

**U.S. ARMY TANK AUTOMOTIVE AND ARMAMENTS COMMAND
WORK DIRECTIVE**

CONTRACTOR: Oasis Advanced Engineering, Inc.

**WORK DIRECTIVE NO. TANK02-001
REVISION: 01**

CONTRACT NO.: DAAE20-00-G-0001

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CONTRACT REFERENCE: AGTS-Based Embedded Gunnery Training Demo

Date: 11 Apr 02

PROGRAM/VEHICLE: Abrams Tank System

SUBJECT: SECTION LEVEL M1A2 SEP EMBEDDED TRAINING (ET) DEMONSTRATION

0.0 OBJECTIVE

Demonstrate embedded training precision gunnery capabilities in an M1A2 SEP Tank at the Fort Knox '02 Armor Conference with follow-on demonstrations at Fort Hood and the AUSA National Conference in October '02. At a minimum the demonstrations will be at the crew/section level and will include integration of Advanced Gunnery Training System (AGTS) exercises and limited After Action Review (AAR) capability. If schedule and funding permit consideration will be given for inclusion of Force XXI Battle Command Brigade and Below (FBCB2) functionality.

1.0 CRITERIA

- A. **BASELINE CONFIGURATION** – The contractor shall use the U.S. M1A2 SEP Tank Software Version 3.4.5 or later for work performed under this work directive. For performance at the Fort Knox '02 Armor Conference, Software Version of 3.4.2 can be used.
- B. **SYSTEM ARCHITECTURE** – The contractor shall develop an embedded sustainment gunnery trainer that incorporates AGTS-based software and includes the ability:
 - 1. To conduct individual exercise based AARs
 - 2. For the Commanders Station to easily transition between vehicle system mode and training mode
 - 3. To correlate virtual data with the vehicle C3 mode (optional based on schedule and funding)
- A. **COMMERCIAL OFF THE SHELF (COTS)** – The contractor shall make maximum use of COTS and Non-developmental hardware and software.
- B. **TANK MODIFICATIONS** – The contractor shall minimize tank hardware modifications. The contractor shall be responsible for returning the tank(s) to their original configuration upon government direction.
- C. **STANDARDS** – The contractor shall use the native programming language for all modifications to Tank Line Replaceable Unit (LRU) software. The contractor shall have the option to use Ada, C, and C++ programming languages for non-tank module software in accordance with the contractor's internal software programming standards.

2.0 REQUIREMENTS

- A. Design of the embedded trainer shall take into consideration: safety, ease of installation, MANPRINT, supportability, and normal operation of the vehicle.

Approved by the Contracting Officer's Technical Representative: Edward Andres

Date: 4/11/02

Approval: Contracting Officer: _____ Date: _____

Acknowledgement: Contractor's Representative: _____ Date: _____

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- B. Integrate AGTS-based functionality, without direct view optics, in order to run precision gunnery exercises at crew/section level with consideration for platoon level. Incorporate inter-vehicle communication for platoon level training through the use of wireless technology. Degraded training modes and additional capabilities to be considered include:
 - 1. Driver and Loader Functionality
 - 2. COAX Functionality with Sound
 - 3. MRS update (night only)
 - 4. LRF Failure
 - 5. Stabilization Failure
 - 6. Power Control Handle Failure (Commander / Gunner)
 - 7. TIS Failure/CITV Failure
 - 8. MPAT / Laser in Air Mode
- C. Provide ability to perform crew/section AAR in the vehicle to include exercise scoring. If schedule and funding permit also include platoon level AAR.
- D. Maintain full FBCB2 functionality and if schedule and funding permit correlate FBCB2 to the on-going exercises.

3.0 TASKS

- A. Provide the ability to easily switch between training and live modes.
- B. Perform requirements analysis, system design, configuration management, system integration, test and engineering design reviews. Invite government, GDLS, and LMIS representatives to participate in requirements and engineering design reviews.
- C. Within schedule and funding limitations leverage GDLS and LMIS capabilities for the optimization of the integration of the government furnished AGTS software into the Embedded Trainer.
- D. Conduct one or more user working group meetings.
- E. Conduct weekly teleconference program status reviews.
- F. Demonstrate system readiness to the government prior to shipment to Fort Knox.
- G. Support government safety release prior to shipment to Fort Knox.
- H. Ship, install, test, and remove ET B-Kits at Fort Knox, Fort Hood, and APG. Return vehicles to previous condition upon completion of demonstrations and user evaluations.
- I. Provide demonstration support at the Fort Knox '02 Armor Conference.
- J. Provide on call technical and demonstration support at Fort Knox and Fort Hood at government COTR direction.

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- K. Provide demonstration support at the National AUSA Conference in October '02.
- L. Provide Program Management and submit monthly cost performance reports.

4.0 GOVERNMENT-FURNISHED EQUIPMENT/ITEMS (GFE/I)

- A. A SEP Production Tank (The government will make arrangements and pay for vehicle routine maintenance due to normal wear and tear.)
- B. As available, the government will provide M1A2 SEP Production Tank source and executable code, documentation, non-COTS software libraries, makefiles, and build scripts for use on this program.
- C. As available, the government will provide AGTS source code, documentation, and non-COTS software libraries for use on this program.
- D. As available, the government will provide Version Description Documentation and Configuration Build Documentation for the M1A2 SEP Tank and AGTS Software.
- E. As requested by the contractor and as available, the government will provide detailed interface specifications and design specifications for the CEU, CDU, CCH, FCEU, IFCEU, MPU and POS/NAV. As available, the government will also provide wiring harness drawings, installation and interconnect drawings, and maintenance manuals for the M1A2 SEP Tank.
- F. The government will provide a power converter for use in operating the tank from shore power.
- G. The government will provide a Sport downloader for use in downloading new software into tank LRUs.
- H. If required, technical support shall be available from GDLS, Night Vision Laboratories, PM FLIR, PM FBCB2, PM TRADE, and TRW. The government will make arrangements for this technical support. Cost for the technical support will be paid for by the government and is not included in the cost of this work directive.
- I. If required, technical support shall be available from LMIS. Oasis with government assistance will make arrangements for this technical support. Cost for the technical support will be paid for by Oasis and is included in the cost of this work directive.

5.0 DELIVERABLES

- A. Two ET B-Kits and related cables. (Two additional ET B-Kits if funding is available.)
- B. All Embedded Training source code and executables on CDROM.
- C. User operator instructions in contractor format.
- D. Engineering installation instructions in contractor format.
- E. Plan of operations for safety release in contractor format.

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- F. Minutes from meetings as directed by the government.
- G. Monthly cost and performance reports in contractor format.

6.0 SCHEDULE

The period of performance for this work directive is twelve months.

Milestones and delivery dates are as follows, based on contract award by 01Mar 02:

1. 1 Mar – Receive GFE: SEP Production Tank, Power Converter, Sport Downloader, Tank Software and AGTS Software
2. 11-15 Mar – Conduct AGTS Visual System Software Rehost Analysis
3. 18-22 Mar – Conduct AGTS Non Visual System Software Rehost Analysis
4. 26 Mar – User working group meeting
5. 29 Mar – Receive micro-code from Night Vision Lab
6. 29 Mar – Requirements Review
7. 4 Apr – Hardware Design Review
8. 10 Apr – Software Design Review
9. 30 Apr – Submit Plan of Operations for Safety Release
10. 9-10 May – Conduct Government Safety Release
11. 6-31 May – Deliver hardware, install and test ET in two (2) SEP Production Tanks at Fort Knox, provide support during Armor Conference and return tanks to original condition.
12. 30 Jul-30 Sep – Deliver hardware, install and test ET in two (2) SEP Production Tanks at Fort Hood, provide support during demonstration and return tanks to original condition.
13. 7-20 Oct – Deliver hardware, install and test ET in one (1) SEP Production Tank at APG, provide support during the AUSA National Conference, return tank to original condition
14. 1-20 Dec – Return SEP Production Tank to original condition, deliver all hardware, software, documentation, and reports.

7.0 BASE HOURS

Engineering Hours	10,550
Management (Technical and Program Management)	1,720
Total	12,270

8.0 BASE TRAVEL & MATERIAL

Estimated travel cost of \$50,000, exclusive of related labor cost, G&A, and fee.

Estimated material cost of \$205,000 (includes \$30k for AUSA booth), exclusive of related labor cost, G&A, and fee.

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Hardware will include:

- 2 sets of ET B-Kits and related cables (preliminary design)
- 2 or more single board computer(s) w/single or dual processor(s)
- 2 graphic subsystems
- 1553B bus card
- 2 or more enclosures w/ hard drive, power supply, backplane & internal cabling

9.0 OPTION - REQUIREMENTS

- A. Provide two additional sets of hardware, install and test.
- B. Correlate FBCB2 to the on-going exercises, in terms of the map and incoming message traffic.
- C. Provide the ability to switch between training and live modes with modifications to MPU.
- D. System Engineering and Integration (Delta).
- E. Generate report on training port for TWGSS.

10.0 OPTION - HOURS

Engineering Hours	2,530
Management (Technical and Program Management)	430
Total	2,960

11.0 OPTION - TRAVEL & MATERIAL

Estimated travel cost of \$0.

Estimated material cost for two additional sets of ET hardware of \$150,000, exclusive of related labor cost, G&A, and fee.

Hardware will include:

- 2 sets of ET B-Kits and related cables (preliminary design)
- 2 or more single board computer(s) w/single or dual processor(s)
- 2 graphic subsystems
- 1553B bus card
- 2 or more enclosures w/hard drive, power supply, backplane & internal cabling