AMSTI-EA 20 Aug 97

MEMORANDUM THRU EO (Keith Gardner)

FOR EO (T. Gillooley)

SUBJECT: Study #970001, Identification of Value Engineering (VE) Effort

1. This memorandum is to identify a planned VE study/analysis

2. A study/analysis is planned for the Close Combat Tactical Trainer (CCTT) Tactical Air Control Party (TACP) console. The study will evaluate the feasibility of combining the functions of the TACP console with that of other CCTT elements to reduce computer and/or image generator electronics requirements.

3. The study/analysis effort will include a functional analysis and be documented as a VE effort for reporting purposes within the VE program.

4. Estimated potential savings based upon current CCTT production plans/quantities is roughly $1,500,000.

5. POC for this effort is Mr. Paul Smith, EA Division, VE Coordinator, 384-3826.

ED ARCH
Chief, Combined Arms
Systems Division

CF:
DC (J. Skurka)
E (E. Trier)
PM CATT (A. Hammond, M. Edwards, P. Spangler)
EA (Smith, Foster, Reese)

AMSTI-EA May 18, 1998

MEMORANDUM FOR ACE (D. Greenwood)

SUBJECT: Implementation of Close Combat Tactical Trainer (CCTT) Tactical Air Control Party (TACP) Value Engineering Proposal (VEP)

1. Reference. AMSTI-EA Memorandum, SAB, dated 12 May 1998. (Encl 1)

2. The Project Manager Combined Arms Tactical Trainer (PM CATT) has concurred with a VEP prepared by this office which recommends combining the CCTT TACP workstation with the CCTT High Mobility Multi-purpose Wheeled Vehicle (HMMWV) simulator, and relocating the TACP radios within the existing CCTT Tactical Operations Center (TOC). The VEP has also been reviewed by the STRICOM Cost Analysis and Validation Office, and when implemented the will result in a cost avoidance to the CCTT program of approximately $1.9M. A copy of the approved VEP is enclosed.

3. The CCTT contractor and government IPT prepared and approved a CCTT Baseline Change Request (BCR) to implement the recommendation from the VEP. This BCR changes the contract Prime Item Development Specification (PIDS). The contractor has submitted a revised PIDS (revision F) to the government for review and approval, which contains the TACP change. Government approval of this proposed PIDS change is required in order to contractually effect the change recommended by the VEP.

4. Upon contractual approval of the revised PIDS it is requested that you notify EO division (T. Gillooley) of the government's approval of a BCR (#241) and change to the CCTT contract specification implementing the recommended alternative of STRICOM Value Engineering Study #970001.

5. Point of contact for this effort is Mr. Paul Smith, 354-3826.

ED ARCH
Chief, Collective Simulation Division

Encl

CF: EO (Gillooley)

AMSTI-EA 12 May 1998

MEMORANDUM FOR AMCPM-CATT

SUBJECT: Implementation of Close Combat Tactical Trainer (CCTT) Tactical Air Control Party (TACP) Value Engineering Proposal (VEP)

1. Reference. AMSTI-EA Memorandum. Subject: Study # 970001, Identification of Value Engineering (VE) Effort dated 18 August 1997.

2. This office initiated a VE study for the CCTT TACP workstation via referenced memorandum. The study was completed and a VEP prepared which recommends combining the CCTT TACP workstation with the CCTT High Mobility Multi-purpose Wheeled Vehicle (HMMWV) simulator, and relocating the TACP radios within the existing CCTT Tactical Operations Center (TOC).

3. A review of the VEP has been completed by the STRICOM Cost Analysis and Validation Office, and if implemented the proposal will result in a cost avoidance to the CCTT program of over $1.9M.

4. Request that PM CATT review and concur with the enclosed VEP so that this office may move forward with contractual implementation.

5. Point of contact for this effort is Mr. Paul Smith, 384-3826.

Encl

ED ARCH
Chief, Collective Simulation Division

Concurrence:

ALAN R. HAMMOND
COL, AR
Project Manager
Combined Arms Tactical Trainer

Encl

VALUE ENGINEERING PROPOSAL (VEP)
FOR
U.S. ARMY SIMULATION, TRAINING AND INSTRUMENTATION COMMAND (STRICOM)

Close Combat Tactical Trainer (CCTT) Tactical Air Control Party (TACP) Console

STRICOM Study #970001

STRICOM #98-020
COST ANALYSIS & VALIDATION OFFICE
REVIEWED FOR SUFFICIENCY
VALIDATION NOT REQUIRED
ANALYST Edna M. Steak
PHONE NO. DSN 970-5127 (407-384)
DATE 5/7/98

Encl

Study Started: 20 Aug 97
Study Completed: 6 Jan 98

Close Combat Tactical Trainer (CCTT) Tactical Air Control Party (TACP) Console
STRICOM Study #970001

1. Item(s) Effected: The TACP Console near the Tactical Operations Center (TOC) and the High Mobility Multipurpose Wheeled Vehicle (HMMWV) Training Module

2. Item Nomenclature: NSN: APN: 126771

3. Function Analysis (Verb/Noun): Provide Training

4. Study Team: Mr. Paul Smith, EA Division, 384-3826
Mr. Bill Reese, EA Division, 384-3828
Mr. Ed Pulz, Nations Inc., 306-5344

5. Background Information: The Close Combat Tactical Trainer (CCTT) is the first of the Combined Arms Tactical Trainer (CATT) family of virtual trainers. CCTT will train Armor, Cavalry, and Mechanized Infantry platoons through Battalion/Task Force on their doctrinal Mission Training Plan collective tasks. The CCTT-system is the first fully Distributed Interactive Simulation (DIS) compliant training system and consists of networked vehicle simulator manned-modules, which in combination with Semi-Automated Forces (SAF), Combat Support workstations, computer networks and protocols, and After-Action Review (AAR) systems. CCTT manned-modules consist of the M1A1, M1A2, M2/3A2, FIST-V, M113A3, and the HMMWV. These manned-modules are high fidelity simulators, which require individuals and crews to correctly perform their respective tasks in order to successfully accomplish their collective missions.

The HMMWV module simulator is designed to replicate the performance characteristics of the actual combat vehicle. The HMMWV physically replicates the individual crew stations of the driver and observer. The HMMWV is also capable of mounting and dismounting an observer into the visual database.

The computer generated visual system is displayed on high-resolution monitors placed in front of the driver and observer. These images provide realistic terrain features such as forests, hills, rivers and roads as well as urban and rural scenes. Own vehicle dynamics

provide unrestricted movement in six-degrees of freedom, and realistic visual feedback due to changes in terrain and effects of own vehicle movement. Firing effects such as muzzle flash, ballistic detonation, fire and smoke are realistically replicated. Weather conditions such as rain, fog and various levels of visibility are replicated. An exercise may be started any time during a 24-hour period. The time of day clock may be set to run or hold at a specific time for specialized training such as night, dusk or dawn conditions.

The sound system consists of strategically placed speakers that reproduce sounds and vibration with such fidelity, quality, realism and volume that crew members experience cues, stress and distractions of a real life combat situation. Actual sounds have been digitally recorded to further replicate real life conditions.

The driver's station provides the lights, indicators, buttons, controls, and guages as found on the actual vehicle. Controls such as the steering wheel, accelerator and service brake are used to drive the simulated vehicle across the virtual terrain. Indicators and gages such as fuel level, vehicle speed and engine RPM are fully functional. The observer's visual system provides target detection using 7X binoculars at 4000 meters and target recognition at 2400 meters. The observer's Night Vision Goggles visual system provides target detection out to 2400 meters and target recognition at 500 meters.

The observer and driver have full use of two CCTT SINCGARS radios. The observer may also use the trainer unique Plan View Display (PVD) map feature to plan troop movement.

A simulated compass (grid azimuth indicator) is a three digit display depicting the orientation of the vehicle referenced to grid north. A digital readout is available 60 seconds after the vehicle has been stationary simulating a crew member exiting the vehicle and taking a compass reading.

A Driver/Observer switch selects control of the simulator between the driver and observer. In the driver position, the vehicle controls and displays are controlled by the driver, and in the Observer position, the images are switched to the observers view. Through the use of a joystick and Observer's Display, the observer may select a weapon, dismount the vehicle and traverse the terrain. Switches on the joystick allow the observer to change from standing, kneeling and prone positions, run, walk, turn, go forward and backwards. Through the use of the Observer's Display, the observer may select the use of weapons such as the M249 SAW, and the .50 caliber and M60 Machine guns, that may be fired from the mounted or dismounted positions. In addition, a grenade launcher may be used in the dismounted position.

The Tactical Air Control Party (TACP) station provides the capability to control the close air support (CAS) for the CCTT training missions. The TACP station provides a plan view display. The simulated aircraft is visible in the exercise database for the same conditions

the aircraft would be visible in real world situations. The TACP simulation also provides the capability for simulated aircraft evasive action for self-protection and the capability to establish all CAS missions during initialization of an exercise. The initialization parameters includes location, destination, weapons load, set attack profile (consisting of initial point, offset direction, and target type) and schedule. The TACP station provides the capability to divert any of the initialized CAS missions (provides on-call missions).

6. **Present Method:** Presently, the TACP is located in the training facility near the TOC (isolated from the TOC by a wall enclosure). The TACP consists of the following items (w/associated cables as required):

   a) 1 TACP Host computer
   b) 1 TACP Evans & Sutherland Image Generator (ESIG)
   c) 1 OC (shared) equipment rack containing the programmable interface electronics (PIE) and I/O electrical unit
   d) 2 CCTT SINCGARS radios
   e) 1 20" monitor for visual display
   f) 1 20" monitor for the TACP command control windows and Plan View Display (PVD)
   g) 1 mouse
   h) 1 keyboard
   i) 1 joystick
   j) 1 workstation table
   k) 1 workstation chair

The HMMWV simulator is contained in a modular room enclosure and consists of the following items (w/associated cables as required):

   a 1 HMMWV host computer
   b 1 HMMWV ESIG
   c 1 equipment rack containing the programmable interface electronics (PIE) and I/O electrical unit
   d 1 equipment rack containing the host processor, audio amplifiers, and power supplies
   e 2 CCTT SINCGARS radios
   f 1 driver's position with vehicle controls and indicators, and 3 26" visual displays
   g 1 observer's position with joystick and 3 26" visual displays
   h 1 observer's 20" Plan View Display (PVD)
   i Sound system

Figures representing existing and proposed TACP workstation and HMMWV module configurations can be found at the end of this report.

7. **Alternatives:**

   a. **Alternative 1:** ***Continue the present course of operation in usage of the TACP.***

   b. **Alternative 2:** ***Move the TACP workstation capability into the HMMWV simulator and relocate the radio communications equipment (CCTT SINCGARS radio) to a more appropriate location in the TOC.***

   c. **Alternative 3:** ***Alternative 2 modifications plus combine the TACP software onto the HMMWV host and utilize the PVD that is already in the HMMWV.***

8. **Discuss and Evaluate Alternatives:**

a. ***Continue the present course of operation in usage of the TACP.*** The current TACP requirements specify that the TACP OC workstation must supply a dismount capability, i.e. provide the ability to move through the database as a dismounted observer with the appropriate visual scene displayed. It is not cost effective to continue to provide this capability in the manner in which it is currently being implemented due to the cost of the visual systems needed to supply the graphic scenes and the anticipated limited use in CCTT training exercises.

b. ***Move the TACP workstation capability into the HMMWV simulator and relocate the radio communications equipment (SINCGARS radio) to a more appropriate location in the TOC.*** This move includes modifying the host software from a -30 configuration to a -60 configuration. Removing the TACP Image Generator (ESIG), the joystick, the Host to ESIG ethernet interface cable, Host to PIE ethernet cable, video cable and one 20" monitor from the Bill of Material (BOM). It also includes moving the TACP host (now a -60 configuration), and the associated mouse, keyboard, PVD monitor to a position on an added 30 inch printer table inside the selected HMMWV enclosure. The Host will be located inside the HMMWV enclosure as well, and will be powered from an available extension outlet already in the simulator. The two TACP SINCGARS radios can be relocated to one of the existing tables within the TOC to support the facilities OC radio requirements when multiple exercises are conducted. To accomplish the TACP DI requirements, the TACP operator would drive through the database and then dismount and walk through the database using the HMMWV dismount functions. The added equipment is one 30" printer table, a 150 ft. ethernet cable to interface the Host computer to the PIE (still located in the OC rack). The TACP worktable can be removed from the TOC altogether. The -60 configuration for a 43P host lists an additional graphics card that is also not needed for the TACP host and will therefore not be installed. This alternative may be implemented at all sites with access to HMMWV training modules.

c. ***Alternative 2 modifications plus combine the TACP software onto the HMMWV host and utilize the PVD that is already in the HMMWV.*** This move includes removing the TACP Host computer, TACP Evans & Sutherland Image Generator (ESIG), one 20" monitor for visual display, one 20" monitor for the Plan View Display (PVD), one joystick, one mouse, one keyboard, one workstation table, one workstation chair, one Host to IG Ethernet interface cable, one I/O to Host Ethernet interface cable, and one video cable from the IG to the visual display monitor from the Bill of Material (BOM). It also includes loading the TACP host software on the HMMWV host processor. The two TACP SINCGARS radios can be relocated to one of the existing tables within the TOC to support the facilities OC radio requirements when multiple exercises are conducted.

To accomplish the TACP Dismounted Infantry (DI) requirements, the TACP operator would drive through the database and then dismount and walk through the database using the HMMWV dismount functions. Additional software development, integration, and testing will be required to combine the current HMMWV PVD software functionality (command and control of dismounted observer) with the TACP PVD software functionality (command and control of Close Air Support aircraft). Modifications to the Master Control Console (MCC) software will also be required to make the HMMWV with TACP a selectable configuration. This would allow the HMMWV manned module to be initialized with or without the TACP depending on the requirements of the exercise to be executed. This alternative poses too much risk of losing TACP functionality. CCTT maintains all CGF vehicle data (functionality and capabilities) in the SAF Entity Object Database (SEOD). For TACP, this includes the data for the aircraft initialized for the exercise. If the TACP software is loaded on the HMMWV processor, and the HMMWV processor goes down, then the TACP functionality (command and control of all close air support assets) will be lost for the remainder of the exercise. This is because OC functionality such as the TACP can not be reset, reconstituted, or added to an exercise as a latecomer due to the present design.

9. Cost Analysis:

a. Alternative 1: ***Continue the present course of operation of the TACP.***

b. Alternative 2: ***Move the TACP workstation capability into the HMMWV simulator and leave the radio communications capability at the currently defined TACP work table.*** The net cost avoidance for this alternative (discounting implementation costs) is the elimination of one 20" monitor, associated host processor graphics card, one TACP ESIG, an ethernet card in the host processor, one workstation table, one joystick, and the S/W to control the ground vehicle control and dismount operation at the TACP. This VEP would remove requirements for the TACP visual, dismounted, and ground vehicle control software

functionality. A cost avoidance will also occur by eliminating costs for the completion and testing of the TACP User Computer Interface (UCI) software after IOT & E. The costs avoided are as follows:

Part	Part #	Cost
20" Monitor	126797	$ 1,350.00
TACP ESIG	126794-8	$ 157,000.00
Desk computer 60"	126671	$ 695.20
Joystick	1177068	$ 3,168.00
Video Cable	117706-3[illegible]	$ 294.80
Desk computer 30"	126843-3	$ - 256.20
ESIG to Host Interface cable 25'	117716-3[illegible]	$ 100.00
I/O Rack to Host Interface cable	117716-3[illegible]	$ 100.00
Replacement I/O Rack to Host Cable	-	$ -373.00
Host Processor Graphics Card	-	$ 1427.00
	Unburdened Material Costs per site	**$163,505.80**
	Contractor Other Material Charges (2.10%)	$3,433.62
	Subtotal Material Costs per site	**$166,939.42**
	Contractor Material Handling Charges (5.84%)	$9,749.26
	Total Material Costs per site	**$176,688.68**
	Contractor Profit per site (10%)	$17,668.87
	Total Cost Avoidance per site	**$194,377.55**
	No. of sites	X 10
GRAND TOTAL COST AVOIDANCE FOR ALT. 2		**$1,943,775.50**

c. **Alternative 3:** ***Alternative 2 modifications plus combine the TACP software onto the HMMWV host and utilize the PVD already in the HMMWV.*** The net cost avoidance for this alternative (discounting implementation costs) is the elimination of two 20" monitors, associated host processor graphics card, one TACP ESIG, one TACP Host computer, one workstation table, one joystick, and the S/W to control the ground vehicle control and dismount operation at the TACP. This VEP would remove requirements for the TACP visual, dismounted, and ground vehicle control software functionality. A cost avoidance will also occur by eliminating costs for the completion and testing of the TACP User Computer Interface software after IOTE. The costs avoided are as follows:

Part	Part #	Cost
20" Monitor	126797	$ 1,350.00
20" Monitor	126797	$ 1,350.00
TACP ESIG	126794-8	$ 157,000.00
TACP Host Computer (MPX5000)	126793-3[illegible]	$ 20,073.00

Part	Part #	Cost
Desk computer 60"	126671	$ 695.20
Joystick	1177068	$ 3,168.00
Video Cable	117706-30	$ 294.80
ESIG to Host Interface cable 25'	117716-30	$ 100.00
I/O Rack to Host Interface cable	117716-30	$ 100.00
Two Host Processor Graphics Cards		$ 2854.00
	Unburdened Material Costs per site	**$186,985.00**
	Contractor Other Material Charges (2.10%)	$3,926.69
	Subtotal Material Costs per site	**$190,911.69**
	Contractor Material Handling Charges (5.84%)	$10,309.23
	Total Material Costs per site	**$201,220.92**
	Contractor Profit per site (10%)	$20,122.09
	Total Cost Avoidance per site	**$221,343.01**
	No. of sites	X 10
	GRAND TOTAL COST AVOIDANCE FOR ALT. 3	**$2,213,430.10**

10. Implementation Costs:

- Government cost to develop this VEP including the studies related to it is estimated as follows:

STRICOM support contractor costs -	68 hours @ $49/hr =	$3,332
U.S. Army MICOM support costs -	20 hours @ $48/hr =	$960
STRICOM support to PM CATT -	36 hours @ $55/hr =	$1,980
		$6,272

- Estimated Lockheed Martin charges for administrative processing, engineering design and drawing modifications total $38.709.00.

- Testing of the new configuration is to be performed at Ft. Hood in conjunction with ongoing system testing and monitored by government personnel. A need for manpower beyond that already in place to support system test activities is not anticipated.

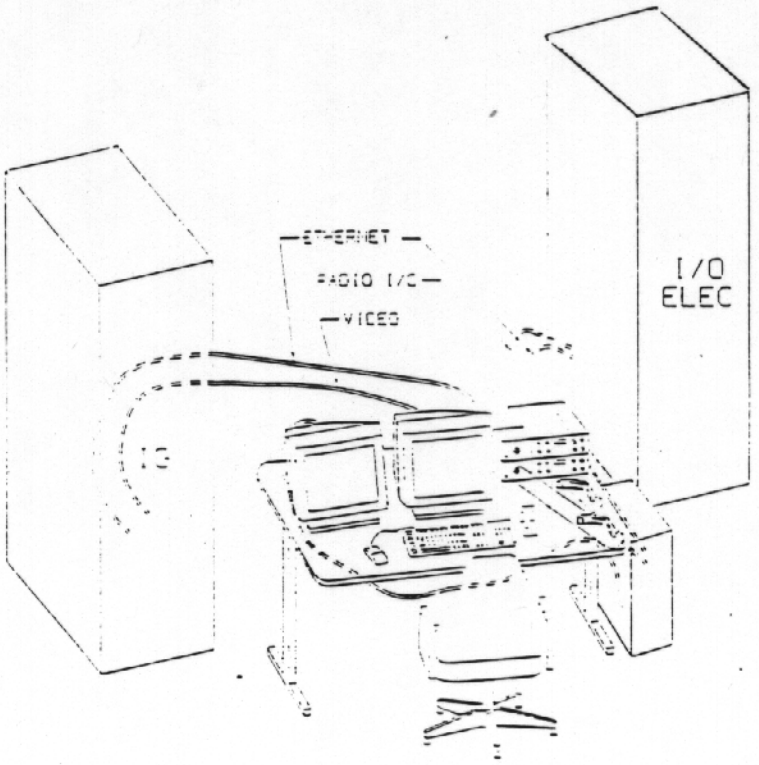
- An estimate of the Alternative 3 implementation costs associated with software development hours to "stack" the TACP software onto the HMMWV host processor was not completed due to a determination that this option presented unacceptable risks to system reliability/availability.

11. Conclusion: ***Alternative 3*** shows potential for an increased cost avoidance over ***Alternative 2*** due to the elimination of the TACP host processor. Selection of ***Alternative 3***, however, presents higher implementation costs due to required software modifications, and the potential of losing both HMMWV and TACP functionality should the HMMWV host processor experience problems. Therefore, it is recommended that ***Alternative 2*** be selected as the most economical means of meeting the present requirements. Estimated cost avoidance based upon implementation of ***Alternative 2***:

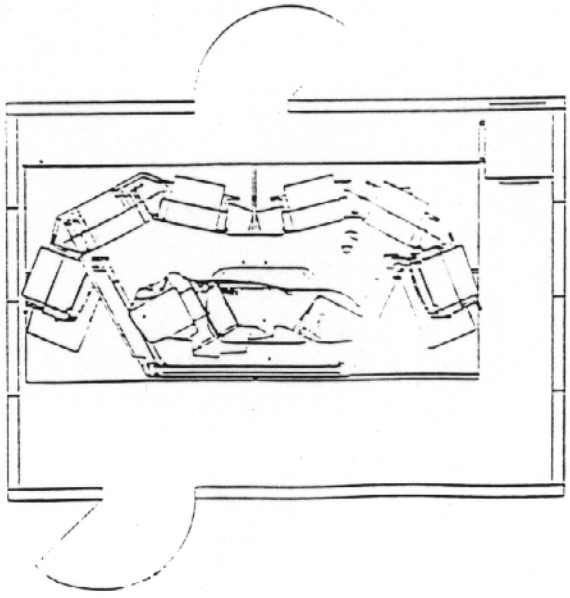
Estimated contract cost avoidance for Alternative 2	$1,943,775.50
Estimated implementation cost for Alternative 2	- $44,981.00
Estimated net cost avoidance for Alternative 2	**$1,898,794.50**

Existing Hardware Configuration

TACP W/S:

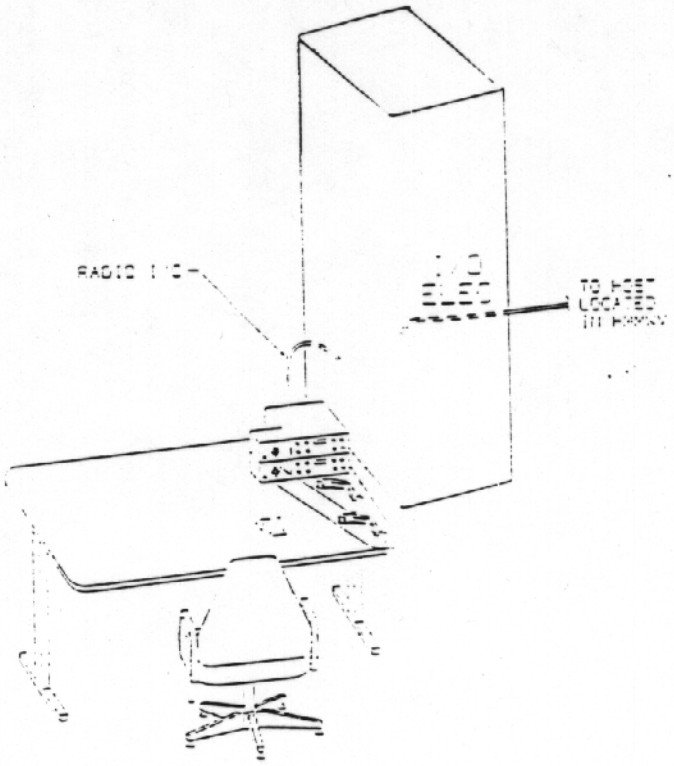


HMMWV:



Option B Proposed Configuration (Pictorial Description of Change)

TACP W/S:



HMMWV: