Crewman’s Associate Advanced Technology Demonstrator Briefing

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(AMSTA-TR-R, Mailstop 264)
Warren, MI 48397-5000

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TARDEC Crew Reduction Efforts

Evolving Knowledge and Technology “Baseline”

- FY93: Crewman’s Associate Simulation
- FY96: System Integration (Lab)
- FY98: Vehicle Tech Demo #1 (VTT)
- FY00: Vehicle Tech Demo #2 (CAT ATD)
- FY04: Two Man Transition
- FY06: Future Combat System

Baseline Developed
Crewman’s Associate ATD

- The development of a crew station soldier-machine interface

- The integration of advanced technologies, such as aided target acquisition, integrated defense, combat ID, digital messaging, driver’s aids, etc.

- Two platforms (time frames) addressed:
  - Potential M1A2 (SEP) + (1998 technology)
  - Future MBT (2005 technology)
Motivation

- Weapon Status
- Intra-Vehicle Communication
- Battlefield Digitization
- Battlefield Communications
- Target Acquisition
- Monitor Instruments
- Crew Reduction
- Target Tracking
- Obstacle Avoidance
- Weapon Control
- Rough Terrain Maneuvering
- Advanced Sensors
- Day/Night & All Weather Operation
- Map Information
Vision

- Autonomous Systems
- Panoramic Displays
- Tactical Displays
- Helmet Mounted Displays
- Advanced Controls
- Voice Interface
- Ergonomic Environment
- Remote Viewing
- Embedded Training
- Cognitive Decision Aids
- Battle Command Automation
- Aided Target Recognition
- Three Dimensional Audio
- Diagnostics/Logistics
- Aided Driving
Objectives

Increase Main Battle Tank operational effectiveness by:

- Decreasing engagement timelines
- Decreasing time required to create and send digital C2 reports
- Improving operations on the move
- Improving situational awareness
- Improving night operations
- Providing a User-friendly interface to the digital battlefield of Force XXI
- Improving CONOPs
- Reducing maneuver damage
CTT Design Methodology

Individual Steps or Complete Design Process Performed to Meet Project Goals
Crewstation Design Principles (Primary)

- Hands on primary controller
- All critical information in the primary vision zone
- One step functions
- Consistent Mental Model
3-D auditory alerts

Panoramic Display (PD) with side window displays (not shown)

3 identical Multi-Function Displays (MFDs)

Programmable Display Pushbuttons (PDPs) access menus without consuming display space

Voice recognition for limited C2 tasks

Radio and HA switches

Shared center console

Yoke-type driving controller with targeting switches

Traditional pedals for acceleration, braking

Alphanumeric keypad

Shared center console

3-D auditory alerts
1998 Crewstation

- 3-D auditory alerts
- Communications Panel
- Warning Screen
- Autoloader
- 3 identical Multi-Function Displays (MFDs)
- Programmable Display Pushbuttons (PDPs) access menus without consuming display space
- Center-munted multi-function controller
- HA Panel
- Removeable keyboard
1998 Driving Station

- Driver’s Navigational Display (DND)
- WACA
- Keyboard
- Gear Select
- Driver’s Vision Enhancer (DVE)
- Training Mode Select
- Master Power
- Personal Data Cartridge Reader
- Personal Data Cartridge Reader
Crewstation Displays

Panoramic Display

- 180 degree indirect vision to the crew
- Inherent protection from directed energy weapons
- Seamless, closed hatch vision
- Common visual environment
- Located within the Primary Vision Zone.
Crewstation Displays

Multifunction Displays

- Display information from different subsystems: targeting, driving, command and control, tactical map, etc.

- Buttons on the top of the MFD select the displays functionality.

- Located within the Primary Vision Zone.

- Provide consistent mental model.
3D Audio Display
• A User-friendly interface to the digital battlefield of Force XXI
• A 65% decrease in the workload required to send C2 messages
• Improved situational awareness
• Improved operations on the move
• Improved night operations
• Reduced maneuver damage
• Improved CONOPs
Test Results
(Non-experimental analysis)

- Operations on the move have been improved due to:
  1) decreased steps required to execute tasks
  2) elimination of dragging the cursor
  3) all critical task on yoke

- The crewmen now have a simplified, User-friendly interface to the digitized battlefield of Force XXI.

- The ability to effectively perform continuous operations has been improved due to the decreased fatigue associated with operating this crew station.
Test Results
(Subjective Comments)

- The electronic map provided the most significant performance enhancement.
- The ability for each crewman to tailor his individual displays to suit his preferences was helpful.
- Digital C2 interface had a positive impact on performance, being easier and faster than M1A2.
- Aided target acquisition had a positive impact on performance.
- Combined interfaces and technologies provided the ability to rapidly convey the information required to control forces at the platoon and company level.
Vetronics Technology Testbed (VTT)

- **Update Crewman’s Associate Crew Station Design**
  - Lessons Learned
  - Technology Advances
  - Test Bed Costs
  - Test Bed Space

- **Integrate into Bradley A0 Hull**
  - Two Crew Stations
  - Supporting Technology
  - Supporting Subsystems

- **Conduct Test Bed Workload Experiments and Technology Demonstrations in the Field**
  - Side-By-Side
  - In-Line