements. Non-Government personnel will not establish final assessments of risk, rate, or rank offerors' proposals. These advisors are expressly prohibited from competing for USSOCOM SBIR awards. All administrative support contractors, consultants, and advisors having access to any proprietary data will certify that they will not disclose any information pertaining to this solicitation, including any submission, the identity of any submitters, or any other information relative to this solicitation, and shall certify that they have no financial interest in any submission evaluated. Submissions and information received in response to this solicitation constitutes the offeror's permission to disclose that information to administrative support contractors and non-Government consultants and advisors.

U.S. Citizen Status: As part of the Phase I proposal, the offeror shall verify the US citizen status of each employee who will participate in the technology effort.

Foreign Nationals (Foreign Citizens): The definition of a foreign national is included in Section 3.4 of the DoD SBIR Program Solicitation. Consistent with Section 5.4.c. (8) of the DoD Program Solicitation, the offeror shall identify all foreign nationals expected to be involved with the USSOCOM Phase I or Phase II effort to include each foreign national's country of origin and level of involvement (identify specific tasks). The offeror shall identify all foreign nationals in the appropriate section of the proposal. The USSOCOM SBIR Program oftentimes pursues technologies that require companies to complete the Department of Defense Contract Security Classification Specification (DD Form 254) to protect sensitive Government Furnished Property and Government Furnished Information during the Phase II period of performance. Offerors must ensure each individual participating in USSOCOM technology pursuits has a personnel security clearance.

International Traffic in Arms Regulation (ITAR): The identification of foreign national involvement in a USSOCOM SBIR topic is needed to determine if a firm is ineligible for award on a USSOCOM

ITAR designated topic. A firm employing a foreign national(s) (as defined in paragraph 3.4 entitled "Foreign Nationals" of the FY14.1 DoD SBIR Solicitation) on a USSOCOM ITAR topic must possess an export license to receive a SBIR Phase I or Phase II contract.

Informal Feedback: An unsuccessful offeror that submits a written request for feedback within 30 calendar days of receipt of notification of non-selection will be provided with informal feedback in lieu of a debriefing. USSOCOM will provide informal feedback within 30 calendar days of an offeror's written request. These component-unique instructions are in accordance with paragraph 4.10, entitled "Debriefing", of the DoD SBIR solicitation FY14.1.

Inquiries concerning the USSOCOM SBIR Program should be addressed to sbir@socom.mil.

SOCOM SBIR 14.1 Topic Index

SOCOM14-001	Power Supply for the Tactical Assault Light Operator Suit (TALOS)
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SOCOM14-003	Advanced Opaque Armor Materials and Manufacturing Methods
SOCOM14-004	Hydrogen Generation from Water and Full or Partial Replacement of Petroleum Fuels in Diesel Internal Combustion Engines
SOCOM14-005	High Performance Marine Diesel Closed Coolant System for High Speed Combatant Craft
SOCOM14-006	(This topic has been removed from the solicitation.)

SOCOM SBIR 14.1 Topic Descriptions

SOCOM14-001 TITLE: Power Supply for the Tactical Assault Light Operator Suit (TALOS)

TECHNOLOGY AREAS: Ground/Sea Vehicles, Sensors, Electronics

ACQUISITION PROGRAM: Tactical Assault Light Operator Suit

The technology within this topic is restricted under the International Traffic in Arms Regulation (ITAR), which controls the export and import of defense-related material and services. Offerors must disclose any proposed use of foreign nationals, their country of origin, and what tasks each would accomplish in the statement of work in accordance with section 5.4.c.(8) of the solicitation.

OBJECTIVE: Investigate and identify a suitable safe, lightweight power supply for the exoskeleton component of the TALOS ensemble.

DESCRIPTION: The TALOS ensemble is a new initiative in USSOCOM that is intended to provide solutions for the enhanced mobility/protection/situational awareness capabilities to augment the direct assaulter. As such, the power supply for the TALOS ensemble will need to provide sufficient, dependable power to ensure rapid, unencumbered movement of the operator. Desired attributes of the power system also include light weight, low noise, and low to no thermal signature. Power sources should not require introduction of a new logistics fuel to the battlefield. The power source shall produce 4-5kW of power continuously for a non-tethered 12 hour mission. The system shall be compatible with shore power (i.e. helicopter power, ship power, Forward Operating Base grid power, indigenous power infrastructure in the operational area). The power supply shall be able to utilize extraction platforms (e.g., helicopters and small craft) power to commence immediate system recharge. The power supply shall be able to scavenge power from sources found on a battlefield (i.e. power lines, car batteries, solar, 110/220VAC power outlets, etc.). The power supply shall be rechargeable and ready for the next mission within 6 hours. The size of the power source shall not exceed 15” x 10” x 5”. The weight of the power source shall not exceed 15 pounds. The power source shall be nonflammable.

A secondary objective of this effort is to enable Special Operations Forces wearing exoskeleton type equipment to more easily carry the weight normally carried by an operator while hiking over long distances.

PHASE I: Conduct a feasibility study to determine the optimum method/technology solution for powering the Exoskeleton element of the TALOS ensemble.

The objective of this USSOCOM Phase I SBIR effort is to conduct and document the results of a thorough feasibility study to investigate what is in the art of the possible within the given trade space that will satisfy a needed technology. The feasibility study should investigate all known options that meet or exceed the minimum performance parameters specified in this write up. It should also address the risks and potential payoffs of the innovative technology options that are investigated and recommend the option that best achieves the objective of this technology pursuit. The funds obligated on the resulting Phase I SBIR contracts are to be used for the sole purpose of conducting a thorough feasibility study using scientific experiments and laboratory studies as necessary. Operational prototypes will not be developed with USSOCOM SBIR funds during Phase I feasibility studies. Operational prototypes developed with other than SBIR funds that are provided at the end of Phase I feasibility studies will not be considered in deciding what firm(s) will be selected for Phase II.

PHASE II: Develop and demonstrate a prototype power supply that meets the performance characteristics defined in the above paragraph entitled “Description”. The prototype system will undergo both laboratory and limited field testing to assess its technology readiness, its ability to integrate with the mechanical and electrical sub-system components of the TALOS and ultimate utility for integration into the TALOS ensemble.

PHASE III DUAL USE APPLICATIONS: This technology is applicable to the commercial health/medical industry to assist in the recovery/rehabilitation of injured/physically disabled individuals or enhancement of life issues for paralyzed/disabled individuals. This technology would also be beneficial to the fire and rescue workers in

increasing firefighter stamina and recovering trapped individuals at disaster sites. Highly maneuverable exoskeletons with a long duration integrated (not tethered) power supply open up new horizons for a multitude of defense, medical, and industry applications.

REFERENCES:
1. Raytheon XOS 2 Exoskeleton, Second Generation Robotics Suit, United States of America. 24 June 2013. Army-Technology.com: http://www.army-technology.com/projects/raytheon-xos-2-exoskeleton-us/.

2. Robot Suit Hal. 24 June 2013: Cyberdyne, Inc. http://www.cyberdyne.jp/english/robotsuithal/index.html.

3. DARPA Warrior Web Exoskeleton Prototype. 23 May 2013: Robots.net: http://robots.net/article/3590.html.

KEYWORDS: Power sources, exoskeleton, fuel cells, batteries, TALOS, small engines

SOCOM14-002 TITLE: Advanced Transparent Armor Materials and Manufacturing Methods

TECHNOLOGY AREAS: Materials/Processes

ACQUISITION PROGRAM: Ground Mobility Vehicles

The technology within this topic is restricted under the International Traffic in Arms Regulation (ITAR), which controls the export and import of defense-related material and services. Offerors must disclose any proposed use of foreign nationals, their country of origin, and what tasks each would accomplish in the statement of work in accordance with section 5.4.c.(8) of the solicitation.

OBJECTIVE: The objective of this feasibility study is to develop innovative transparent armor for Ground Mobility Vehicles (GMV) that is lighter than existing transparent armor and that is affordable. Develop innovative transparent armor that is at least 25% lighter at a given protection level and in the current space claim than current transparent armor in GMV. The cost of the innovative armor should be no more than twice the cost of a current flat panel purchased in a lot of 500 (estimated at $230.00 per panel). The flat panel technology should be scalable into a curved armor panel as well, with a projected cost of not more than 8 times the flat innovative panel in a similar size.

DESCRIPTION: Compared to opaque armor, transparent armor used to make current ballistic glass is much heavier. Current advanced transparent armor is much lighter, but also much more expensive. Use of transparent armor in some form or fashion is necessitated by the need for a vehicles crew to achieve and maintain maximum situational awareness (SA). Development of new transparent solutions that provide significant weight reductions at an affordable cost will allow current vehicles to: 1) carry more payload in all vehicle classes and 2) reduce the visual signature in Non Standard Commercial Vehicles (NSCV) if it is also thinner. Additionally, the logistics burden could be reduced due to less fuel being required to operate the lighter vehicles and less weight in stocking and transporting replacement ballistic windows. Safety is also enhanced if transparent armor is applied to door panels reducing the effort needed to open during a rollover or other emergency egress situations. The transparent material for this SBIR should be capable of meeting Army Purchase Description (ATPD) 2352P focused on optimum clarity with the use of night vision goggles and resistance to environmental weathering. Controlled environmental and ballistic tests will confirm the transparent material performance. For this effort, the new transparent technology must be a direct replacement for the GMV front windshield with a weight savings goal of 25% at a target cost of no more than twice that of the current glass. The new transparent technology also needs to be scalable into curved transparent armor of similar size, with the center of the panel being 2 inches further out than the sides. Specific consideration for the curved panel needs to consider manufacturing capability, optical clarity at various view angles, and what durability or life of the curved panel would be in comparison to a similar flat panel. Current advanced transparent armor technology has shown that weight savings of roughly 50% over standard ballistic glass is achievable but the current exceptional costs of 6 to 10 times that of glass make it unrealistic for vehicle application. This effort seeks to bridge that gap by producing a significant reduction in weight, while being affordable enough to realistically field.

PHASE I: Conduct feasibility (Technology Readiness Levels), affordability (cost/square feet for existing and selected material), environmental suitability (compliance with Army Purchase Description (ATPD) 2352P in terms of solar degradation, optical clarity, wear resistance, scalability (for NSCV and GMV class vehicles) and manufacturability (Manufacturing Readiness Levels) studies of the recommended transparent material in curved and flat form. Select a single optimum material to address both curved and flat applications from the feasibility studies and design a flat GMV replacement window and a size representative curved window, using the design, project weight, manufacturing cost (in 500 unit quantities). Also analyze the expected ballistic performance of the transparent material and predict the level of small arms protection it will offer. Develop a should cost assessment of manufacturing costs in 500 unit quantity lots for both curved and flat panels.

The objective of this USSOCOM Phase I SBIR effort is to conduct and document the results of a thorough feasibility study to investigate what is in the art of the possible within the given trade space that will satisfy a needed technology. The feasibility study should investigate all known options that meet or exceed the minimum performance parameters specified in this write up. It should also address the risks and potential payoffs of the innovative technology options that are investigated and recommend the option that best achieves the objective of this technology pursuit. The funds obligated on the resulting Phase I SBIR contracts are to be used for the sole purpose of conducting a thorough feasibility study using scientific experiments and laboratory studies as necessary. Operational prototypes will not be developed with USSOCOM SBIR funds during Phase I feasibility studies. Operational prototypes developed with other than SBIR funds that are provided at the end of Phase I feasibility studies will not be considered in deciding what firm(s) will be selected for Phase II.

PHASE II: Manufacture prototypes of the transparent armor material in a standard ballistic testing configuration. Validate agreed upon ballistic, optical, Night Vision Goggle (NVG), environmental performance in accordance with ATPD 2352P (see reference).

PHASE III DUAL-USE APPLICATIONS: Phase III military applications include replacement of any heavy ballistic glass solutions currently in GMV's via attrition. Alternate applications include upgrades to current vehicles to increase the viewing area in a vehicle without increasing the current weight of the vehicle.
Civilian sector applications include armored cars for dignitaries, business executives and monetary transport.

REFERENCES:
1. Army Purchase Description 2352P entitled "Purchase Specification for Transparent Armor" (page 23), Transparent Armor, Army Tank-automotive and Armaments Command, 2008

KEYWORDS: Transparent Armor, Ceramic, GMV, Weight Reduction, Lightweight Armor, Survivability, Advanced Manufacturing

SOCOM14-003 TITLE: Advanced Opaque Armor Materials and Manufacturing Methods

TECHNOLOGY AREAS: Materials/Processes

ACQUISITION PROGRAM: Non Standard Commercial Vehicle

The technology within this topic is restricted under the International Traffic in Arms Regulation (ITAR), which controls the export and import of defense-related material and services. Offerors must disclose any proposed use of foreign nationals, their country of origin, and what tasks each would accomplish in the statement of work in accordance with section 5.4.c.(8) of the solicitation.

OBJECTIVE: Develop a low cost, light weight armor package that has reduced visual signature while offering high protection against threats for Non Standard Commercial Vehicles (NSCV).

DESCRIPTION: Modified commercial vehicles are a staple of Special Operations activities. One reason a commercial vehicle is used is to blend in with local vehicles. They serve a purpose of enabling advance mobility platforms access to sensitive or denied areas while operating undetected and/or indistinguishably from indigenous

platforms. At the same time as remaining inconspicuous, it is necessary to include protection to allow the vehicle and Operators to engage in activity as needed to accomplish the mission which may include the need for an armored vehicle with mobility allowing fast movement over terrain considered impassable. Traditional armor consists of individually formed plates attached together underneath the vehicle sheet metal. This method can lead to seams and joints where ballistic coverage may be compromised. It can also add difficulty to making the vehicle look like its indigenous counterparts. This SBIR topic seeks innovative light weight armor packages for NSCVs that are low in cost, reduce vehicle visual signatures, and provide increased vehicle functionality and available space.

PHASE I: Conduct a feasibility study to develop low cost, light weight armor package alternatives that reduce visual signatures while offering high protection against threats (see reference) for NSCVs. Assess and determine viable armor solutions that can be applied to a NSCV, highlighting the manufacturing and installation processes and the system enhancements the armor solution will provide in terms of weight, space, cost, visual signature, threat performance and functionality. Comparison of the proposed solutions against current standard armoring solutions will be conducted and documented to show the pros and cons of the innovative armor in a vehicle sized application.

The objective of this USSOCOM Phase I SBIR effort is to conduct and document the results of a thorough feasibility study to investigate what is in the art of the possible within the given trade space that will satisfy a needed technology. The feasibility study should investigate all known options that meet or exceed the minimum performance parameters specified in this write up. It should also address the risks and potential payoffs of the innovative technology options that are investigated and recommend the option that best achieves the objective of this technology pursuit. The funds obligated on the resulting Phase I SBIR contracts are to be used for the sole purpose of conducting a thorough feasibility study using scientific experiments and laboratory studies as necessary. Operational prototypes will not be developed with USSOCOM SBIR funds during Phase I feasibility studies. Operational prototypes developed with other than SBIR funds that are provided at the end of Phase I feasibility studies will not be considered in deciding what firm(s) will be selected for Phase II.

PHASE II: Develop a detailed design of the selected armor solution in an NSCV, including drawings and Computer Aided Design. Installation instructions will be created to illustrate that the solution can be retrofitted into a NSCV. Manufacture and ballistically test armor coupon prototypes to validate that the selected solution can meet the current threats the NSCV's are designed against. Acquire a NSCV equivalent vehicle, manufacture a full vehicle kit of armor and perform a full vehicle installation of the armor kit. All projected enhancements from Phase I will be validated or updated based on the actual results identified in Phase II to quantify in detail the benefits (and any impacts) of the new system.

PHASE III DUAL-USE APPLICATIONS: Partner with the current Special Operations Forces (SOF) NSCV manufacturer to embed the armor into future SOF NSCVS. Commercially, a new armor solution with the benefits cited above would enable the SBIR contractor to partner with a current vehicle armoring company that produces privately armored vehicles with similar goals as the SOF vehicles.

REFERENCES:
1. NATO Standard Agreement (STANAG) 4569, "Protection Levels for Occupants of Logistics and Light Armored Vehicles", 24 May 2004; Levels 1-3. (Updated 12/20/13)

KEYWORDS: Non Standard Commercial Vehicle, NSCV, Armor, Visual Signature, Formed, Curved, Inconspicuous, Ballistic, Weight Reduction

SOCOM14-004 TITLE: Hydrogen Generation from Water and Full or Partial Replacement of Petroleum Fuels in Diesel Internal Combustion Engines

TECHNOLOGY AREAS: Ground/Sea Vehicles, Materials/Processes

ACQUISITION PROGRAM: Special Operations Craft - Riverine

OBJECTIVE: Develop a system to generate hydrogen from water on site for use in combatant craft diesel engines to decrease dependency of Naval Special Warfare on petroleum fuels and to increase craft fuel economy and range.

DESCRIPTION: Improving fuel economy, reducing greenhouse gas emissions and minimizing fuel costs associated with Military vehicles is a necessity given dwindling budgets and the ability to affect significant savings through operational efficiencies. One of the easiest and most cost effective ways to achieve this is through the use of alternative fuels/technology that can fully or partially replace petroleum derived fuels using existing internal combustion engine technology without extensive or costly modification. The proposed work within Naval Special Warfare Group Four (NSWG-4) is to investigate the performance, efficiency, and emission characteristics of diesel engines designed at the factory to use conventional diesel fuel exclusively, when introduced to mixtures of hydrogen and oxygen, as well as pure hydrogen. The hydrogen introduced into the engine will be generated from water on site. Targeted efficiencies include potential petroleum fuel savings of 30 to 50 percent and potential power and payload increases given the inherent complete burn of fuel.

PHASE I: Conduct a feasibility study on the generation of hydrogen from water on site and the introduction of varying amounts of hydrogen and oxygen into the air stream of a diesel internal combustion engine at the time of induction, so that no extra injection system or additional modifications to existing engine hardware is required. Comment on the fuel consumption (efficiency), engine out Carbon Dioxide (CO2) and Carbon Monoxide (CO) to be reduced by introducing small amounts of hydrogen and oxygen in the airstream of a conventional diesel engine. Identify experiments and a systematic approach to quantify the reduction in fuel consumption and harmful emissions output. Conduct experiments and laboratory studies to quantify results. Report on the electrical energy and costs required to produce hydrogen from water on site, including equipment weight and size, and compare these costs to the costs of petroleum. Report on the hydrogen applications to offer operational energy solutions that challenge the math, method and logistics associated with expeditionary maneuver to, from and within the Battlespace.

The objective of this USSOCOM Phase I SBIR effort is to conduct and document the results of a thorough feasibility study to investigate what is in the art of the possible within the given trade space that will satisfy a needed technology. The feasibility study should investigate all known options that meet or exceed the minimum performance parameters specified in this write up. It should also address the risks and potential payoffs of the innovative technology options that are investigated and recommend the option that best achieves the objective of this technology pursuit. The funds obligated on the resulting Phase I SBIR contracts are to be used for the sole purpose of conducting a thorough feasibility study using scientific experiments and laboratory studies as necessary. Operational prototypes will not be developed with USSOCOM SBIR funds during Phase I feasibility studies. Operational prototypes developed with other than SBIR funds that are provided at the end of Phase I feasibility studies will not be considered in deciding what firm(s) will be selected for Phase II.

PHASE II: Perform testing on a prototype diesel/gas engine to be provided (loaned) by Naval Special Warfare Group Four. Generate Hydrogen from water on site and introduce varying amounts of hydrogen and oxygen into the air stream of a diesel internal combustion engine at the time of induction, so that no extra injection system or additional modifications to existing engine hardware is required. Report on energy require to produce hydrogen from water on site, engine fuel consumption (efficiency), engine out Carbon Dioxide (CO2) and Carbon Monoxide (CO) to be reduced by introducing small amounts of hydrogen and oxygen to the intake airstream. Identify the optimum level of hydrogen for reducing engine out Nitrogen (NOx) levels. The testing and a systematic approach shall quantify the reduction in fuel consumption and harmful emissions output. Report on the electrical energy and costs required to produce hydrogen from water on site, including equipment weight and size, and compare these costs to the costs of petroleum. Report on the hydrogen applications to offer operational energy solutions that challenge the math, method and logistics associated with expeditionary maneuver to, from and within the Battlespace.

PHASE III DUAL-USE APPLICATIONS: Applicable to Special Naval Special Warfare combatant craft diesel engines. Commercial use application is based on improving fuel economy, reducing greenhouse gas emissions and minimizing fuel costs associated with commercial internal combustion engines.

REFERENCES:
1. http://en.wikipedia.org/wiki/Hydrogen_internal_combustion_engine_vehicle

KEYWORDS: Hydrogen Internal Combustion Engines

SOCOM14-005 TITLE: High Performance Marine Diesel Closed Coolant System for High Speed Combatant Craft

TECHNOLOGY AREAS: Ground/Sea Vehicles, Materials/Processes

ACQUISITION PROGRAM: Special Operations Craft – Riverine (SOC-R) and 11-Meter Naval Special Warfare Rigid Inflatable Boat (11M NSW RIB)

The technology within this topic is restricted under the International Traffic in Arms Regulation (ITAR), which controls the export and import of defense-related material and services. Offerors must disclose any proposed use of foreign nationals, their country of origin, and what tasks each would accomplish in the statement of work in accordance with section 5.4.c.(8) of the solicitation.

OBJECTIVE: Develop a closed coolant system for the SOC-R to eliminate use of off-board, raw water to cool the engines.

DESCRIPTION: SOC-R engine cooling is provided by raw water from the engine pumps and from the Hamilton jets. This raw water sometimes contains debris that clogs the engine strainers causing the engines to overheat. This is especially problematic during beaching operations when personnel transfer to and from the craft. What is needed is a closed coolant system to cool the engines without using raw seawater, thereby eliminating the need for existing strainers that sometimes clog with seaweed and other debris.

The cooler shall not degrade the current capabilities of the SOC-R, such as reducing speed due to increased drag of the cooler or cavitations to the propulsion system. The cooler must be capable of surviving beaching/ grounding at low speeds without structural damage and at high speeds without major damage or loss of watertight integrity.

PHASE I: Conduct a feasibility study for the development of a conformal, recessed cooling system to provide engine cooling. The cooler shall not degrade the current capabilities of the SOC-R. The cooler must be capable of surviving beaching and grounding at low speeds without structural damage and at high speeds without major damage or loss of watertight integrity. The cooler must not exceed 75 lbs. The feasibility study shall include a design of the cooler.

The objective of this USSOCOM Phase I SBIR effort is to conduct and document the results of a thorough feasibility study to investigate what is in the art of the possible within the given trade space that will satisfy a needed technology. The feasibility study should investigate all known options that meet or exceed the minimum performance parameters specified in this write up. It should also address the risks and potential payoffs of the innovative technology options that are investigated and recommend the option that best achieves the objective of this technology pursuit. The funds obligated on the resulting Phase I SBIR contracts are to be used for the sole purpose of conducting a thorough feasibility study using scientific experiments and laboratory studies as necessary. Operational prototypes will not be developed with USSOCOM SBIR funds during Phase I feasibility studies. Operational prototypes developed with other than SBIR funds that are provided at the end of Phase I feasibility studies will not be considered in deciding what firm(s) will be selected for Phase II.

PHASE II: Using the design developed in Phase I, build a prototype of the cooler and install in Naval Special Warfare's SOC-R test craft for evaluation. The test craft with cooler shall be demonstrated in operational conditions in the littoral (rolling sea) and riverine environments. The cooler(s) must demonstrate the capability to outperform exiting strainer systems in keeping the engines within normal operating temperatures. The cooler must be capable of surviving beaching and grounding at low speeds without structural damage and at high speeds without major damage or loss of watertight integrity. The cooler must not exceed 75 lbs.

PHASE III DUAL-USE APPLICATIONS: Application for a cooler for high speed combatant craft includes the 11M NSW RIB and other Navy high speed craft that operate in riverine environments. Potential application for the Department of Homeland Security/United States Coast Guard high speed water craft.

REFERENCES:
1. http://www.boatsafe.com/nauticalknowhow/cooling.htm

KEYWORDS: Marine Closed Coolant System, Keel Cooler, Marine Cooler

SOCOM14-006 This topic has been removed from the solicitation.