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The Dismounted Battlespace Battle Lab (DBBL), Ft. Benning, Georgia, had the lead responsibility for planning and executing the Enhanced Fiber Optic Guided Missile (EFOGM) Battle Lab Warfighting Experiment (BLWE). The EFOGM BLWE consisted of a Virtual Prototype Evaluation (VPE) and Operational Concept Validation (OCV) of the EFOGM simulation system. The primary objective of the BLWE was to confirm that the EFOGM system Phase I simulators (current baseline system design) replicated the EFOGM system capabilities listed in the EFOGM ATD Phase I Exit Criteria. As a secondary objective, the BLWE was to validate the EFOGM company employment concept as a baseline for Rapid Force Projection Initiative (RFPI) Advanced Concept Technology Demonstration (ACTD) Tactics, Techniques, and Procedures (TTPs).

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FINAL REPORT

For

Enhanced Fiber-Optic Guided Missile (EFOGM) System

Battlelab Warfighting Experiment Support

FOR: NAWCTSD/STRICOM
12350 Research Parkway
Orlando, FL 32826-3224
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1.0 Introduction

The Dismounted Battlespace Battle Lab (DBBL), Ft. Benning, Georgia, had the lead responsibility for planning and executing the Enhanced Fiber Optic Guided Missile (EFOGM) Battle Lab Warfighting Experiment (BLWE). The EFOGM BLWE consisted of a Virtual Prototype Evaluation (VPE) and Operational Concept Validation (OCV) of the EFOGM simulation system. The primary objective of the BLWE was to confirm that the EFOGM system Phase I simulators (current baseline system design) replicated the EFOGM system capabilities listed in the EFOGM ATD Phase I Exit Criteria. As a secondary objective, the BLWE was to validate the EFOGM company employment concept as a baseline for Rapid Force Projection Initiative (RFPI) Advanced Concept Technology Demonstration (ACTD) Tactics, Techniques, and Procedures (TTPs).

The EFOGM simulation system is managed by the Non Line Of Sight (NLOS) Project Management Office (PMO) and is being developed by the EFOGM prime contractor (Raytheon Company). The EFOGM Advanced Technology Demonstration (ATD) supports the overall Army Modernization Plan, providing a residual combat capability to a user unit in the RFPI Advanced Concept Technology Demonstration (ACTD). The BLWE provided the User with an early opportunity to experiment, in a simulation environment, with EFOGM system precision standoff capability against high priority ground and airborne helicopter targets under day, night, and adverse weather conditions out to the maximum range of the EFOGM system.

2.0 Participating Agencies

The BLWE was a coordinated effort between DBBL and the NLOS PMO. In addition, the following additional agencies/organizations were involved: the Land Warrior Test Bed (LWTB), Training and Doctrine Command (TRADOC) System Manager - Anti-Tank (TSM-AT), Early Entry Lethality and Survivability (EELS) Battle Lab, the RFPI Technical Program Management Office (TPMO), United States Army Missile Command (MICOM) Battlefield Environment Weapon System Simulation (BEWSS) Test Bed (BTB), Army Materiel Systems Analysis Agency (AMSAA), Operational Test and Evaluation Command (OPTEC), the Test and Evaluation Command (TECOM), Redstone Technical Test Center (RTTC), Simulation Training and Instrumentation Command (STRICOM), TRADOC Analysis Center- White Sands Missile Range (TRAC-WSMR), and the United States Army Infantry School (USAIS) Foreign Analysis Directorate. As a joint effort, sponsorship, technical tasks, funding, and management responsibilities were distributed among the participating organizations. The following is a description of the roles and responsibilities of the agencies/organizations involved with the conduct of the EFOGM BLWE:

a. The DBBL was responsible for BLWE conduct, coordinating support from other participating agencies and developing BLWE scenarios. The Battle Command Division Chief was responsible for EFOGM system concept integration into the RFPI Hunter/Stand-Off Killer (HSOK) concept. The DBBL coordinated with the USAIS for assignment of personnel to participate in the BLWE. The DBBL was responsible for providing general prerequisite equipment training to soldiers participating in the BLWE, prior to their participation in EFOGM system specific training exercises. The DBBL

was also responsible for developing TTPs for the BLWE, and training the participating soldiers using those TTPs.

b. The LWTB was responsible for providing space for one EFOGM Stationary Simulator (SS) and one EFOGM Mobile Simulator (MS), providing integration support for the simulation systems utilizing LWTB Distributed Interactive Simulation (DIS) network, and supporting the execution of EFOGM BLWE.

c. The NLOS PMO executed material developer responsibilities, including managing the Raytheon effort. The NLOS PMO was responsible for the delivery of EFOGM simulation hardware and software, and for conducting associated training. The EFOGM hardware and software included two DIS-capable SSs and one MS. One of the SSs was provided to the BTB during the conduct of the EFOGM BLWE while, the other SS and one MS was provided to the LWTB. The MS was used to conduct Captive Flight Test operations during the VPE phase of the BLWE. Technical support prior to and during the BLWE, as well as support for Manpower and Personnel Integration (MANPRINT)/safety evaluations was provided by the NLOS PMO. EFOGM system specific training of gunners and platoon leaders to support the BLWE was provided by the NLOS PMO and Raytheon. The NLOS PMO ensured the technical compatibility of the EFOGM system simulators with DIS protocols and the RFPI Command and Control (C2) Testbed (RC2T) message set.

d. TSM-AT was responsible for providing Combat Developer representation for the BLWE.

e. EELS Battle Lab was a second Battle Lab sponsor of the BLWE. An EELS representative continued to serve on the BLWE Integrated Product and Process Team (IPPT).

f. The RFPI TPMO was responsible for the delivery of three RC2T simulators to the LWTB. The RFPI TPMO was also responsible for supplying an intelligent minefield (IMF) emulator for the experiment. The RFPI TPMO Simulations Manager, in support of the NLOS PMO, ensured technical integration of the simulators consistent with the requirements of the RFPI ACTD.

g. The MICOM BTB was responsible for providing space and power for one EFOGM system SS, providing the terrain database, integrating the simulator into the DIS environment, and executing the MICOM portion of the DIS experiment.

h. AMSAA provided certified performance data. AMSAA conducted an evaluation of the SS prior to the experiment, assisted in BLWE planning, and conducted a technical assessment of the VPE phase. AMSAA participated in the development of the VPE scenarios and assisted in the preparation of the experiment report. AMSAA will review and comment on the experiment report.

i. OPTEC, through the use of the Ft. Benning Test and Evaluation Coordination Office (TECO), assisted in planning the BLWE and evaluated the OCV phase. OPTEC conducted an independent operational assessment of the BLWE. TECO was responsible for coordination of OCV phase data collections and reductions. OPTEC/TECO responsibilities were as follows:

(1) Acting as an independent third party to advise DBBL in all matters involving the BLWE.

(2) Providing input to the DBBL concerning manpower, material, and funding support for the VPE and OCV test plan. Input was based upon test plan objectives, issues, criteria, and measures of performance/measures of effectiveness (MOP/MOE).

(3) Assisting in the collection and reduction of test data for the OCV phase of the test.

(4) Providing subjective judgments, in consonance with DBBL, concerning indications and trends produced by the reduced data.

(5) Assisting DBBL in evaluating what information should be included in the OCV portion of the test report.

j. TECOM, through the use of the RTTC, assisted in planning the BLWE and was responsible for data collection and reduction for the VPE phase. TECOM participated in the development of the VPE scenarios and assisted in the preparation of the experiment report. TECOM will review and comment on the experiment report once completed. RTTC, a TECOM organization, was responsible for identifying, scheduling, and coordinating ranges, targets, and range support for missile surrogate flights.

k. STRICOM supported the BLWE DIS simulation effort utilizing the Advanced Distributed Simulation Technology (ADST) II contract to provide LWTB field engineering support.

l. TRAC-WSMR, as an RFPI support function, advised the IPPT on scenario and simulation issues impacting the collection of valid data.

m. USAIS Foreign Analysis Directorate advised DBBL on the threat portrayal in BLWE scenarios.

3.0 Experiment Overview

The EFOGM BLWE was jointly conducted between DBBL at Fort Benning and the NLOS PMO at Redstone Arsenal. The EFOGM BLWE utilized scenarios and vehicle network loading information which were derived from the Anti-Armor Advanced Technology Demonstration (A2ATD) Experiment 6. Modifications were made to the A2ATD experiment 6 version of ModSAF to enhance the EFOGM functionality.

The EFOGM BLWE consisted of two executed phases: a VPE phase and an OCV phase. The VPE phase was conducted from 3-7 June, 1996 and the OCV phase from 10-14 June, 1996. The primary objective of the VPE phase was to confirm that the Phase I simulators replicated the

EFOGM system capabilities listed in the EFOGM ATD Phase I Exit Criteria. The primary objective of the OCV phase was to validate the EFOGM company employment concept.

The VPE phase consisted of three major activities: CFT operations, missile reload operations, and simulated test exercises. CFT operations were performed at Redstone Arsenal (RSA) using a manned aircraft to carry a surrogate missile, and an EFOGM Mobile Simulator which controlled the surrogate missile via a radio frequency data link. Missile reload operations were conducted at Fort Benning using the EFOGM MS. Simulated test exercises were conducted at the LWTB using the EFOGM SS to conduct platoon-level exercises.

The OCV phase consisted of company level exercises and was jointly performed between the LWTB and the BTB at RSA via Long Haul Network connections. EFOGM SSs initially supported the BLWE at both locations. However, complications with these simulators lead to the decision to represent the two EFOGM platoons using ModSAF. Red forces were provided by the BTB. Blue forces and Brigade Command & Control were provided by the LWTB.

3.1 Equipment

The following equipment was used to support the EFOGM BLWE.

a.) Manned Simulators:

Two EFOGM SSs consisting of a High Mobility Multi-purpose Wheeled Vehicle (HMMWV) cab and driver compartment mock-up with Commander and Driver sections and eight simulated missiles were used to support the EFOGM BLWE. One EFOGM MS consisting of a HMMWV and eight missile simulators was used to support the EFOGM BLWE.

The systems were operated by two-man crews, which permit operation of controlled mission planning tools for the crews to generate, store and forward multiple missile routes for target areas. The following features existed within the Stationary and Mobile Simulators:

1) EFOGM Imaging Infrared (IIR) seeker

2) Video Local Area Network (VLAN)

3) Fiber Optic Data/Guidance link missile system

4) Vehicle Mobility and Out-The-Window viewing

b.) ModSAF. Modular Semi-automated Forces (ModSAF) workstations were used to create and control battlefield entities. ModSAF version 2.0 enhanced software was used for the EFOGM BLWE.

c.) Data Logger. The DIS Datalogger and the Data Collection and Analysis Tool (DCAT) which consist of Xlogger and NetVisualizer were used for network logging of the exercises.

d.) DIS Radios. Thirteen DIS Radios were utilized during the BLWE for Command & Control, and Administrative purposes.

e.) Data Analysis. Data Analysis activities were provided via an external mobile van parked next to the LWTB. Data from each exercise was transported via disk to the van for analysis purposes.

f.) DIS Manager (DISMAN). The DISMAN utility was operated by the Battlemaster at the LWTB and provided Start/Resume and Stop/Freeze network packets for control of the BLWE runs.

g.) IMF. The IMF Emulator provided Wide-Area Munitions (WAMs), to include minefield emplacement and control. The IMF Emulator was used during the OCV phase of the experiment. The IMF was not represented in ModSAF. The major functions of the IMF emulator were to:

- Emplace minefield(s)
- Monitor minefield(s)
- Emulate mine activity
- Control mine function
- Communicate w/C2 system

The IMF Emulator was hosted on an Silicon Graphics Incorporated (SGI) Indigo2 Extreme and provided the situation map display and menu driven human interface control features of an IMF Controller. The IMF WAMs, Gateway, and Advanced Acoustic Arrays (AAAs) were represented by the emulator which handles the DIS entity representations and reception. The emulator modeled AAA and WAM target detection and provided the cues to the IMF Controller operator on the map display.

h.) Stealth. The VRLink DIS Stealth was utilized for viewing a three dimensional representation of the overall battle.

i) Plan View Display (PVD). The PVD was used to provide a map-based 2D "God's eye view" of the overall battle. The PVD provided numerous map tools, terrain definition options, intervisibility checks, and overlay functions.

j.) RC2T. The RC2T, in its current instantiation, was designed as a Hunter/Standoff Killer C2 element for JRTC 96-02. For the BLWE, the RC2T was required to simulate interfaces from several Battlefield Operational Systems (BOS) (Applique, Forward Area Air Defense (FAAD), and Advanced Field Artillery Tactical Data System (AFATDS)) as well as act as the EFOGM Company Commander element. As a result, there was low to moderate technical risk in configuring the RC2T to perform the minimum required functionality of these various workstations.

k.) DATT. The DIS Air Target Tracker was a late addition to the BLWE and was used to provide air early warning to the RC2T EFOGM Company Commander element.

3.2 Personnel

The LWTB served as the experiment control center for this experiment. The VPE phase was operated solely from the LWTB on a Local Area Network (LAN). During the OCV phase, MICOM BTB provided Red Forces and backup Data Logging via a Wide Area Network (WAN) using the DSI (Defense Simulation Internet) gateway to the LWTB.

The following is a listing of some of the personnel who supported the EFOGM BLWE:

LWTB Site

Personnel	Quantity	Responsibility
Experiment Director	1	DBBL
Data Manager	1	BTB
Battlemaster	1	LWTB
DISMAN Operator	1 (Battlemaster Function)	LWTB
ModSAF Operator	2	LWTB
ModSAF Operator	2	BTB
Stealth Operator	1	LWTB
Gateway Operator	1	LWTB
RC2T Operator	3	RFPI
IMF Operator	1	RFPI
DDAT Operator	1	RFPI
EFOGM Station Simulator	6	NLOS
EFOGM Mobile Simulator	2	NLOS

BTB Site

Personnel	Quantity	Responsibility
Battlemaster	1	BTB
ModSAF Operator	2	BTB
Gateway Operator	1	BTB
Stealth Operator	1	BTB
EFOGM Station Simulator	6	NLOS
EFOGM Mobile Simulator	2	NLOS

Soldier Requirements

	Soldiers	GRADE	Responsibility
Command	1	03-05	Red Force Cdr.
SS at Ft. Benning	4	E5-E6	Gunners
	1	E3-E4	Driver
	1	02	Platoon Leader
SS at RSA	4	E5-E6	Gunners
	1	E4	Driver
	1	02	Platoon Leader
MS	1	E5-E6	Gunner
	1	E3-E4	Driver

Additional personnel who supported the EFOGM BLWE included Field Engineers, Manual Data Collectors, and Software Engineers.

The following is a functional description of the personnel involved in supporting the BLWE:

a.) Experiment Director (ED): The ED was responsible for the overall conduct of the BLWE. He ensured that the experiment was conducted in such a manner that the data collected would be satisfactory. The ED was responsible for coordination of all Government facilities, equipment, and personnel. The ED was the Chairperson for the Data Validation Group (DVG). The DVG made the determination as to whether or not a trial was valid. The DVG also determined what data should be reduced and utilize for analysis purposes. Criteria which needed to be established to provide guidance for the DVG, along with experiment rules, were developed during pre-experiment and experiment activities. The ED was located at the LWTB. The ED used Operations Orders and radios. He was provided information from the ModSAF terminals, the administration network, and the stealth system. The ED distributed to the other experiment personnel the specific scenario that was to be conducted on a trial-by-trial basis. The ED was responsible for ensuring that all of the equipment was functioning prior to each "start trial". A "Start Trial" check list was developed to reflect all the simulators/simulations and support equipment that needed to be operational and to the extent that it had to be functional to begin a trial. During the conduct of the experiment, the ED was located in the Experiment Control Area at the Stealth Vehicle at the LWTB, which was used to monitor the progress of the trial. The ED was available to both the RED and BLUE commanders to resolve any questions on "valid" options /tactics that would be allowed. (Typically during the conduct of the experiment, certain "experiment rules" were established to ensure consistency of performance of the ModSAF systems. These rules were developed during the pre-experiment activities and only on an as-needed basis). The ED coordinated with the LWTB Battlemaster to ensure that proper tactical behavior was elicited from the tactical participants. Also during the conduct of the experiment, the ED monitored the trial for anomalies that would need to be discussed at the DVG. (It was the responsibility of the ED to capture all the experiment and DVG rules for inclusion in the final report). When anomalies occurred, the ED was responsible for determining if the trial should continue or be terminated. Criteria was established that provided this guidance and was based on equipment malfunctions. These criteria were included as a "Stop Trial" checklist. The Start Trial, Experiment Rules, and Stop Trial check lists were developed during pre-experiment activities. The ED was assisted by assistant experiment directors at the MICOM facilities for the OCV. Their responsibilities were the same as the ED's responsibilities for validating the experiment.

b.) Battlemaster: The function of the Battlemasters during the BLWE was to perform coordination activities. These activities included: verifying that all simulators were properly initialized, ensuring that all network equipment were operational, ensuring that the correct scenarios were loaded, and ensuring personnel were ready to begin the exercise (See Battlemaster Checklist in Appendix B for additional details). The Lead Battlemaster was located at the LWTB. An Assistant Battlemaster was located at the BTB during the OCV phase.

c.) ModSAF Operators: The ModSAF Operators directed the Red and Blue forces and provided field artillery fires when called upon. Scenarios were developed prior to the test and reviewed by appropriate personnel to include the Test Director, ED, and Battlemaster.

d.) Data Logger Operators: The Data Logger operators were responsible for starting the actual logging computers and insuring that all of the PDU traffic was being captured during the

experiment runs. This individual was located at the Battlemaster suite for coordination with the ED and Battlemaster.

e.) Manual Data Collection Supervisor: The Manual Data Collection Supervisor provided assistance to the Battlemaster and was responsible for management of the trial data to the ED. The Manual Data Collection Supervisor also functioned as the assistant ED at the LWTB. The Manual Data Collection Supervisor collected, marked, inventoried, and stored all the discrete data information generated from each experiment trial. This included the Data Logger tapes and the ED's Log.

f.) Manual Data Collectors: Manual Data Collectors were located at each of the three individual Fire Units associated with the EFOGM SS, the HMMWV cab mock-up, the Tactical Operations Center (TOC), and the EFOGM MS. The Manual Data Collectors utilized laptop computers to record significant events observed during the conduct of the scenarios.

g.) Field Engineers: Field Engineers were utilized to correct any hardware problems, transfer data files between sites, load software on the Local Area Network (LAN) equipment, provide maintenance support, and to coordinate the use of the DSI WAN Gateway.

h.) Software Engineers: Software Engineers were utilized to correct software deficiencies. Software engineering support was provided for the EFOGM SS, ModSAF, and RC2T systems.

i.) Crew Members (see Appendix I for the roster of participating soldiers) were utilized to operate the EFOGM Stationary Simulator and Mobile Simulator.

3.3 VPE Phase

The following equipment was used during the VPE phase:

a.) One EFOGM SS.

b.) ModSAF Workstations. The number of entities generated by ModSAF required two ModSAF stations and two ModSAF simulators (one set for red forces, one set for blue forces). Each ModSAF station (and the accompanying ModSAF simulator linked to the ModSAF station) was operated by a ModSAF operator. The ModSAF platforms (SGI Indys) were configured with 96MB of Random Access Memory (RAM). All equipment was located in the LWTB, Building 2868B and connected together via a local network.

c.) Data Logger. The DIS Datalogger and the Data Collection and Analysis Tool (DCAT) which consist of Xlogger and NetVisualizer were used for network logging of the exercises.

d.) DIS Radios. Ten DIS Radios were utilized during the test for Command and Control and Administrative purposes.

e.) Data Analysis. Data Analysis was provided via a mobile van parked next to the LWTB. Data from each exercise was transported via disk to the van for analysis purposes.

f.) DISMAN. The DISMAN utility was operated by the Battlemaster at the LWTB and provided Start/Resume and Stop/Freeze network packets for control of the exercises.

g.) PVD. A Plan View Display (PVD) was included as part of the Stealth and at the Battlemaster station for a top level view of the exercises.

h.) Stealth. The VRLink DIS Stealth was utilized for viewing a 3 dimensional representation of the overall battle.

i.) RC2T. The RC2T simulated the interface for several BOS systems (Applique, FAAD, and AFATDS) and supported the EFOGM Company Commander element.

j.) DIS Air Target Tracker (DATT). The DATT was a late addition to the experiment and was used to provide air early warning to the RC2T EFOGM Company Commander element.

3.4 OCV Phase

The following equipment was used during the OCV phase:

a.) One EFOGM Stationary Simulator located at the LWTB. One EFOGM Stationary Simulator located at the BEWSS. One Mobile Simulator located at the LWTB.

b.) ModSAF workstations. The Red Forces were generated by one ModSAF workstation linked to a ModSAF simulator from the BTB. The blue forces were operated from the LWTB with some of the workstations operated in pocket mode. This mode allows small numbers of entities to be generated by the ModSAF Station without having a second workstation linked to it to function as a ModSAF Simulator. The blue ModSAF forces consisted of the following:

1.) EFOGM ModSAF (ModSAF Station and Simulator)

2.) ARTY ModSAF (ModSAF Station and Simulator)

3.) HELO (Pocket configuration) and R&S (Pocket configuration)

4.) Development ModSAF (ModSAF Station and Simulator)

One workstation was being used for developmental/bug fix work since the ModSAF software used for this effort was a modified version of an official release and was still considered to be developmental software. Due to problems during the OCV phase associated with data overload on the SS, this developmental workstation was converted to a second EFOGM ModSAF and a lower end system used for the developmental workstation.

c.) Data Logger. The DIS Datalogger and the Data Collection and Analysis Tool (DCAT) which consist of Xlogger and NetVisualizer were used for network logging of the exercises.

d.) DIS Radios. Thirteen DIS Radios were utilized during the test for Command and Control and Administrative purposes. An additional intercom line was provided by the LWTB using the ClearCom system for use in the Tactical Operations Center (TOC).

e.) Data Analysis. Data Analysis was provided via a mobile van parked next to the LWTB. Data from each exercise was transported via disk to the van for analysis purposes.

f.) DISMAN. The DIS Manager utility was operated by the Battlemaster at the LWTB and provided Start/Resume and Stop/Freeze network packets for control of the exercises.

g.) IMF. The Intelligent Minefield (IMF) Emulator was utilized and provided wide-area munitions (WAMs), to include minefield emplacement and control.

h.) Stealth. The VRLink DIS Stealth was utilized for viewing a 3 dimensional representation of the overall battle.

i.) PVD. A Plan View Display (PVD) was included as part of the Stealth and at the Battlemaster station for a top level view of the exercises.

j) RC2T. The RC2T simulated the interface from several BOS systems (Applique, FAAD, and AFATDS) as well as act as the EFOGM Company Commander element.

k.) DDAT. The DDAT was a late addition to the experiment and was used to provide air early warning to the RC2T EFOGM Company Commander element.

3.5 Software.

a.) Simulators: The EFOGM Simulators software was developed by the EFOGM prime contractor, the Raytheon Company. These simulators featured an IIR seeker, a Global Positioning System (GPS)/Inertial Measurement Unit (IMU), a Missile Electronics Unit (MEU), and Fire Unit (FU) simulation

b.) ModSAF. Modular Semi-Automated Forces (ModSAF) were operated under the Distributed Interactive Simulation (DIS) protocol. An enhanced version of the A2ATD experiment 6 ModSAF version 2.0 was used for the EFOGM BLWE.

c) PVD. A Plan View Display (PVD) was included as part of the Stealth along with an additional PVD at the Battlemaster station for a top level view of the exercises. The PVD used was a ModSAF station with the capability to display vehicles. The software was the same as all other ModSAF.

3.6 Databases

a.) The A2ATD experiment 6 High Resolution Scenario (HRS) 33.7 terrain database was used for the BLWE.

b.) The required MultiGen Flight Format Terrain and Models were supplied by the BTB for the LWTB Stealth.

c.) The SS and MS utilized MultiGen Flight format terrain and models.

d.) The ModSAF Workstations utilized S1000 Compact Terrain Data Base (CDTB) Format terrain and models.

e.) The RC2T systems utilized MultiGen Flight Format terrain and models.

3.7 Critical Events & Milestones.

a.) The EFOGM SS shell arrived at the LWTB on 2 April followed by a two day integration period. The computer for the simulator and FUs arrived 17 April.

b.) The LWTB Battlemaster attended an In Process Review (IPR) in Huntsville 2-3 May.

c.) DCAT, NetVisualizer Software and the Stealth Database/Models arrived at the LWTB on 9 May.

d.) Long Haul testing between the LWTB and the BTB was conducted 8-10 May, 1996. The test was used as a network stress test for the BLWE. With the exception of a full set of DIS Radios all systems were placed on the network during this test.

e.) The MS arrived at the LWTB on 11 May. Overnight parking for the MS throughout the test was provided by the LWTB.

f.) Power for the Recording Van which was parked outside the LWTB was installed on May 22 by the Fort Benning post engineers. The van arrived at 1500 on the 22 May and remained throughout the BLWE. The van departed 17 June.

g.) The RC2T, IMF and DDAT arrived 28 May at the LWTB.

h.) Conducted the first pilot test for the VPE portion 1 June with all computers and simulators on the network.

i.) VPE exercise conducted 3-7 June.

j.) Due to power outage on 9 June, runs were delayed by two hours.

k.) OCV exercise conducted 10-14 June.

l.) AVTB, Ft. Rucker Battlemaster arrived 13 June to support ModSAF efforts for the OCV.

m.) ADST II ModSAF engineer from Orlando arrived 13 June to support ModSAF development for the OCV.

n.) Lockheed Martin Delivery Order Manager for the test and STRICOM engineer were at the site during the week of the OCV phase.

o.) The inability of the SS to perform under heavy traffic loading led to a decision to run the OCV phase with ModSAF EFOGM only. An additional EFOGM ModSAF workstation was installed on 10 June for this purpose at the LWTB (additionally, one EFOGM workstation was also installed at the BTB).

p.) Corrections to the VLAN portion of the SS allowed for makeup runs of the VPE phase utilizing the VLAN. These were conducted on 14 June.

3.8 ModSAF Enhancements.

Enhancements were made to the EFOGM-ModSAF to correct some of the deficiencies noted during the A2ATD experiment 6. The following deficiencies were corrected for the EFOGM BLWE:

a.) Missile firing -- Previously, an EFOGM launcher would not fire a missile unless it found a target near its aim point. ModSAF enhancements were made to correct this problem.

b.) Missile sensors. The EFOGM sensors were not explicitly modeled. ModSAF enhancements were added to model the sensor characteristics (field of view, acquisition curves, etc)

c.) Operator feedback. The ModSAF operator was not shown any targets acquired by the missile. ModSAF enhancements were added to display all targets acquired by missiles in flight. This allowed the ModSAF operator to feed intelligence back to his chain of command, or to directly engage targets with subsequent missiles.

d.) Missile aim point. Missiles fired at the same coordinates fly exactly to those coordinates. This tended to produce an unrealistic number of overkills. The following ModSAF enhancements were added to correct this problem:

1. Moving targets were given priority over stationary targets, so that if a target has been mobility-killed, it will be less likely to be re-engaged.

2. Enhancements were added so that each launcher could "remember" targets that has been attacked, and thus select new targets over targets that have been previously attacked.

e.) Hitting moving targets. In Experiment 6, NLOS/EFOGM appeared to have trouble hitting moving targets. The enhancements indicated under item d) above corrected some of these problems.

f.) Target selection. No logic was incorporated for missiles to prioritize targets. ModSAF enhancements were made incorporating a prioritization scheme.

3.9 Experiment Scenarios/Stop/End Criteria

The following Stop/End Criteria were used during the test for both the VPE/OCV Phases

A. Stop Criteria

1. ModSAF (Red or Blue) Crashed
2. DATT or IMF Crashed
3. RC2T Crashed
4. Stationary Simulator IR Scene crashed

B. End Criteria

1. Less than 12 vehicles (all red) engaged or damaged
2. Greater than or equal to 12 vehicles 60% destroyed or damaged
3. Red penetrated O6 N-S Grid
4. All EFOGMs ran out of ammo

3.10 Scenarios

There were a total of 131 individual scenarios generated to support the BLWE. The listing of these scenarios is located in Appendix H.

3.11 Added Capabilities

Capabilities which were added to the LWTB and simulation as a result of this BLWE included: EFOGM ModSAF enhancements, a MultiGen Flight format Stealth, and an external power supply. It is anticipated that the EFOGM Stationary Simulator will be delivered to the LWTB in the near future.

4.0 Long Haul Network (LHN) Testing

Long Haul Network Testing was conducted 9-10 May. The object of this LHN exercise was to test the connectivity between the LWTB (Ft. Benning, GA) and BTB (Redstone Arsenal, AL), as well as the personnel and systems. The following problems were experienced which caused a delay in the LHN testing:

a.) A one hour delay was experienced due to power loss associated with the upgrade of the Uninterruptable Power Supply (UPS) system.

b.) A new ModSAF version had to be loaded on each of the eight ModSAF workstations prior to the start of the exercise. This was unanticipated at the LWTB. The installation was not completed until 12:30 a.m. the next day.

c.) Some contributing factors to b.) above was the lack of a portable 4mm SGI tape drive (a loaner 4mm SGI tape drive was delivered the next day to the LWTB from the Operational Support Facility (OSF)), the requirement to rebuild the operating systems on the eight ModSAF systems, and the need to remove extraneous files from the tape brought from BTB. The extraneous files had to be removed because, the collective set of files provided by PM NLOS exceeded the disk space available on the ModSAF workstations.

d.) The required license for running the NetVisualizer software was not initially available. In the future, it is recommended that all required software licenses be identified during the planning stages so that these license can be procured in time to support exercises.

e.) Delays were experienced for the loading of the VR-Link software because the targeted assets were being used to support a separate effort. The VR-Link software was successfully loaded & tested on 10 May 96.

f.) Documentation for the software being provided by the BTB was initially unavailable.

The following are LHN test observations:

a.) The network radio traffic was not sufficiently tested -- The LWTB had 3 of the VR-100/400 systems and only two frequencies in operation. The LWTB later received an additional 7 VR-100/400 radios, and all ten were subsequently used during the conduct of the experiment. It is recommended that an agreement on radio frequencies to be used for experiments be identified during the planning stages to ensure adequate dissemination. Note: It was discovered that the VR-100 destination address must be the following: "255.255.255.255". The source addresses on the VR-100 must be of the form: "164.217.site#.host#".

b.) The EFOGM MS and SSs did not participate.

c.) The RC2T systems were operated from the BTB.

d.) Both Disloggers and an Xlogger were used during the LHN tests at the LWTB. Two complete runs were made on 9 May 96. The LWTB executed the blue scenarios and the BTB executed the red. Only on the second run did LWTB run EFOGM ModSAF. The primary problems experienced during the LHN testing were associated with the RC2T systems (see lessons 1,5,6,7,9 below). All problems were corrected or identified for correction to the satisfaction of both Battlemasters and the designated Test Director such that additional runs on 10 May were deemed unnecessary.

e.) It is recommended that all required adjustments to hardware and software are identified during the planning stages so that these adjustments can be made prior to the start of LHN testing (i.e.- DIS Port numbers, exercise Identification number, etc).

f.) It is recommended that the Battlemaster and Test Director perform preliminary analyses to allow them to better anticipate/resolve potential problems/conflicts.

5.0 Data Collection

Data Collection was provided by several different means. The LWTB Sun Datalogger was used to record all network traffic (simulation and voice). The associated filenames are contained in Appendix F. The Data Collection and Analysis Tool (DCAT) from RSA along with NetVisualizer (a network load graphic application) were also used. Manual data collection was also performed at each of the EFOGM SS Fire Unit stations, the HMMWV cab mock-up station, and the TOC. Manual Data Collection was also performed for the load/reload operations of the Mobile Simulator. Appendix E contains a sample Interview Form that was used for manual data collection. All data analysis was provided by Army Research Lab's (ARL) Human Research & Engineering Directorate MICOM Field Element via the recording van. Prior to each test run a Battlemaster checklist was used to confirm the readiness of all participants.

6.0 Lessons Learned

a.) Communications Point Of Contact (POC): There was no single POC assigned responsibility for establishing and supervising the communications network for both tactical and administrative radio networks. To improve the efficiency of operations a single POC should be selected to provide this function. This person would be responsible for providing input to the test design plan during the planning stages, maintaining administrative/tactical networks, and resetting frequencies on the VR-100/400 systems.

b.) ModSAF Operator POC: There was no single POC who had control of all the ModSAF operators. It is recommended in the future that the Battlemaster serve this function. It is envisioned that duties would include assigning ModSAF operators for specific functions, controlling all ModSAF operators, and verifying that proper documentation of any changes to ModSAF files are performed (vehicle locations, ammunition loads etc).

c.) Systems Engineer: Several different agencies involved with providing various pieces for the BLWE, however, no single POC was designated to provide oversight for the integration of these systems. It is recommended that if similar efforts are conducted in the future, an ADST II systems engineer be assigned to perform this function. This would minimize the integration risk and allow appropriate tradeoffs to be made prior to the start of an experiment (i.e., it was found that the EFOGM SSs could not handle the Protocol Data Unit (PDU) traffic and dropped off the net. There was no time to correct this problem so a decision had to be made "on the spot" to replace these simulators with ModSAF EFOGM entities).

d.) There was no formal training program developed to train the TOC/Role player personnel with the equipment they would be operating during the BLWE such as the RC2T systems, ModSAF stations, radios, etc. However, this training is crucial to ensure the success of an experiment.

e.) The ED checklist was an exact replica of the Battlemaster checklist which led to ambiguities during the BLWE. It is recommended that separate checklists be developed for the ED and Battlemaster so that associated roles are distinct and clearly understood.

f.) There were no walk-throughs of the events prior to starting the VPE and OCV phases. It is recommended that these walk-throughs be performed prior to the start of an exercise to familiarize personnel with their duties.

g.) Substitutions of operators & role players were made. Some of these personnel were not provided with adequate train-up or briefings associated with their roles and responsibilities. It is understood that sometimes personnel are switched on short notice, however, it is strongly recommended that a training be provided prior to personnel assuming their newly assigned positions.

h.) Even though the ED was informed of technical problems, decisions were made by the ED without seeking the advice of technical experts. It is recommended that a panel be formed between the ED and technical experts for evaluating critical decisions. Technical experts would be able to provide valuable information such as the reasons for equipment failure, associated down time estimates, and in assisting to determine when Endex criteria has been reached.

i.) Software changes to common systems at both sites were not well coordinated. Thus, it was difficult to determine whether these common systems were configured identically at a given time. It is recommended that when changes are required to common systems at remote locations, a sound configuration management procedure be in place. This procedure should be developed during the planning stages for an experiment.

j.) Roles and responsibilities for site activities were not well defined or organized. During the BLWE, conflicting information was received from various parties which made decision making a challenge for the ED. It is recommended that each site involved in an experiment assign one individual as responsible for activities at the given site. This individual would be responsible for reporting pertinent information to the ED.

k.) The tactical graphics which were developed by the TOC personnel were not supplied to the ModSAF operators. It is recommended that whenever operations orders or briefbacks are conducted at the TOC, all of the ModSAF operators be required to attend. This would ensure that all participants are aware of the tactical plan for the experiment.

l.) Control of the role players during the experiment was a problem due to other priorities placed on these role players by their organizational chain of command. Role players are essential to the success of an experiment thus, it is recommended that action be taken to ensure that individuals are dedicated for the duration of an experiment (i.e., associated organizational chains of command agree to release the individuals and understand that their place of duty is at the test site for the duration of an experiment).

m.) During the BLWE, software modifications were made without the knowledge of the ED. It is recommended that whenever any software changes are required (to include ModSAF patches/file changes etc), they be approved by the ED prior to execution. This is critical because, most of these types of changes require down time to implement.

n.) Many problems were experienced with network radios during the experiment. The current DIS-Radios (VR-100) required re-booting because, they had a tendency to lock-up or drop-off the network frequently. During heavy PDU traffic conditions on the LAN, the frequency of these problems increased significantly. Thus, it is recommended that the DIS-Radios (VR-100) be re-evaluated and appropriate modifications made to decrease the amount of downtime during an experiment.

7.0 Results

The VPE phase was conducted without any significant problems other than there was no digital or video feedback in the EFOGM SSs. Most of the VPE phase objectives were accomplished.

During the OCV phase, significant problems associated with the EFOGM SSs were found. They were such that the two EFOGM platoons represented by the SSs (one at the BTB and the other at the LWTB) had to be replaced by EFOGM ModSAF platoons in order to satisfy some of the OCV phase objectives.

8.0 Reference

Battlelab Experiment Plan (BLEP) -- Enhanced Fiber Optic Guided Missile (EFOGM) System Virtual Prototype Evaluation (VPE) and Operational Concept Validation (OCV) Battle Lab Warfighting Experiment (BLWE), 14 March 1996, Dismounted Battlespace Battle Lab Fort Benning, Georgia and Non-Line of Sight Project Office, Redstone Arsenal, Alabama.

Appendix A Acronyms and Abbreviations

AAA	Advanced Acoustic Armor
A2ATD	Anti Armor Advanced Technology Demonstration
ACTD	Advanced Concept Technology Demonstration
ADST	Advanced Distributed Simulation Technology
AFATDS	Advanced Field Artillery Tactical Data System
AMSAA	Army Materiel Systems Analysis Agency
ARL	Army Research Lab
AT	Anti-tank
ATD	Advanced Technology Demonstration
AVN	Aviation
BDA	Battle Damage Assessment
BDE	Brigade
BEWSS	Battlefield Environment Weapon System Simulation
BLEP	Battle Lab Experiment Plan
BLWE	Battle Lab Warfighting Experiment
BOS	Battlefield Operating System
BTB	BEWSS Test Bed
C2	Command and Control
C2I	Command, Control, and Intelligence
C3I	Command, Control, Communication & Intelligence
CDRL	Contract Data Requirements List
CDTB	Compact Terrain Database
CECOM	Army Communications and Electronics Command

CFE	Contractor Furnished Equipment
CFF	Call For Fire
CFT	Captive Flight Test
CGF	Computer Generated Forces
COTS	Commercial-of-the-shelf
DATT	DIS Air Target Tracker
DBBL	Dismounted Battlespace Battle Lab
DCAT	Data Collection and Analysis Tool
DIS	Distributed Interactive Simulation
DISAT	DIS Analytical Tool
DISC	Distributed Interactive Simulation Center
DISMAN	Distributed Interactive Simulation Manager
DSI	Defense Simulation Internet
DTED	Digital Terrain Elevation Data
DVG	Data Validation Group
ED	Experiment Director
EELS	Early Entry Lethality and Survivability
EFOGM	Enhanced Fiber Optic Guided Missile
FAAD	Forward Area Air Defense
FU	Fire Unit
GFE	Government Furnished Equipment
GPS	Global Positioning System
HMMWV	High-Mobility Multi-purpose Wheeled Vehicle
HRS	High Resolution Scenario
HSOK	Hunter/Standoff Killer

IIR	Imaging infrared
IMF	Intelligent Minefield
IPPT	Integrated Product and Process Team
IR	Infrared
LAN	Local Area Network
LHN	Long Haul Network
LWTB	Land Warrior Test Bed
MANPRINT	Manpower and Personnel Integration
MEU	Missile Electronic Unit
MICOM	US Army Missile Command
ModSAF	Modular Semi-Automated Forces
MOE	Measure of Effectiveness
MOP	Measure of Performance
MS	Mobile Simulator
NLOS	Non-Line Of Sight
OCV	Operational Concept Validation
OPFOR	Operational Forces
OPTEC	Operational Test and Evaluation Command
PDU	Protocol Data Unit
PM	Project Manager
PMO	Program Management Office
PVD	Plan View Display
RAM	Random Access Memory
RC2T	RFPI C2 Testbed
RFPI	Rapid Force Projection Initiative

RSA	Redstone Arsenal, Alabama
RTTC	Redstone Technical Test Center
SINCGARS	Single Channel Ground and Airborne Radio System(s)
SS	Stationary Simulator
STRICOM	US Army Simulation, Training, and Instrumentation Command
TECO	Test & Evaluation Coordination Officer
TECOM	U.S. Army Test and Evaluation Command
TPMU	Technical Program Management Office
TOC	Tactical Operations Center
TRAC-WSMR	TRADOC Analysis Center - White Sands Missile Range
TRADOC	Training and Doctrine Command
TSM-AT	TRADOC System Manager Anti-Tank
TTPs	Tactics, Techniques, and Procedures
UPS	Uninterruptable Power Supply
USAIS	US Army Infantry School
VLAN	Video Local Area Network
VPE	Virtual Prototype Evaluation
WAM	Wide Area Munitions
WAN	Wide Area Network

Appendix B Battlemaster Checklist

DATE : Battlemaster Checklist

Run :

1. Admin radio net functioning
2. All personnel in place
a. Simulator crews
b. Role players
3. Initiate tactical radio checks
4. Verify all entities present
a. Simulator
b. Red ModSAF
c. Blue ModSAF
d. Entity Count
5. Verify tactical radio checks & clock setting complete
6. Request permission to start loggers
7. Start dataloggers
a. X-Logger
b. Dislogger(s)
c. VONR (DCAT)
8. RC2T, BM, issue DLRP at this time. Report when all icons are present.
9. Read Red tactical script
10. Read Blue tactical script
11. Confirm icons present on RC2T if not already reported
12. Is any station not ready to begin
13. Request startex permission from Test Director
14. We will begin this run in 15 seconds
15. 5 seconds
16. Startex at ----------
17. Report Stop or End Trial Criteria met to Experiment Director
18. Announce cease fire upon ED approval
19. All missiles grounded
20. Endex at ----------
21. Announce next run number and time of radio check

Appendix C Radio Frequency Table

VPE Radio Frequencies and Call Signs

Battlemaster.....Mud 6

Test Director.....Stallion 6

EFOGM: Co Cdr.....Echo 6

PLT Ldr.....Echo 16

FU 1.....Echo 11

FU 2.....Echo 12

FU 3.....Echo 13

FU 4.....Echo 14

Red ModSAF.....Red 1

Blue ModSAF.....Blue 1

Frequency	Channel	Use
237037120.....	1	.....BM/Co Cdr/ModSAF
237137120.....	2	.....Co Cdr/PLT Ldr
237237120.....	3	.....None
237337120.....	4	.....None
237437120.....	5	.....None
237537120.....	6	.....None

OCV Radio Frequencies and Call Signs

Test Director.....Stallion 6
Battlemaster (LWTB).....Mud 6
Battlemaster (BTB).....Viking 6
Assist Battlemaster (LWTB).....Thumper 6

BDE Cdr.....Falcon 6
BDE S2 (R&S).....Falcon 2
BDE FSO.....Redleg 6
BDE AVN LNO.....Eagle 6
BDE ADA.....Duck 6

Arty ModSAF.....Mud 1
EFOGM ModSAF.....Mud 2
HELO ModSAF.....Mud 3
R&S ModSAF.....Mud 4

EFOGM: Co Cdr.....Echo 6

PLT Ldr (LWTB).....Echo 16
FU 1.....Echo 11
FU 2.....Echo 12
FU 3.....Echo 13
FU 4.....Echo 14
PLT Ldr (BTB)..... .....Echo 26
PLT Ldr (ModSAF).....Echo 36

Frequency		Channel	Use
237037120.....	1	.....	LBM to BBM/Admin
237137120.....	2	.....	LBM to BDE Cdr
237237120.....	3	.....	EFOGM
237337120.....	4	.....	R & S
237437120.....	5	.....	Arty
237537120.....	6	.....	Open

Appendix D Daily Schedule Example

DAILY VPE EXPERIMENT SCHEDULE

WEDNESDAY 5-June-96

START	STOP	ACTIVITY
730	800	Experiment Personnel start prep
		Troops/Data Collector Interviews
800	815	Troops Receive Battle Orders
815	830	PLT Ldr conducts troop leading procedures
		Troops enter sims and perform pre-battle checks
830	1145	Man-in-the-Loop Experiment Period
1145	1200	Internal AARs
1200	1300	Lunch
1300	1330	Troops/Data Collector Interviews
1330	1345	Troops enter sims and perform pre-battle checks
1345	1630	Man-in-the-Loop Experiment Period
1630	1645	Internal AARs
1645	1715	Daily Hotwash / Review

THURSDAY 6-June-96

START	STOP	ACTIVITY
745	815	Experiment Personnel start prep
		Troops/Data Collector Interviews
815	830	Troops enter sims and perform pre-battle checks
830	1145	Man-in-the-Loop Experiment Period
1145	1200	Internal AARs
1200	1300	Lunch
1300	1330	Troops/Data Collector Interviews
1330	1345	Troops enter sims and perform pre-battle checks
1345	1630	Man-in-the-Loop Experiment Period
1630	1645	Internal AARs
1645	1715	Daily Hotwash / Review

FRIDAY 7-June-96

START	STOP	ACTIVITY
745	815	Experiment Personnel start prep
		Troops/Data Collector Interviews
815	830	Troops enter sims and perform pre-battle checks
830	1145	Man-in-the-Loop Experiment Period
1145	1200	Internal AARs
1200	1300	Lunch
1300	1330	Troops/Data Collector Interviews
1330	1345	Troops enter sims and perform pre-battle checks
1345	1630	Man-in-the-Loop Experiment Period
1630	1645	Internal AARs

1645 1715 Daily Hotwash / Review

Appendix E Manual Data Collection Interview Form.

HUMAN FACTORS ENGINEERING INTERVIEW
EFOGM VPE MISSILE RELOAD OPERATIONS

Soldier's Name:
Rank:
MOS:
Unit:
Month's of experience on this system -
Major System equipment item tested -
Test conditions that existed (circle all that applied) DAY - NIGHT - MOPP 0- MOPP IV
Today's Date-

1. Did you experience any difficulties in exiting the vehicle?
   If so, describe the difficulties you encountered -

2. Did you experience any difficulties in disconnecting and stowing umbilical cables?
   Describe the difficulties that you encountered -

3. Did you experience any difficulties while rotating the launcher to the reload position?
   Describe the difficulties that you encountered -

4. Did you experience any difficulties while extracting expended missile canisters from the launcher? Describe the difficulties that you encountered -

5. Did you experience any difficulties while removing overpacking materials from the unfired missile canisters? Describe the difficulties that you encountered -

6. Did you experience any difficulties while reloading unfired missile canisters on the launcher? Describe the difficulties that you encountered -

7. Were the missile canister handles comfortable while lifting and carrying barehanded?
   a. While wearing MOPP IV gloves?
   b. While wearing Arctic gloves?
   Describe the difficulties that you encountered -

8. Did you experience any difficulties while rotating the launcher to the stowed position?
   Describe the difficulties that you encountered -

9. Did you experience any difficulties while you reconnected umbilical cables to the missiles?
   Describe the difficulties that you encountered -

10. Did you experience any difficulties while re-entering the vehicle?
    Describe the difficulties that you encountered -

Appendix F Data File Names and Format

VPE/OCV Data Logging Information

For each run three loggers were used to capture data . The DIS logger on the Sun station, Xlogger and DCAT. The format of the filenames for each logger's output files is as follows:

Xlogger Files June_14_05-01.log.xlog
month_day_run#-repetition#.log.xlog

DIS Logger Files June_14_05-01.log.sun
month_day_run#-repetition#.log.sun

When two DIS Loggers were used at the same time, the filename of the voice log contained .sunv as the extension.

DCAT - This software produced four files for each run.
June_14_05-01
June_14_05-01.dat
June_14_05-01.net
June_14_05-01.raw
month_day_run#-repetition#.extension

VPE Pilot Test Runs		VPE Record Runs		OCV Pilot Test Runs		OCV Record Runs	
Date	# of runs	Date	# of runs	Date	# of runs	Date	# of runs
June 1	*	June 5	18	June 8	8	June 12	7
June 3	*	June 6	16	June 10	1	June 13	7
June 4	9	June 7	15	June 11	4	June 14	13

*Not Recorded

The logged files were stored on the Sun machine named funsun.

The VPE log files were stored on disk1h:
/logger/disk1h/sunlogs
/logger/disk1h/xiogs
/logger/disk1h/dcat_files

The OCV log files were stored on disk2h:
/logger/disk2h/sunlogs
/logger/disk2h/xlogs
/logger/disk2h/dcat_files

Directories for making tar tapes were set up on disk1g:
/logger/disk1g/ocv_record
/logger/disk1g/ocv_pilot

/logger/disk1g/vpe_record
The following is a list of runs completed each day.

Date Type of Runs Run Numbers

June 4 VPE Pilot Test 08-01, 19-01, 29-01, 14-01, 16-01, 16-02, 14-02, 14-03, 07-01

June 5 VPE Record Runs 01-01, 02-01, 03-01,04-01, 04-02, 05-01, 06-01, 07-01, 08-01, 08-02, 09-01, 10-01, 10-02, 11-01, 12-01, 13-01, 14-01, 14-02

June 6 VPE Record Runs 15-01, 15-02, 16-01, 17-01, 18-01, 19-01, 19-02, 19-03, 20-01, 21-01, 22-01, 23-01, 24-01, 27-01, 30-01, 30-02

June 7 VPE Record Runs 08-01, 15-01, 07-01, 15-02, 19-01, 19-02, 05-01, 05-02, 23-01, 13-01, 16-01, 16-02, 20-01, 13-02, 22-01

June 8 VPE Record Runs 05-01, 09-01, 23-01, 16-01, 16-02, 13-01, 19-01, 13-02*

June 10 OCV Record Runs 01-01

June 11 OCV Record Runs 01-01, 03-01, 05-01, 07-01

June 12 OCV Record Runs 01-01, 03-01, 05-01, 07-01, 08-01, 09-01, 10-01

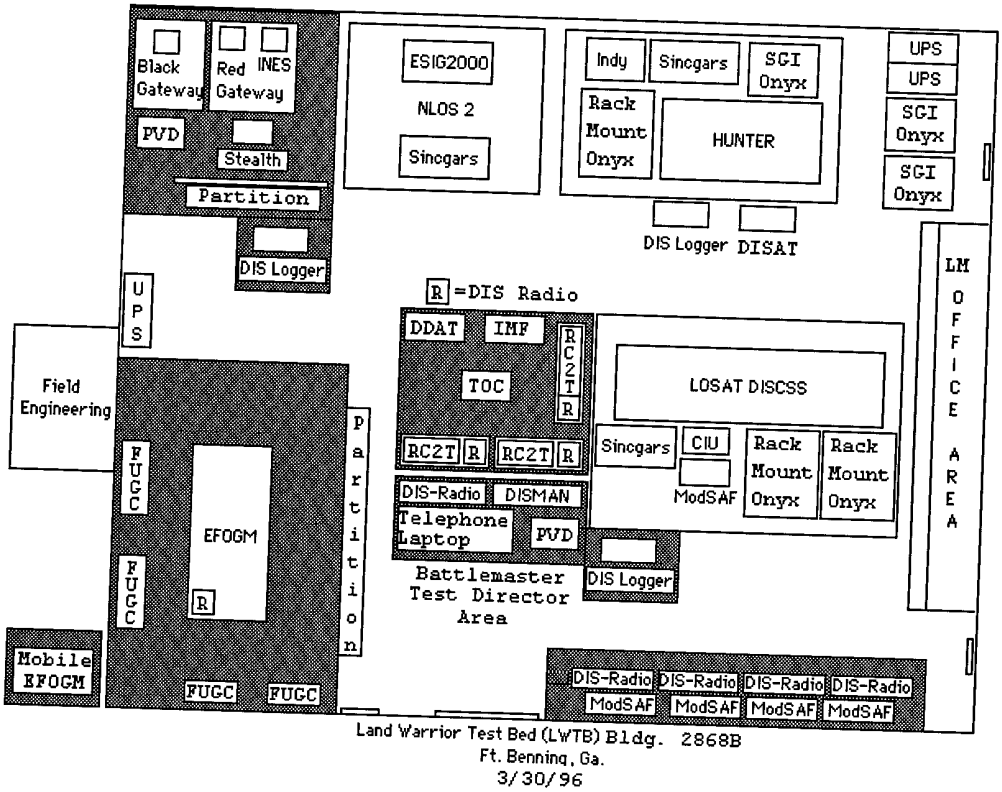
June 13 OCV Record Runs 02-01, 04-01, 06-01, 11-01, 12-01**, 13-01**, 13-02**

June 14 VPE Record Runs 07-01, 05-01, 05-02, 08-01, 09-01, 09-02, 09-03, 13-01, 19-01, 13-02, 16-01, 09-04, 19-02

* On run 13-02 there are 3 set of files produced from DCAT. The files that have redo on the end are the correct files.

** These runs will have two sunlog files. One with .log.sun extension and one with .log.sunv extension. The .sunv log contains all voice communications for that run.

Appendix G LWTB Equipment Layout



Land Warrior Test Bed (LWTB) Bldg. 2868B
Ft. Benning, Ga.
3/30/96

Appendix H Scenario Listing

ModSAF SCENARIO LIST

1.OCV_BLUE_ARTY.1
2.OCV_BLUE_AVN_CO.1
3.OCV_BLUE_ RS_FORCE.1
4.OCV_RED_2FSE.1
5.OCV_RED_ARTY_BN.1
6.OCV_RED_EC_2.1
7.OCV_RED_EC_3.1
8.OCV_RED_EC_4.1
9.OCV_RED_EC_5.1
10.OCV_RED_EC_6.1
11.OCV_RED_EC_7_ARTY.1
12.OCV_RED_EC_7_NORTH.1
13.OCV_RED_EC_7_SOUTH.1
14.OCV_RED_FSE_North.1
15.OCV_RED_FSE_South.1
16.OCV_RED_Peace_1.1
17.OCV_RED_Peace_1.3
18.OCV_RED_Peace_1.4
19.OCV_RED_Peace_2.1
20.OCV_RED_Peace_3.1
21.OCV_RED_Peace_4.1
22.OCV_RED_Peace_5.1
23.OCV_RED_Peace_6.1
24.OCV_RED_Peace_7.1
25.OCV_Red_Arty.1
26.OCV_Red_BN1.1
27.OCV_Red_BN_3.1
28.OCV_Red_DS_1.1
29.OCV_Red_DS_2_Arty.1
30.OCV_Red_DS_2_North.1
31.OCV_Red_DS_2_South.1
32.OCV_Red_DS_3_Arty.1
33.OCV_Red_DS_3_North.1
34.OCV_Red_DS_3_South.1
35.OCV_Red_DS_4_Arty.1
36.OCV_Red_DS_4_North.1
37.OCV_Red_DS_4_South.1
38.OCV_Red_DS_5_Arty.1
39.OCV_Red_DS_5_North.1
40.OCV_Red_DS_5_South.1
41.OCV_Red_DS_6_Arty.1
42.OCV_Red_DS_6_North.1
43.OCV_Red_DS_6_South.1
44.Practice_Blue_1.1

45.Practice_Red_1.1
46.VPE_BLUE_AG_1.1
47.VPE_BLUE_AG_2.1
48.VPE_BLUE_AG_3.1
49.VPE_BLUE_AG_4.1
50.VPE_BLUE_AG_5.1
51.VPE_BLUE_AG_6.1
52.VPE_BLUE_AG_7.1
53.VPE_BLUE_MRC_1.1
54.VPE_BLUE_MRC_2.1
55.VPE_BLUE_MRC_3.1
56.VPE_BLUE_MRC_4.1
57.VPE_BLUE_MRC_5.1
58.VPE_BLUE_MRC_6.1
59.VPE_BLUE_MRC_7.1
60.VPE_BLUE_MRC_8.1
61.VPE_BLUE_MRC_9.1
62.VPE_BLUE_TB_1.1
63.VPE_BLUE_TB_2.1
64.VPE_BLUE_TB_3.1
65.VPE_BLUE_TB_4.1
66.VPE_BLUE_TB_5.1
67.VPE_BLUE_TB_6.1
68.VPE_BLUE_TB_7.1
69.VPE_BLUE_TRAINING_1.1
70.VPE_BLUE_TRAINING_2.1
71.VPE_BLUE_TRAINING_3.1
72.VPE_BLUE_TRAINING_4.1
73.VPE_BLUE_TRAINING_5.1
74.VPE_BLUE_TRAINING_6.1
75.VPE_PEACE_RED_1.1
76.VPE_PEACE_RED_10.1
77.VPE_PEACE_RED_2.1
78.VPE_PEACE_RED_3.1
79.VPE_PEACE_RED_4.1
80.VPE_PEACE_RED_5.1
81.VPE_PEACE_RED_6.1
82.VPE_PEACE_RED_7.1
83.VPE_PEACE_RED_8.1
84.VPE_PEACE_RED_9.1
85.VPE_RED_AG_1.1
86.VPE_RED_AG_2.1
87.VPE_RED_AG_3.1
88.VPE_RED_AG_4.1
89.VPE_RED_AG_5.1
90.VPE_RED_AG_6.1
91.VPE_RED_AG_7.1
92.VPE_RED_AG_7_NORTH.1
93.VPE_RED_AG_7_SOUTH.1
94.VPE_RED_MRC_1.1

95.VPE_RED_MRC_2.1
96.VPE_RED_MRC_3.1
97.VPE_RED_MRC_4.1
98.VPE_RED_MRC_5.1
99.VPE_RED_MRC_6.1
100.VPE_RED_MRC_7.1
101.VPE_RED_MRC_8.1
102.VPE_RED_MRC_9.1
103.VPE_RED_PEACE_8.1
104.VPE_RED_TB_1.1
105.VPE_RED_TB_2.1
106.VPE_RED_TB_3.1
107.VPE_RED_TB_4.1
108.VPE_RED_TB_5.1
109.VPE_RED_TB_5_NORTH.1
110.VPE_RED_TB_5_SOUTH.1
111.VPE_RED_TB_6.1
112.VPE_RED_TB_7.1
113.VPE_RED_TRAINING_1.1
114.VPE_RED_TRAINING_2.1
115.VPE_RED_TRAINING_3.1
116.VPE_RED_TRAINING_4.1
117.VPE_RED_TRAINING_5.1
118.VPE_RED_TRAINING_6.1
119.open_blue.1
120.practice_2.1
121.practice_movers_1
122.practice_movers_1.1
123.practice_movers_2
124.practice_movers_2.1
125.red_ag.1
126.rough_blue.1
127.training_1
128.training_2
129.training_1.1
130.training_2.1
131.wooded_blue.1

Appendix I Soldier Roster

SPC KERBACHER JEFF	29TH REGT
SPC MARTIN MARCUS	29TH REGT
SPC MOORE STEVEN	29TH REGT
SPC PRITCHETT LESTER	29TH REGT
SFC PUSATERI BILL	29TH REGT
PFC PAULEY JOHN	29TH REGT
PV2 KOHLUS DEAN	29TH REGT
PV2 RILEY GRADY	29TH REGT
PV1 LOVAN YEN	29TH REGT
CPT WILLIAM A	DBBL
CPT GRIEME W	FT.SILL

LTC MATTHEWSON JAMES	PM-NLOS
LTC BOURGOINE DANIEL	DBBL
MAJ ENSOR JOHN	DBBL
MAJ MERKLE JENNIFER	DBBL
CPT RUSSELL HINDS	TSM-AT
CPT DYKES DAVID	TRAC-WSMR
CPT GRONEMEYER RICK	DBBL
CPT CARTY WILLIAM	DBBL
CPT EVANS JOSEPH	DBBL
2LT SKINNER RYAN	B CO. 2/11th
2LT CARLYLE PAUL	HHC 2/11th
2LT WRAY BRIAN	HHC 2/11th
CPT HOSKINS XAVIER	29TH REGT

2LT CARPENTER SCOTT	29TH REGT
SFC BAUMGARTNER	DBBL
SFC SHAW GENE	29TH REGT
SSG MIKESELL TIM	29TH REGT
SSG SIROFCHUCK ANDY	29TH REGT
SPC BELLAMY ELLIS	29TH REGT