



Report Number 152

**SOLDIER BATTLE LAB
USAIC, FT. BENNING, GA 31905-5400**

**TACTICOMP/Ku SATCOM (WBOTM)
OBSERVATION REPORT**

**16-23 February 2006
(1-23 IN 3/2 SBCT Ft. Lewis, WA)
NTC Rotation - Ft. Irwin, CA**

17 MARCH 2006

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13. ABSTRACT (Maximum 200 words) In January 06, TRADOC and Rapid Equipment Fielding authorized the limited purchase of TACTICOMP and Ku Satellite Communications (SATCOM) Wide-band On The Move (WBOTM) systems to equip 1-23 IN, 3/2 SBCT. In February 06, TRADOC Spiral Development Division tasked the USAIC Infantry Futures and the Soldier Battle Lab (SBL) to observe the battalion utilizing the systems during their mission readiness exercise at the National Training Center (NTC). The collected data will assist TRADOC leadership in determining future TACTICOMP and Ku SATCOM procurement.				
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17 March 2006

MEMORANDUM FOR Spiral Development Division, Army Capabilities
Integration Center, ATTN: ATFC-DO (COL Daniel Wolfe), Building 270,
92 Patch Rd Ft Monroe, VA 23651

SUBJECT: TACTICOMP / Ku SATCOM WBOTM Observation Report

1. Per USAIC task in Feb 06, subject as above, the final report is enclosed.
2. The findings in this report are the product of the collaborative efforts of the entire TACTICOMP / Ku SATCOM WBOTM USAIC team sponsored by the Spiral Developments Division, HQ TRADOC. A joint effort (SBL, DCD, TSM-SB) with the SBL as report lead, the analysis and conclusions have been derived from team members' insights and 1-23 IN leader and Soldier interviews conducted at the National Training Center, Fort Irwin, CA from 16 - 23 February 2006.
3. No changes will be made to this report without SBL Deputy Director authorization.

FOR THE COMMANDER:

Encl
TACTICOMP / Ku SATCOM
Final Report

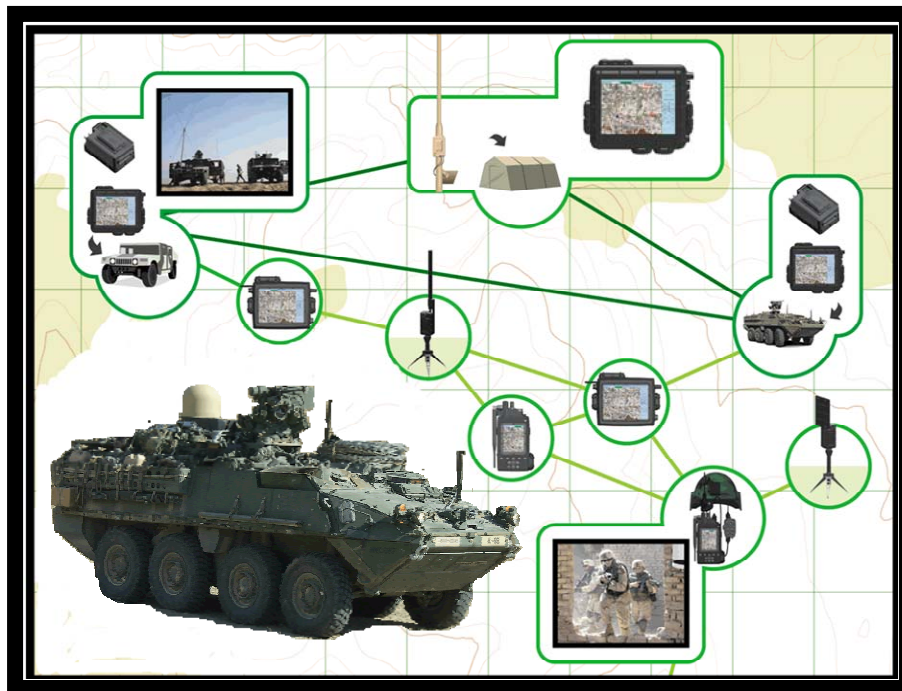
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TACTICOMP / Ku SATCOM (WBOTM) OBSERVATION REPORT

16 - 23 February 2006
(SBL 152)



Prepared for:
U.S. Army Training and Doctrine
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1. EXECUTIVE SUMMARY

A. Introduction. Under DA Authorization, TRADOC and Rapid Equipment Fielding (REF) purchased TACTICOMP and Ku SATCOM systems for the 1-23 IN, 3/2 SBCT for use during a National Training Center (NTC) mission readiness exercise and future deployment. TRADOC Spiral Development Division tasked USAIC Infantry Futures and the SBL to observe the unit and their employment of these systems. The observation team was a compilation of personnel from the SBL Futures Branch, TSM-SB C4ISR, and DCD Battle Command Division.

(1) **TACTICOMP** is a battle command system designed to provide a Soldier with Voice over IP (VoIP), situational awareness, data reports, instant messaging, and streaming video capability down to squad level. The TACTICOMP 6 (T6) is vehicle-mounted and the TACTICOMP 1.5 (T1.5) is hand-held. The T1.5 includes a Tactisight Head-Mounted Display (HMD) and a Combat Controller. This ad hoc self-healing mesh network allows the TACTICOMPs to route between each other extending the range capability.

(2) **Ku SATCOM WBOTM** is a vehicle mounted satellite communications wideband on the move system that enhances the TACTICOMPs capabilities to provide greater operational range. It also allows direct worldwide communication via a satellite phone.

B. Observation Objectives. The TRADOC objectives for the observation team were:

- Objective 1: Observe 1-23 IN and report observations of TACTICOMP system to TRADOC Army Capabilities and Integration Center (ARCIC) (for use in TRADOC “way ahead” decision: issue system at PLT or increase to CO level).
- Objective 2: Observe and report observations on the Ku SATCOM WBOTM system installed in A Co CDR and 1-23 IN Bn CDR Stryker vehicles.
- Objective 3: Observe and assist 1-23 IN with Tactics, Techniques and Procedures (TTP) development prior to overseas deployment. **Note:** As a result of the constraints and limitations listed in para. 2.C.3, the observation team was unable to achieve success in meeting this objective.

C. Conclusions. Together the TACTICOMP and Ku SATCOM WBOTM systems provide a viable near-term battle command solution.

(1) Mounted Soldier: Gains the ability to send and receive streaming video from the TACTICOMP; satellite communications with the use of the Ku SATCOM WBOTM.

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(2) Dismounted Soldier: Gains VoIP, situational awareness, pre-formatted data reports, instant messaging (IM Chat), streaming video; extended over-the-horizon range of the TACTICOMP with the use of the vehicle mounted Ku SATCOM WBOTM.

D. Recommendation. Recommend equipping 1-23 IN with a sufficient number of TACTICOMP and Ku SATCOM systems for their future deployment.

Below is an initial equipping solution.

1-23 IN RECOMMENDED EQUIPPING					
	T1.5*	MMR(O)	MMR(D)	T6 w/vehicle Kit	Ku SATCOM
Bn Cdr	2	1	1	1	1
Bn S3	1	1	1	1	1
HQ Co Cdr	1	1	1	1	0
Recon Plt	12	4	4	4	1
3 Infantry COs					
Company Cdr	3 ea	1 ea	1 ea	1 ea	1 ea
Company XOs	1 ea	1 ea	1 ea	1 ea	0
PLTs	12 ea	1 ea	1 ea	4 ea	0
TOTAL	64	15	15	24	6

* Includes combat controller and helmet mounted display.

NOTE: This recommendation is based solely on initial discussions with the 1-23 leadership and representatives from PM ASPO.

2. OBSERVATION OVERVIEW

A. Introduction.

(1) Purpose. Provide observation results that will assist TRADOC leadership in determining future TACTICOMP and Ku SATCOM systems procurement.

(2) Background. Under DA Authorization, TRADOC and REF purchased TACTICOMP and Ku SATCOM systems for the 1-23 IN, 3/2 SBCT for use during a NTC mission readiness exercise and future deployment. TRADOC Spiral Development Division tasked USAIC Infantry Futures and the SBL to observe the unit and their employment of these systems. The observation team was a compilation of personnel from the SBL Futures Branch, TSM-SB C4ISR, and DCD Battle Command Division.

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(3) Systems Description.

(a) TACTICOMP is a battle command system designed to provide a Soldier with VoIP, situational awareness, data reports, instant messaging, and streaming video capability down to squad level. The T6 is vehicle-mounted and the T1.5 is hand-held. The T1.5 includes a Tactisight Head-Mounted Display (HMD) and a Combat Controller. This ad hoc self-healing mesh network allows the TACTICOMPs to route between each other extending the range capability.

TACTICOMP Components

 <p>Tacticomp™ 6</p> <ul style="list-style-type: none">• 1.8 GHz Intel Pentium M Processor• Runs Windows 2K, XP, Linux or Solaris• Up to 1 Gbyte SDRAM• 8.4" SVGA (800x600) 32-bit Color TFT LCD• Removable 80 GB Ruggedized Hard Drive• Situational Awareness Software• OpenGL 3-D Graphics Accelerator• LPI, Spread Spectrum, Self-forming, Self-healing Mesh Network Transceiver	 <p>Tacticomp™ 1.5</p> <ul style="list-style-type: none">• 400 MHz Intel XScale Processor• Runs Windows CE or Linux• 32-bit Color TFT-QVGA LCD• 96 MB Flash ROM• 128 MB SDRAM• 3.5" QVGA Color TFT LCD• Situational Awareness Software• LPI, Spread Spectrum, Self-forming, Self-healing Mesh Network Transceiver.
 <p>VAP/Backbone</p> <ul style="list-style-type: none">• Bridges the Mesh Network to Wi-Max Backbone as well as all Tactical Radios• High Speed Video Digital Signal Processor (DSP)• Accepts NTSC Video Input from UAVs/Cameras• Vehicle Power or Li-Ion Rechargeable Batteries• 8db High Gain, Omni-directional Antenna• Ad Hoc, Self-healing, Self-forming Mesh Transceiver• Dual PC Card Slots• Ethernet, RS-232 and USB Ports	 <p>Tactisight™</p> <ul style="list-style-type: none">• HDR CMOS Camera for Bright/Dark• LCD VGA Display shows: Arial Photos, Topo Maps, Direction and Waypoints.• Shows distance and Geo-location of all Squad Members from user• Runs for 12-24 hrs. off of Tacticomp™• Color Display- adjusts for Day/Night VGA or SVGA• Shares the Standard NVG Mount- lets both be used at the same time• Fully adjustable, flips out of the way• Low "Glow" Soft Eyecup for security• Mounts: Standard, MICH and Pro-Tec• Connects to Tacticomp™ Computers <p>Tactisight™ HMD</p>
 <p>Intel Access Point™</p> <ul style="list-style-type: none">• Bridges the Mesh Network to Wi-Max Backbone as well as all Tactical Radios• High Speed Video Digital Signal Processor (DSP)• Accepts NTSC Video Input from UAVs/cameras• Up to 24 hours using external Dual 5590 Batteries• 8db High Gain, Omni-directional Antenna• Ad Hoc, Self-healing, Self-forming Mesh Transceiver• Software Auto-routes Mesh from one IAP to another• Built-in operational condition Indicators	 <p>Combat Controller™</p> <ul style="list-style-type: none">• 4-Function Buttons and 4-way, like all Tacticomp™ computers• Buttons/joystick for cursor control and selection• 2- PTT, "Push to Talk" Communication Buttons• Lets user select and send HMD CMOS Color video• Connection and power: Computer/HMD USB Ports• Recessed buttons prevents accidental activation• Warfighter Down button on back all-calls "friendlies" <p>Shown with T1.5 and Tactisight™ HMD</p>

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(b) Ku SATCOM WBOTM is a vehicle mounted, satellite communications, wideband on the move system that enhances the TACTICOMPs capabilities to provide greater operational range. It also allows direct worldwide communication via a satellite phone.

Ku SATCOM Components



PHONE



ROUTER



VEHICLE MOUNTED EXTERIOR ANTENNA

(4) Systems Distribution.

(a) T6 systems with omni-directional antennas were installed in six Stryker vehicles, to include battalion commander, company commander, and four platoon vehicles in 1-23 IN.

(b) The vendor distributed 20 hand-held T1.5 systems, to include seven Tactisights and one Handycam, to A/1-23 IN; each squad in 2nd Platoon received two to three T1.5s. (A Co. did not issue the Tactisights and Combat Controllers during the observation period).

(c) The vendor installed Ku SATCOM WBOTM systems on two Strykers (Battalion and Company Commander).

B. Observation Objectives. The TRADOC objectives for the observation team were:

- Objective 1: Observe unit (1-23 IN) and report observations of TACTICOMP system to TRADOC ARCIC (for use in TRADOC “way ahead” decision to issue system at PLT or increase to CO level).
- Objective 2: Observe and report observations on the Ku SATCOM WBOTM system installed in A Co CDR and 1-23 IN Bn CDR Stryker vehicles.
- Objective 3: Observe and assist 1-23 IN with TTP development prior to overseas deployment.

C. Observation Methodology.

(1) Methods. The observation occurred during a tactical maneuver exercise, in changing environments and terrain, under various missions, and with no control of variables. With limited time and a general directive to minimize disruption to the unit, the team maximized time by focusing the data collection effort to the following three methods.

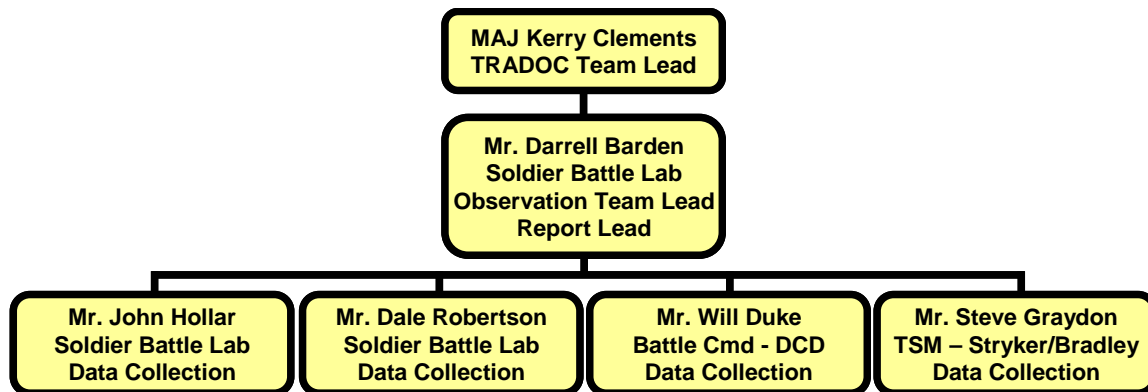
a. Interviews. Users were provided with a list of focus areas in order to familiarize them with the issues to be addressed during subsequent interviews conducted during the consolidation/reorganization period following each tactical mission. The number of interviews conducted, although successful, was limited due to the operational tempo of tactical scenarios.

b. Surveys. Two separate surveys were issued to the unit operators on Mission Day Three. One addressed system design, functionality, and utility, the other focused on TTPs. Due to the unit focusing on tactical responsibilities, the data gathered from surveys was limited.

c. Observations. Team members were co-located with the Stryker Battalion Commander, one of the Stryker Company Commanders (A Co), and one Stryker Platoon (2nd Plt).

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(2) Personnel / Organization. The observation team consisted of representatives from the Soldier Battle Lab, Battle Command Division, Directorate of Combat Developments (DCD), and TRADOC Systems Manager – Stryker / Bradley (TSM-SB). The Soldier Battle Lab served as the Team Lead and Report Lead. The observation team was organized as indicated in the figure below.



(3) Constraints and Limitations.

a. User Training. Home-station classroom TACTICOMP user training occurred just prior to deploying to NTC. No Ku SATCOM training occurred prior to deployment due to unit schedule and deployment requirements/priorities. As a result, the unit training proficiency level was not sufficient enough to reliably quantify technology performance and suitability.

b. Equipment Issue. Final installation of the vehicle mounted components and issue of the hand-held devices by the vendors was completed the evening prior to deploying into the maneuver area of NTC. The unit did not issue the T1.5 Combat Controllers and Tactisights to the users during the observation period.

c. Unit Focus. Due to training shortfall and lack of equipment availability, the unit was unable to attain a satisfactory proficiency level with the new equipment. Due to the equipment delivery the night prior to entering the maneuver area, the unit's focus was on the mission and not on how to best integrate and utilize technologies.

d. Vehicle Availability. Due to component part failure, two key Stryker vehicles were non-mission capable during the initial days of the tactical event, resulting in the non-availability of the mounted TACTICOMP and Ku SATCOM systems.

- A66 hindered by vehicle power inverter electrical issues.
- HQ66 non-mission capable for 2 days with inoperable fuel pump.

3. OBSERVATIONS

A. Introduction. The findings are listed according to areas perceived as problems and associated recommended improvements, favorable system capabilities, and conclusions / recommendations.

Note: As a result of the constraints and limitations listed in para. 2.C.3, the observation team was unable to achieve success in meeting TRADOCs Objective 3: Observe and assist 1-23 IN with TTP development prior to overseas deployment.

B. Positive Observation. The Leaders and Soldiers provided positive feedback regarding the following capabilities:

TACTICOMP

- provides extended range capability via a self-healing ad hoc network.
- provides visual indication of direction and distance (valuable when calling for indirect fires and also reporting target/IED locations).
- provides the ability to send chat messages between elements
 - alleviates radio net clutter.
 - with IP designation, can tailor messages to individuals.
- provides pre-formatted reports (useful for quickly sending situational updates, requesting resupply, etc..).
- provides the ability to track and locate movement of vehicles and dismounted Soldiers (GPS).
- provides streaming video capability (although not used during the observation period, the unit did realize the potential value).
- provides user friendly Microsoft Windows operating system.

Ku SATCOM WBOTM

- provides the capability to link TACTICOMP mesh networks that extend over-the-horizon.
- provides Satellite phone communications.

C. Observed Shortcomings / Recommended Improvement. The perceived problem areas are compiled (not prioritized) from interviews and surveys. With each identified problem there are Soldier/observer recommended improvements which could resolve the shortcoming.

(1) Training. The vendor conducted 2-3 days of formal classroom TACTICOMP instruction at Ft. Lewis, WA, with a limited number of available personnel. Following the training, the vendor shipped the equipment to the NTC,

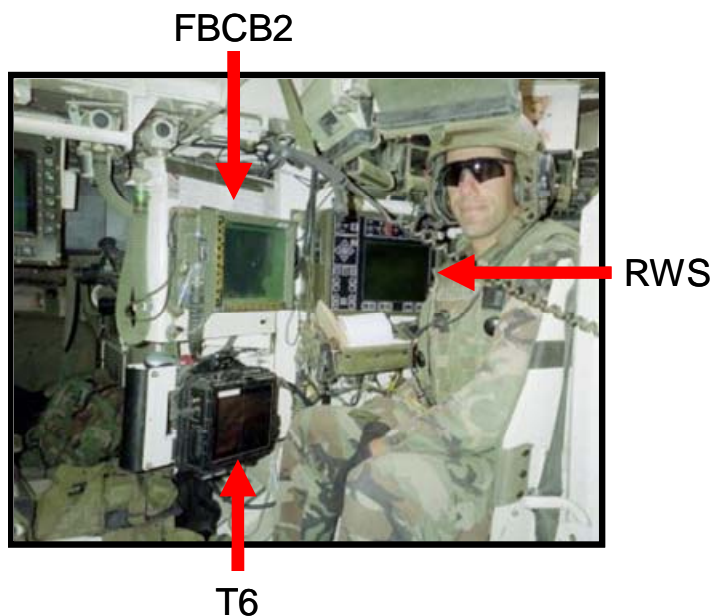
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not allowing the unit to continue with hands-on familiarization. No Ku SATCOM training occurred prior to deployment due to unit schedule and deployment requirements/priorities. As a result, the unit training proficiency level was not sufficient enough to reliably quantify technology performance and suitability.

Recommended Improvement: Ensure systems are available to the unit for use during home station training prior to overseas deployment. A/1-23 IN has a training and LFX in April before vehicle shipment.

(2) Vehicle Configuration. The T6 system's current location and mounting configuration created concern among the users. Chief among these concerns was that the system screen was not easily viewable due to location and mounting bracket design.

Recommended Improvement: The T6 should be mounted side-by-side with FBCB2 for easier information management. The mounting bracket should allow for angular adjustment to improve viewing from various angles.



(3) Carry Configuration. Soldiers were not pleased with the T1.5 carry case provided by the vendor.

Recommended Improvement: T1.5 users expressed a preference for a carry case similar to the Improved First Aid Kit (IFAK) with minor modifications to allow for chest mounted viewing of the display screen.



T1.5
Carry Case



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(4) Tactisight Head-Mounted Display (HMD). Current design is awkward and not preferred. Interviewed Soldiers did not want to use the HMD as presently designed. They do not want to wear a helmet mounted system.

Recommended Improvement: Recommend HMD and camera combination that can be easily carried and accessed on LBE / Kevlar vest.



Tactisight

(5) Audible Tone Indicator (Alerts). The TACTICOMP system does not alert the operator to incoming messages or reports.

Recommended Improvement: Soldiers expressed the need for audible/vibratory tones to announce incoming messages and reports.

(6) Compatability. TACTICOMP system with Meshnet is not currently interoperable with fielded systems (FBCB2 and SINCGARS). PM Army Space Program Office is in the process of making TACTICOMP interoperable with FBCB2.

Recommended Improvement: FBCB2 interoperability solutions implemented prior to deployment.

(7) Antenna. The antenna base reliability is questionable due to design and placement. Current location and configuration may cause antenna to break off.

Observation Improvement: T1.5 antenna base may need modification to increase durability.

Antenna
Base



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D. Conclusions. Together the TACTICOMP and Ku SATCOM WBOTM systems provide a viable near-term battle command solution.

(1) Mounted Soldier: Gains the ability to send and receive streaming video from the TACTICOMP; satellite communications with the use of the Ku SATCOM WBOTM.

(2) Dismounted Soldier: VoIP, situational awareness, pre-formatted data reports, instant messaging (IM Chat), streaming video; extended over-the-horizon range of the TACTICOMP with the use of the vehicle mounted Ku SATCOM WBOTM.

The chart below depicts the current and potential communication capabilities gained with TACTICOMP and Ku SATCOM WBOTM systems within a Stryker Battalion.

Current Capability				Added Capability	
	FBCB2 w/ EPLRS	MBITR	ICOM 33	TACTICOMP 6	TACTICOMP 1.5
Voice	No	Yes	Yes	Yes	Yes
Data	Yes	No	No	Yes	Yes
Video	No	No	No	Yes	Yes
IM Chat	Yes	No	No	Yes	Yes
Situational Awareness	Yes	No	No	Yes	Yes
Pre Formatted Reports	Yes	No	No	Yes	Yes
Ku SATCOM Link	No	No	No	Yes	Yes
Equipped	BN - Sqd	BN - Sqd Ldr	PLT - Sqd	BN - Sqd	BN - Tm Ldr
Mounted / Dismounted	Mounted	Dismounted	Dismounted	Mounted	Dismounted

* Projected added capability is subjective based on potential capability estimates; all capabilities were not observed at NTC

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E. Recommendation.

(1) Recommend equipping 1-23 IN with a sufficient number of TACTICOMP and Ku SATCOM systems for their future deployment.

Below is an initial equipping solution.

1-23 IN RECOMMENDED EQUIPPING					
	T1.5*	MMR(O)	MMR(D)	T6 w/vehicle Kit	Ku SATCOM
Bn Cdr	2	1	1	1	1
Bn S3	1	1	1	1	1
HQ Co Cdr	1	1	1	1	0
Recon Plt	12	4	4	4	1
3 Infantry COs					
Company Cdr	3 ea	1 ea	1 ea	1 ea	1 ea
Company XOs	1 ea	1 ea	1 ea	1 ea	0
PLTs	12 ea	1 ea	1 ea	4 ea	0
TOTAL	64	15	15	24	6

* Includes combat controller and helmet mounted display.

NOTE: This recommendation is based solely on initial discussions with the 1-23 leadership and representatives from PM ASPO.

(2) Recommend an in-theater assessment of 1-23 IN after three to six months operational use of equipment.

(3) Recommend an in-theater assessment of 1-10 IN (IBCT).

NOTE: This limited observation did not produce quantifiable, operational, and environmental data elements. It was limited in scope and duration and is not intended to replace or supplement an operational test. Recommendation for equipping the unit is predicated solely upon leader survey data and insights anticipating utility in an operational environment.