

W56HZV-05-R-BAA1 Topic #21

Added by Amendment 44, issued 9 July 09

Revised by Amendment 45, issued 14 July 09

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Topic #21: JP8 Fuel Cell Auxiliary Power Unit (APU) System

OBJECTIVE:

This program shall develop a fuel cell based auxiliary power unit (APU) that operates off 100% JP-8 Army logistic fuel (MIL-STD-83133F²); no blended fuels. The system developed shall include a DC/DC converter whose output is connected to the vehicle DC bus, which the vehicle battery and alternator are also connected to. The system must be water neutral; meaning all water requirements for the system (if any) must be met by internal water recovery with no external sources. The system must meet the specifications in Table 1 and be at Technology Readiness Level (TRL) 5 by program end. The Government anticipates this APU to be used on multiple platforms, such as Abrams, Bradley, Medium Tactical Vehicle and/or future vehicles. The expected program duration is 36 months. Upon successful completion of this program, one or more of four options may be exercised for an additional 12 to 36 months.

DESCRIPTION:

The base effort program must meet the requirements in Table 1. Since the sulfur content of JP8 can vary, the contractor shall be required to use JP8 identified by the Government. Table 2 contains metrics that the government reserves the right to measure during the 1000 hour testing conducted at the contractor's facility; however these are not metrics that have any requirements for the base effort. The contractor shall be responsible for developing and obtaining COR concurrence for the test plan for the base effort 1000 hour demonstration.

The following table contains metrics required for this BAA Topic:

Table 1:

Requirement	Program Objective
Size	~225L – See Appendix A for Dimensions
Start-up/Shutdown	One Step Start up and Shutdown
Technology	Must use Fuel Cell
Weight	600lbs
Power Output and Quality	5kW Threshold, 10kW Objective, 28Vdc, MIL-STD-1275D ¹
Shock and Vibration during Operation	Paved surface driving (Local Interstate Highway)
JP8 Operation	MIL-STD-83133F ²
Test Duration	1000 hours at program end at contractor facility
Water Neutrality	Must be Water Neutral
Turndown Ratio	Must be Stable from 1kW – Max Power

- a. MIL-STD-1275D can be found at http://assist.daps.dla.mil/quicksearch/basic_profile.cfm?ident_number=36186
- b. MIL-STD-83133F can be found at http://assist.daps.dla.mil/quicksearch/basic_profile.cfm?ident_number=33505

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The following table contains metrics that may be measured during base effort testing; these are NOT requirements for the base effort program: These will only be measured to assess the current state of the technology; for informational purposes only.

Table 2:

Measurable Metric	How Metric will be Assessed
Thermal Signature	Signature Produced
Noise	Measured Across Frequency Spectrum
Reliability	Status of Reliability Checklist

Option 1: A three year follow on program to advance the system developed during the base effort to a TRL 6 and meet the requirements in Table 3. The contractor shall deliver three identical units for vehicle testing at Yuma Proving Ground (YPG), Cold Regions Test Center (CRTC) or Aberdeen Proving Grounds (APG). The contractor shall be responsible for shipping and integrating the units into the test vehicles, which will be supplied by the Government. The contractor shall be responsible for developing and obtaining COR concurrence for the test plan for the vehicle testing to verify the system meets the requirements of Table 3. The contractor shall be responsible for all costs.

The following table contains metrics that a fully integrated APU system shall meet:

Table 3:

Measurable Metric	Fully Integrated Objective
Operational Temperatures	-10°F to 125°F MIL-STD-705C ³
Altitude	4000 ft at rated power and efficiency MIL-STD-705C ³
Shock and Vibration	MIL-STD-810G ⁴
Start up/Shut down time	The power source shall start and accept full-rated load within 30 minutes.
Mean Time Between Failures	1140 hours
Mean Time Before Schedule Maintenance	200 hours

- c. MIL-STD-705 can be found at http://assist.daps.dla.mil/quicksearch/basic_profile.cfm?ident_number=35902
4. MIL-STD-810G can be found at http://assist.daps.dla.mil/quicksearch/basic_profile.cfm?ident_number=35978

Option 2: A three year program to utilize the components developed during the base effort for a modular design configuration on military vehicle. Vehicles may include Abrams, Bradley Fighting Vehicle, Medium Tactical Vehicle or a future vehicle. The Government is interested in developing a reformer/fuel cell system that will not be co-located, meaning the reformer and fuel cell will be in different locations in the vehicle. This option will include installing and demonstrating the system on a vehicle supplied by the Government. The vehicle will idle, but

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not be moving. Shock and vibration will not be tested. The contractor shall be responsible for developing and obtaining COR concurrence for the test plan for vehicle demonstration. In the event that both option 1 and option 2 are exercised, the vehicles supplied by the Government for demonstration purposed will not be from the same vehicle family.

Option 3: A one year program to modify the system developed during the base effort to handle full military vehicle shock and vibration requirements (MIL-STD-810G). The contractor shall be responsible for demonstrating the APU handling the shock and vibration specified. The contractor shall be responsible for developing and obtaining COR concurrence for the test plan for the system demonstration.

PROPOSALS THAT REFLECT A “PARTIAL TECHNICAL SOLUTION” TO THE TECHNICAL OBJECTIVES, INCLUDING ALL OPTIONS, ARE NOT ACCEPTABLE. THE GOVERNMENT WILL CONSIDER ONLY THOSE PROPOSED PROJECTS THAT ADDRESS ALL ELEMENTS OF THE OBJECTIVE.

PROJECT DURATION AND ESTIMATED MAXIMUM FUNDING AVAILABLE:

a. **PERIOD OF PERFORMANCE:**

Main/base contract: 36 months;

Option 1: 36 months, the Government will have the right to exercise through 36 months after award of the base contract;

Option 2: 36 months, the Government will have the right to exercise through 36 months after award of the base contract;

Option 3: 12 months, the Government will have the right to exercise within 30 months after award of the base contract;

b. **FUNDING:** The Government anticipates awarding up to 2 contracts. Funding is estimated at \$5.25M per contract for three years, as follows:

Maximum Government funding available in fiscal year 2010: \$1.5 M per contract.

Maximum Government estimated funding in fiscal year 2011: \$2 M per contract.

Maximum Government estimated funding in fiscal year 2012: \$1.75 M per contract.

Options:

Option 1: Funding is estimated at \$8M per contract over three years.

Option 2: Funding is estimated at \$5.25M per contract over three years.

Option 3: Funding is estimated at \$300Kper contract over one year.

c. **COST CEILING/COST SHARE:** Proposed projects involving costs exceeding those identified in b. immediately above will be unaffordable. The contractor may propose total project costs in excess of the Government funded cost ceiling only if the excess costs are to be funded by a cost sharing arrangement. Please note that a cost sharing arrangement is not a consideration for award; therefore, no evaluation preference will be given if a cost share is proposed.

UNCLAS: DIST A. APPROVED FOR PUBLIC RELEASE

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In order to be eligible for award, offerors must propose base effort and all options. Evaluation will assess the entire program (base and all options). Offers that do not address the entire program will be considered as partial technical solutions by the Government.

- d. **MULTIPLE AWARDS:** The government anticipates two contracts to be awarded as a result of this topic.

DESIRED AWARD DATE: December 17, 2009

MILESTONE SCHEDULE:

- a. Discussion Timeframe: July 9, 2009 through August 10, 2009
- b. Electronic Copies of Proposals Due: **Proposals must be received no later than 3:00 P.M. local time, September 10, 2009**
- c. **Note:** Effective 13 FEB 2009, all proposals must be submitted using the ASFI Bid Response System (BRS), accessible at <https://acquisition.army.mil/asfi/default.cfm>
- d. You will find Topic #21 for proposal submission by searching Contracting Opportunities for "TARBAATOPIC21." As reflected by the results of this search, proposals for Topic #21 may be uploaded via the ASFI BRS at the following URL:
https://acquisition.army.mil/asfi/solicitation_view.cfm?psolicitationnbr=TARBAATOPIC21
- e. Estimated Award Date: **December 17, 2009**

Note to Offerors:

Your attention is called to the solicitation closing date and time of September 10, 2009 at 3:00 p.m. local time. In accordance with FAR 52.208(a), offerors are responsible for submitting proposals so as to reach the Government office designated in the solicitation by the time specified. Any proposal received at the designated Government office after the exact time specified is "late" and will not be considered unless one of the exceptions is met at FAR 15.208(b). There is no "expected" or "target" length of time for proposal submission; size and content may be factors. Therefore offerors are strongly cautioned to submit their proposals allowing adequate time for submission; size and content may be factors. Therefore offerors are strongly cautioned to submit their proposals allowing adequate time for submission.

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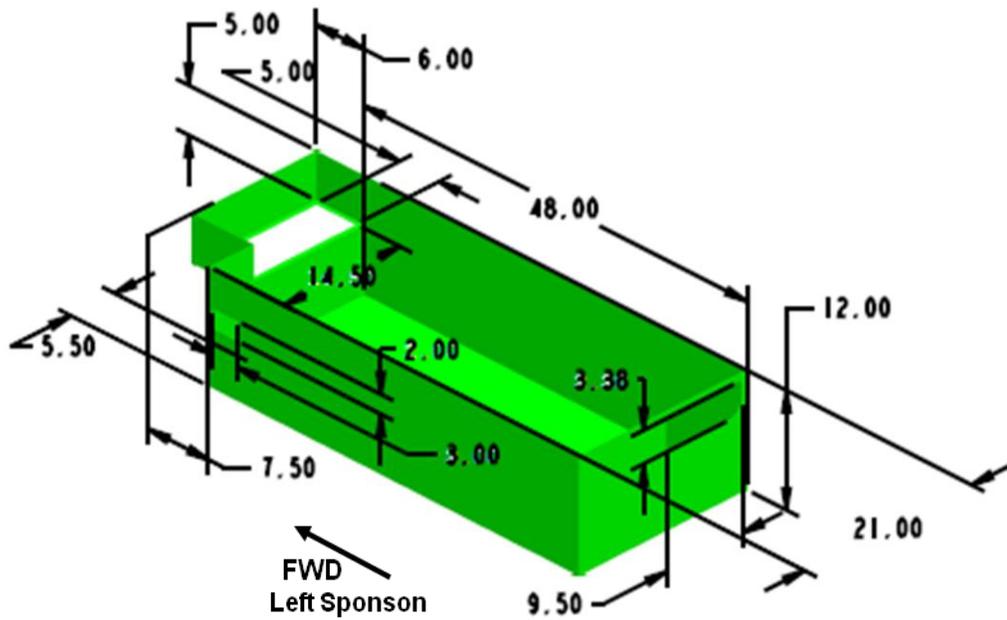
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Appendix A

Dimensions & Suggested Interface Locations



Appendix B: Technical Readiness Level (TRL) Definitions

Technology Development Terminology

Proof of Concept:

Analytical and experimental demonstration of hardware/software concepts that may or may not be incorporated into subsequent development and/or operational units.

Breadboard:

A low fidelity unit that demonstrates function only, without respect to form or fit in the case of hardware, or platform in the case of software. It often uses commercial and/or ad hoc components and is not intended to provide definitive information regarding operational performance.

Brassboard:

A medium fidelity functional unit that typically tries to make use of as much operational hardware/software as possible and begins to address scaling issues associated with the operational system. It does not have the engineering pedigree in all aspects, but is structured to be able to operate in simulated operational environments in order to assess performance of critical functions.

Proto-type Unit:

The proto-type unit demonstrates form, fit, and function at a scale deemed to be representative of the final product operating in its operational environment. A subscale test article provides fidelity sufficient to permit validation of analytical models capable of predicting the behavior of full-scale systems in an operational environment

Engineering Unit:

A high fidelity unit that demonstrates critical aspects of the engineering processes involved in the development of the operational unit. Engineering test units are intended to closely resemble the final product (hardware/software) to the maximum extent possible and are built and tested so as to establish confidence that the design will function in the expected environments. In some cases, the engineering

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unit will become the final product, assuming proper traceability has been exercised over the components and hardware handling.

Mission Configuration:

The final architecture/system design of the product that will be used in the operational environment. If the product is a subsystem/component, then it is embedded in the actual system in the actual configuration used in operation.

Laboratory Environment:

An environment that does not address in any manner the environment to be encountered by the system, subsystem, or component (hardware or software) during its intended operation. Tests in a laboratory environment are solely for the purpose of demonstrating the underlying principles of technical performance (functions), without respect to the impact of environment.

Relevant Environment:

Not all systems, subsystems, and/or components need to be operated in the operational environment in order to satisfactorily address performance margin requirements. Consequently, the relevant environment is the specific subset of the operational environment that is required to demonstrate critical "at risk" aspects of the final product performance in an operational environment. It is an environment that focuses specifically on "stressing" the technology advance in question.

Operational Environment:

The environment in which the final product will be operated. In the case of space flight hardware/software, it is space. In the case of ground-based or airborne systems that are not directed toward space flight, it will be the environments defined by the scope of operations. For software, the environment will be defined by the operational platform.