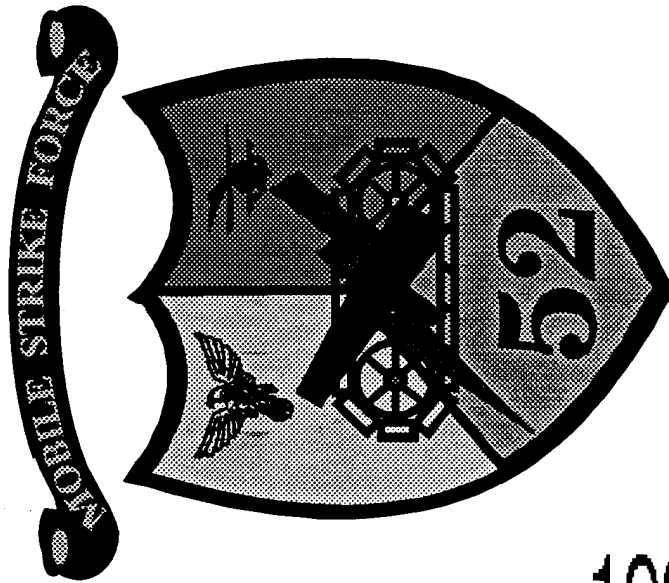
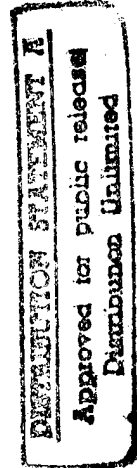




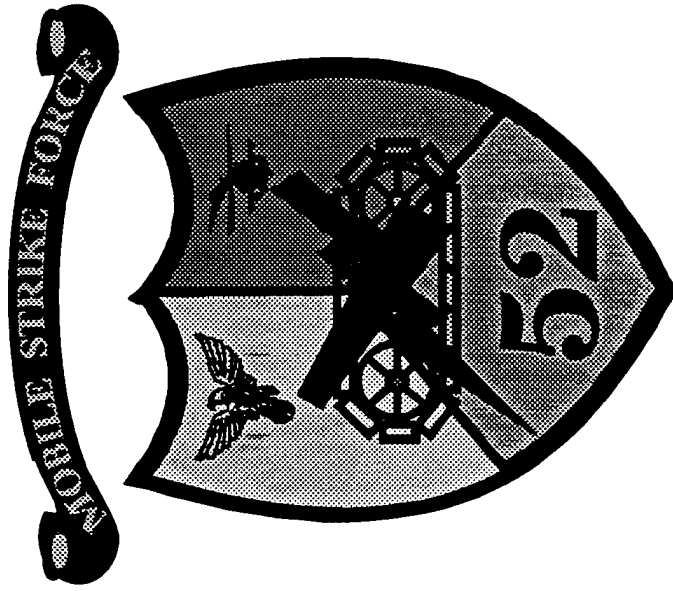
Mobile Strike Force 95 Organizational and Operational Analysis 1995

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TRADOC Analysis Center
Fort Leavenworth, Kansas

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Mobile Strike Force 95 Organizational and Operational Analysis 1995



**TRADOC Analysis Center
Fort Leavenworth, Kansas**

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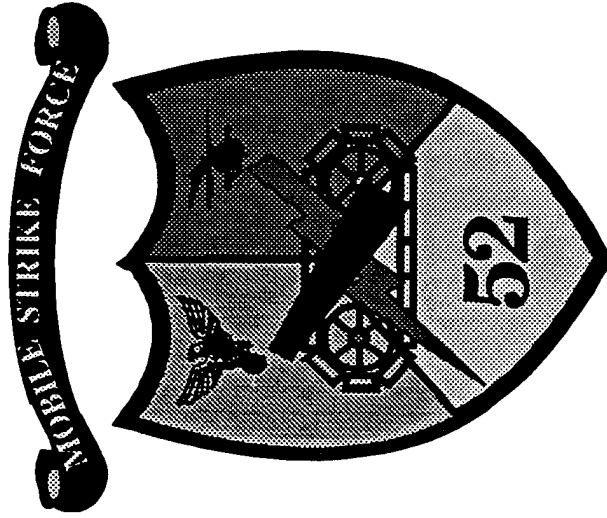
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The TRADOC Analysis Center (TRAC) study team for the Mobile Strike Force 95 Organizational and Operational Analysis and the principal authors of this report were Mr. Timothy J. Bailey - Study Director, Mr. Roland R. Groover, MAJ Sherrie George, CPT(P) Thomas M. Cioppa, CPT Brendan P. Sheehan and Ms. Carol J. Mullen. The authors of this document are indebted to the many people whose advice and cooperation made this study possible, especially BG John Miller, Commander of the 52d Mobile Strike Force, Fort Leavenworth, Kansas, and BG(Ret) Huba Wass de Czege, Cubic Applications, for mentoring the study team throughout the study and giving invaluable advice and guidance on the evolving operational concepts for the Mobile Strike Force in 2010.

The authors would also like to acknowledge and thank the people from the battle laboratories, schools, centers and other organizations throughout the Army, as well as U.S. Air Force and U.S. Navy representatives, who worked diligently with the TRAC study team to ensure the study was on the cutting edge of the tactics, techniques and procedures (TTP), operational concepts and future technologies envisioned for 2010. LTC James K. Greer, Chief, Force XXI Division, and Mr. Robert Dodd represented the Battle Lab Integrated Training Division, Fort Monroe Virginia, the sponsor of the study. LTC John Langhauser represented the U.S. Army Early Entry, Lethality and Survivability Battle Lab. LTC Alan Ray represented the U.S. Army Aviation Center. LTC Richard McKee represented the U.S. Air Force Air Combat Command. Commander Don Hill represented the U.S. Navy. MAJ Scott Mitchel and MAJ Michael Smith represented the U.S. Army Armor Center. MAJ Don Sellers represented the U.S. Army Infantry School. MAJ William Reagle represented the U.S. Army Field Artillery Center. CPT Rick Gronemeyer represented the U.S. Army Dismounted Battlespace Battle Lab. CPT John Reich represented the U.S. Army Combat Service Support Battle Lab. CPT Phil Powell represented U.S. Army Combined Army Support Command. CPT Jacqueline Coffey represented the U.S. Army Engineer School. CPT Larry Jones represented the U.S. Army Chemical School. Ms. Jody Allison represented the U.S. Army LOSAT Project Office. Mr. Mark-Thomas Bray represented the U.S. Army Air Defense School. Mr. Dave Paul represented the U.S. Army Combined Arms Command Threats.

Additional participants from TRAC who were key to the analysis effort included LTC Ephraim Martin, who was in charge of all simulation operations, MAJ Jim Riley and CPT Dan Wilson, who conducted the wargaming. They were assisted by Ms. Laurie Hable, Mrs. I. Jane Giffin, Mr. Rick Cunningham, Mr. Terry Gach, and Mr. Ken Raab. These personnel conducted the actual data input and repetitive modeling. CPT Rob Mock for his work in scenario development. Mr. John Noble, Mr. Fairly Vanover and Mr. Bill Palmer, TRAC, Fort Lee, Virginia, provided logistical input to the wargaming.

Mobile Strike Force 95 Organizational and Operational Analysis January 1996



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Purpose

This analysis was conducted by the US Army Training and Doctrine Command (TRADOC) Analysis Center (TRAC) for the TRADOC Battle Laboratory Integration, Technology and Concepts Directorate (BLITCD) in support of the PRAIRIE WARRIOR / Mobile Strike Force 95 Advanced Warfighting Experiment (PW/MSF 95 AWE). The purpose of this analysis is to extend the investigation of the MSF organizational and operational (O&O) concepts beyond the single concept examined in the PW 95 student exercise.

TRAC accomplished this through an experimental design for a conceptual, division-sized MSF linked to the PW 95 student exercise and based on the MSF organizational, operational and materiel concepts developed by BLITCD according to TRADOC PAM 525-5 and FORCE XXI design principles. The experimental design for the analysis focused, in turn, on tailoring the MSF for tempo, survivability, and lethality.

Purpose

- Conduct an analysis for the TRADOC Battle Lab Integration, Technology and Concepts Directorate (BLITCD) in support of the PRAIRIE WARRIOR/Mobile Strike Force 95 Advanced Warfighting Experiment (PW/MSF 95 AWE).
- Extend the MSF O&O Concept and technologies beyond the single instance portrayed in the 1995 PRAIRIE WARRIOR student exercise.
- Determine how the MSF can be best tailored for lethality, survivability and tempo.

PW/MSF 95 AWE

The United States is transitioning from the industrial age to the information age, from a cold war paradigm to a force projection strategy, and from the confrontation of a clearly defined threat to a myriad of ill-defined threats. This transition requires a top-to-bottom examination of the Army which calls for the sound application of an integrated set of design tools, experiments, and analyses on which to base incremental decisions regarding Force XXI development.

Experimentation, in the near term (FY 95), consists of multiple advanced warfighting experiments (AWEs). The PW/MSF 95 AWE, one of the FY 95 AWEs, is a collection of experiments and analyses which are linked by the PW 95 exercise as an experimental vehicle to evaluate a conceptual Mobile Strike Force with respect to the Force XXI design principles.

The MSF 95 O&O Analysis is one of four analytical efforts performed in support of the AWE. This briefing of the MSF 95 O&O Analysis contains the findings and results of the O&O analysis. The results of all four AWE analytic efforts were consolidated into an integrated analytical report prepared by TRAC for the Louisiana Maneuvers (LAM) board of directors (BOD) meeting in October 1995.

PW/MSF 95 AWE

RESPONSIBLE AGENCY	10/94	11/94	12/94	1/95	2/95	3/95	4/95	5/95	6/95	7/95	8/95	9/95	10/95	11/95	12/95	1/96
PW/MSF 95 AWE TRAC-SAC	Plan											Integrated Report	Brief			
MSF O&O ANALYSIS TRAC-SAC	Plan	O&O Scenario Development	Runs/Analysis	Draft Report											Final Scripted Brief	
MSF CSS ANALYSIS TRAC-LEE	Plan	Plan	QOTW Scenario	Runs / Analysis	Report											
	Plan	CSS Scenario Development	Runs/Analysis	Report												
		Plan	Deploy Analysis	Report												
BC 95 ANALYSIS TRAC-SAC				BC Elective												
	Plan	Plan	Observations & Analysis	Draft Report											Final Scripted Brief	
PW DATA COLLECTION CAAT/CALL	Plan	Plan	Observations & Collection	Report												

Objectives

The MSF 95 O&O Analysis supported three of the four issues identified by the PW/MSF 95 AWE. The primary focus of this report is on the first two issues: to assess the design and operational concepts of the MSF. The Force XXI design principles served as the yardstick against which the MSF O&O concept was measured.

Assessment of the battle command capabilities will be accomplished by the Battle Command 95 Analysis being conducted by TRAC for the Battle Command Battle Lab (BCBL). Those results will also be published under a separate cover.

The O&O analysis also provided the requirements for standard classes of supply and services for the CSS analysis for the AWE. These results are published in the CSS analysis under a separate cover.

Objectives

- ✓ Assess MSF force design concepts using Force XXI design principles
- ✓ Assess MSF and Force XXI operational concepts
- ✗ Assess proposed Force XXI battle command capabilities
- Assess Force XXI CSS concepts

Issues

The PW/MSF 95 AWE Analysis Support Plan stipulated the issues to be addressed by the MSF O&O Analysis. Of the five issues identified for the O&O analysis, the first four were the primary focus of the analysis. The fifth issue (4c), which called for the amount of the various classes of supply and standard services to be tallied and used as requirements for the MSF CSS Concept Analysis, was provided to TRAC - Fort Lee for inclusion in their analysis.

The first O&O issue (1d) required the O&O analysis to measure how well the MSF performed in terms of its combat, combat support and CSS capabilities in comparison to a set of force sufficiency criteria (FSC) based goals. These FSC have been used successfully by TRAC in past studies in the areas of lethality and survivability. The FSC have been expanded into the area of tempo. This analysis will focus on lethality, survivability and tempo; the MSF CSS Concept Analysis will examine the CSS aspects. The second issue (1e) mandated the O&O analysis measure the contributions of the 2010 technological capabilities to the MSF's combat effectiveness in order to ascertain which systems or sets of systems were consistently the greatest contributors. The third issue (2a) required the O&O analysis to determine if the MSF was able to dominate its battle space in terms of a commander's ability to apply superior combat power to the full depth, breath, and height of the battlefield and to achieve a decisive victory, quickly and with minimal casualties. The fourth issue (2b) called for the O&O analysis to determine if and which organizational adjustments to the MSF were necessary to best satisfy the FSC goals. The organizational adjustments were determined by a force tailoring process developed by TRAC.

MSF O&O Analysis

Study Issues

- **1d:** Does the mix of combat, combat support, and CSS capabilities provide a balanced Mobile Strike Force design which meets pre-defined sufficiency criteria in each area?
- **1e:** What Mobile Strike Force 2010 technological capabilities contribute most to its effectiveness?
- **2a:** Does the Mobile Strike Force have the assets necessary to conduct operations which result in domination of its battle space as defined by the Mobile Strike Force operational concept?
- **2b:** What organizational adjustments, if any, are required to the Mobile Strike Force to allow it to better execute the operational concept?
- **4c:** What is the required Mobile Strike Force daily replenishment of the standard classes of supply and services?

Approach

The general approach taken to perform the O&O analysis is depicted here. The actual O&O analysis is contained in the center panel, but there were a number of other efforts on the periphery that influenced the O&O analysis.

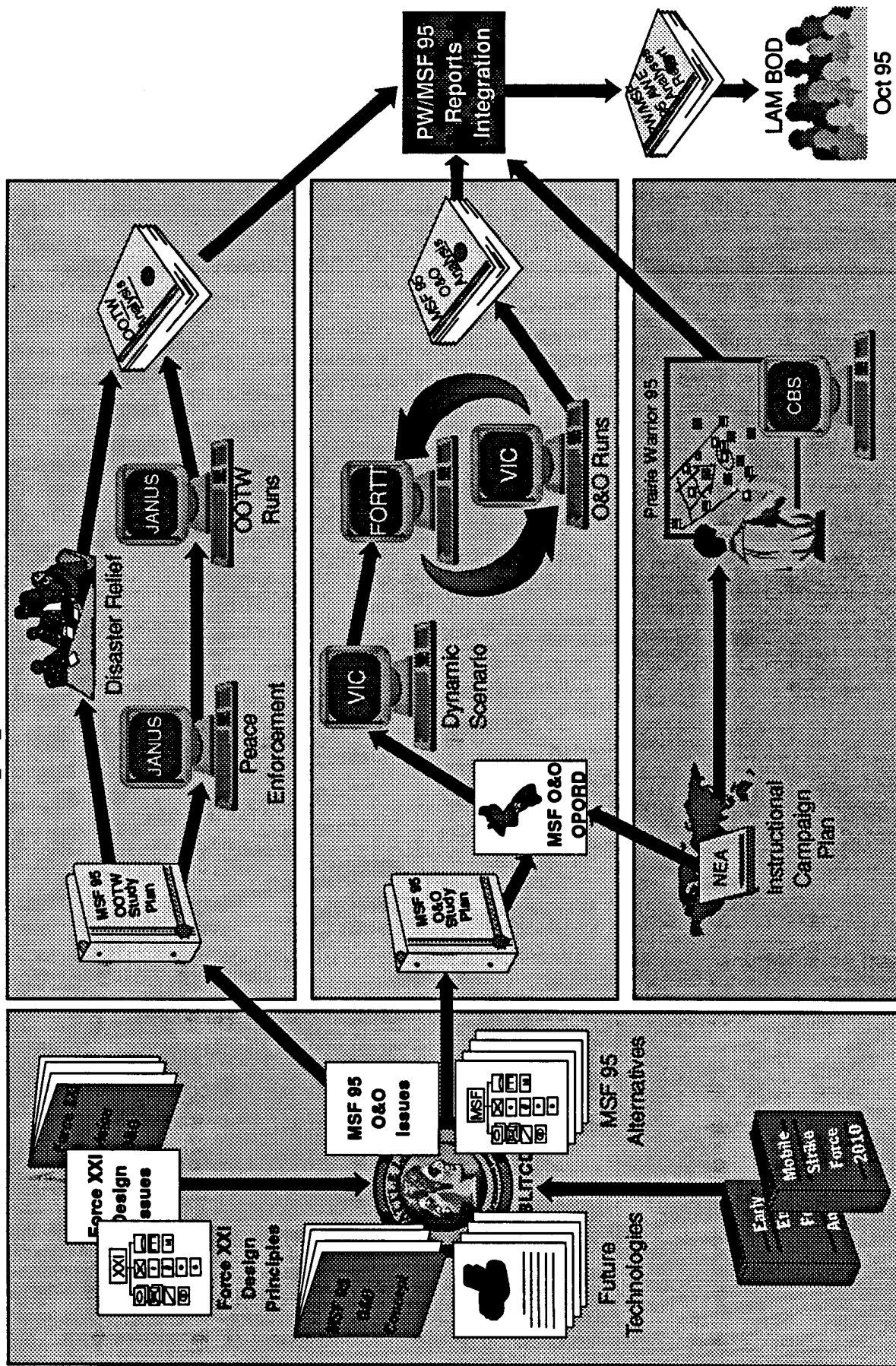
BLITCD was charged with the responsibility of taking previous studies (e.g., the Early Entry Force Analysis and MSF 2010 efforts conducted last year by TRAC, see Appendix A, References) and the evolving Force XXI design principles and operational concept to develop the MSF O&O concept, issues, alternatives and future technologies. This work formed the basis for the MSF 95 O&O Analysis Study Plan.

The first step in the study plan was to prepare the operational scenario. To accomplish this, the Prairie Warrior (PW) instructional campaign plan was used, so that the O&O analysis would have the same starting point as the PW student exercise. The resultant operational scenario is visionary, daring, and embraces the precepts of the MSF O&O concepts, especially simultaneity. Next, the operational scenario was implemented as an OPORD in the Vector-in-Commander (VIC) constructive simulation. The resulting dynamic scenario provided the general battle flow for all remaining MSF adjustments investigated. The complete run design was executed through iterative application of VIC and automated Force Tailoring Tool (FORT-T). The results of all the runs were analyzed and are documented in this scripted brief.

While the O&O analysis was being conducted, another element of TRAC, the Scenario and Wargaming Center, conducted an operations other than war (OOTW) analysis. The purpose of this analysis was to investigate the suitability of the MSF to perform disaster relief and peace enforcement missions and determine whether, or not, the MSF needed any augmentation. This effort was documented in a separate report.

A draft scripted brief was delivered to the overall AWE study director who integrated the O&O results with the results from the other three analytical efforts and prepared a single, integrated AWE report for presentation to the Louisiana Maneuvers Board of Directors in October 1995.

Approach



SME Participants

Subject matter expert (SME) participation and guidance from Commander, 52d MSF and retired general officers, as well as TRADOC battle labs, US Army schools and centers, US Air Force and US Navy, were instrumental in the proper application of Force XXI and MSF O&O concepts and the employment of future 2010 technologies. Since the MSF O&O concept was evolving during the execution of this analysis, it was essential to have the vision in the minds of the Force XXI leaders and proponents who are determining how to organize and fight the Army in the 21st century to take full advantage of future technologies.

The SMEs provided their primary inputs through a series of In-Progress Reviews (IPRs.) The first IPR was held on 12 January 1995 to provide a forum for the materiel developers to furnish information on the future technologies being investigated to the SME and TRAC analysts. The second IPR was held on 24 January 1995 to inform the SMEs about the operational scenario TRAC was developing for the MSF O&O analysis and to allow the SMEs to ensure it would serve as a framework to adequately investigate their O&O concepts and future technologies. The third IPR was actually a series of meetings conducted from 1 through 24 March 1995, where the SMEs produced detailed plans for their respective battlefield operating system. These plans were inserted into the overall plan, which was revised and prepared for the VIC combat model. The fourth IPR was held on 27 April 1995 for SME review of the results of the VIC modeling of the dynamic scenario to determine its realism and adherence to the Force XXI and MSF O&O concepts. This reference case constituted the battle flow for all subsequent alternatives investigated during the O&O analysis.

Throughout the remainder of this effort, the SMEs were contacted on an 'as needed' basis whenever required by force structure modifications dictated by the force tailoring process.

SME Participants



Commander 52d MSF

Retired General Officers



Battle Lab Integration, Technology and Concepts Directorate

Early Entry Lethality and Survivability Battle Lab

Battle Command Battle Lab (Huachuca)

Combat Service Support Battle Lab



Armor Center

Infantry School

Field Artillery School

Aviation Center

Engineer School

Air Defense School

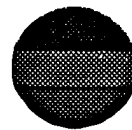
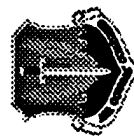
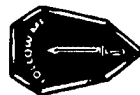
Chemical School



USAF Air Combat Command/Joint Projects Office

US Navy CGSC Liaison Officer

TRADOC Threats



Main Assumptions

Many of the assumptions used in this analysis were taken from the operational campaign plan developed by Command and General Staff College (CGSC) and the School for Advanced Military Studies (SAMS) for the Prairie Warrior 1995 Student Exercise. These assumptions define the parameters of the scenario used in this analysis and, in some cases, drive the results. It is interesting to note that not all of these assumptions were followed by the World Class Opposition Force (OPFOR) during the actual PW 95 exercise.

An important one of these assumptions was that the armor brigade of the MSF was not required to conduct an offensive maneuver to achieve a position from which to strike the Operational Exploitation Force (OEF). This assumption meant that the MSF armored brigade task force did not fight its way into position and the ground maneuver systems were not used. Its mission was as a security force for the artillery and as a contingency force to stop any OEF forces that escaped the main effort.

Another of the campaign plan assumptions was that the OEF would move only at night. It was believed that daylight operations by the OEF would present lucrative targets for the USAF. Accordingly, the OEF occupied hide sites during the day.

Assumptions were made limiting the numbers of Army Tactical Missile System (ATACMS) munitions and USAF sorties available to something that was realistic, yet would not overshadow an examination of the MSF's capabilities.

It was necessary to make some assumptions about how some MSF systems would evolve by the year 2010. For example, in order to better dominate the battle space, it was necessary to be able to airmobile some systems (i.e., High Mobility Artillery Rocket System (HIMARS)) that cannot be airmobiled today. Certain assumptions had to be made about the 2010 operational capabilities of some systems (e.g., a ground control station (GCS) can control only one unmanned aerial vehicle (UAV) at a time). Thus, the MSF will have only 4 UAVs in operation at a time.

Main Assumptions

- The MSF heavy brigade will be unopposed during the six hour operational move from the tactical assembly area to its battle positions at the DMZ.
- OEF, equipped as a world class OPFOR, will only move at night. OEF will occupy underground hide sites during the day.
- 54 ATACMS Block II munitions are available in theater for MSF (main effort) use.
- The CFC Commander will allot 150 sorties of air interdiction/CAS to the MSF which will include a mix of Air Force and Navy aircraft.
- A HIMARS variant will be airmobile.
- Each brigade will have one GCS (DS) and the division will have one GCS (GS).

MSF O&O Concept

The MSF is not a prototype division. It is a concept vehicle for the study of future systems, organizations, and operational concepts. Lieutenant General Miller defined the MSF during his speech at the AUSA's Kansas City Regional Defense Forum. He characterized the MSF as a concept vehicle which allows us to look at new technologies, organizations, and operational concepts. The MSF O&O concept written by Brigadier General (retired) Wass de Czege emphasizes the importance of concepts such as simultaneity, surprise, and maximizing the effects of precision guided munitions. His conceptual force is bold and entails risk. His operational concept facilitates the analysis of a broad spectrum of systems and organizations. This operations plan (OPLAN) was developed to stress the systems, organizations and operational concepts of the force. It is a high risk plan which emphasizes the operational ideas embodied in the MSF O&O Concept.

Operational planning began in December 1994. Three courses of action (COAs) were developed by the TRAC Scenario and Wargaming Center (SWC) and reviewed by Brigadier General Miller, Commander, Mobile Strike Force, and Brigadier General (retired) Wass de Czege. Inputs to the three COAs were considered, and plans were adjusted. In a final decision briefing, the study team picked the simultaneous ambush COA because it provided the best opportunity to review the broad spectrum of capabilities within the MSF. After detailed planning by SMEs, SWC and Study and Analysis Center (SAC) personnel, a written operations plan (OPLAN) was produced for the simultaneous ambush COA. This OPLAN was gamed in the VIC model and initial results were reviewed in an IPR. SMEs provided input and modifications to the plan. The resulting dynamic scenario became the standard scenario for the remainder of the alternatives: base case, and the adjustments for lethality, survivability, tempo.

Note: The OPLAN is published in Appendix E. to this briefing.

MSF O&O Concept

- **"The MSF is a Force that does not exist. It might exist, but it is used primarily to gain insights to help shape the army of the future."**
Lieutenant General John E. Miller, AUSA's Kansas City Regional Defense Forum, 11 April 95.
- The O&O Concept describes characteristics and capabilities which the MSF should have, and the OPLAN attempts to incorporate many of these:
 - ▶ Control the tempo of the battle
 - ▶ Move just in time
 - ▶ Simultaneity (Ambush Dynamic)
 - ▶ Render OPFOR suddenly helpless and vulnerable to exploitation.
 - ▶ MSF can launch seven thousand precision projectiles within ten minutes.

MSF Force Structure

The MSF was task organized into four combat brigades. These were the armor brigade, aviation brigade, light infantry brigade and DIVARTY. The MSF also had a aviation lift brigade, engineer brigade and a standard division slice of combat support and service support elements.

These four combat brigades were task organized as follows. The armor brigade task force included two mechanized battalions with 78 Bradleys each, two armor battalions with 46 M1A2s/M1A3s each, an Armored Gun System (AGS) battalion, a heavy engineer battalion, two Bradley Stinger Fighting Vehicle (BSFV) batteries, and a future scout vehicle troop. The aviation brigade task force included three attack aviation battalions, one general support aviation task force with a CH-47 troop and two UH-60 troops. Also attached are one light infantry battalion, a HIMARS battery, a Future Scout Vehicle (FSV) cavalry troop, and an ATCAS battalion with two batteries.

The light infantry brigade task force had an attack aviation battalion, a light engineer battalion, an air defense battery with Avengers, man-portable Air Defense System (MANPADS) and an FSV cavalry troop. It also had three Infantry battalions and one battalion of ATCAS. The DIVARTY included two Multiple Launch Rocket System (MLRS) battalions, an M198 battalion, a LOSAT company and a Paladin battalion.

The MSF standard division slice included a regimental aviation squadron, military intelligence battalion, with four GCSs, twenty four short range UAVs, and normal attachments.

See Appendix D for a list of the weapons systems.

The higher unit mission and intent provided by CGSC was from the Combined Forces Command (CFC). The CFC's mission was to defeat orange land forces and end hostilities on terms favorable to blue land. The MSF's mission was drawn from the CFC Commander's intent: "...destroy ... (the) operational exploitation corps;" clearly the destruction of the OEF produced terms which were favorable to blue land as they negotiated a settlement. This higher unit mission, the higher commander's intent plus a task organization provided the only intended link between the MSF O&O scenario and the scenario used in Prairie Warrior (PW). Each MSF started with the same force structure. Both were fought over the same terrain against an enemy developed by the World Class OPFOR. The MSF O&O OPLAN started with the same inputs but was developed separately from PW to facilitate answering the issues in the constructive simulation.

MSF Force Structure

1-52nd AR TF

1-5 (AGS)
B/1-524 (LOSAT)
1-40 FA (DS)
5-21 EN
A/B/1-441 ADA
A/1-52 CAV

4-52nd AVN TF

1-88 IN
A/1-8 FA
C/1-52 CAV
2-47 FA (DS)

1-51st INF TF

2-507 AVN
5-22 EN
A/1-842 ADA
B/1-52 CAV
1-41 FA (DS)

52nd DIVARTY TF

A/2-252 AT
1-1 FA (MLRS)
2-37 FA (GSR)(MLRS)
1-6 FA (GSR) (Paladin)

111 AVN

52nd EN BDE

14 EN (C) (W)
19 EN (C) (M)
652 CSE
5022 BRIDGE CO
5023 BRIDGE CO
22 PSYOP DTCH
610 TERRAIN DET

MSF TROOPS

33 AIR CAV
52 MI
52 SIG CO
52 CHEM CO
52 MP CO
A/3-4 (CORPS SAM)
A/6-58 (CORPS AV)

CFC Mission

"Defeats Orange Land armed forces, ends hostilities on terms favorable to the Blue Land."

CFC Commander's Intent

"CFC forces [the MSF] will have...destroyed the...operational exploitation corps."

Scenario

As was said earlier the scenario for the MSF O&O analysis was developed by the MSF O&O team with input from the Scenario and Wargaming Center of TRAC and SME's from the various battlefield operating system. The final version was implemented in the constructive model by the VIC production team in the Operations Analysis Center of TRAC. The OPLAN was written based on the scenario and detailed input from all of the SMEs. The OPLAN integrates the O&O concept and the scenario into a viable course of action for the MSF. This course of action is discussed in the following charts which address the enemy situation, the commander's intent and mission and the five phases of the operation: Phase I, Reconnaissance; Phase II, Positioning Attack Assets; Phase III, Ambush; Phase IV, Exploitation; and Phase V, Reconstitutioning/Repositioning.

Note: The OPLAN is published in Appendix E. to this briefing.

MSF O&O Scenario

- Enemy Situation
- Mission and Commander's Intent
- Phase I -- Reconnaissance
- Phase II -- Positioning Attack Assets
- Phase III -- Ambush
- Phase IV -- Exploitation
- Phase V -- Reconstitution/Repositioning

Enemy Situation

Pyongyang is represented on the upper left of each map. South of Pyongyang nine brigades were deployed. Going east from the nine brigades are four company sized avenues of advance, depicted by the lines, which lead to the Kokson bowl. Three avenues of advance exit the Kokson bowl and lead to the Chorwon bowl. South of the Chorwon bowl is the DMZ. The city depicted south of the DMZ is Seoul, the capitol of South Korea. Southeast of the Chorwon bowl is the Imjin River.

On the left side map are the two battalions and a series of red dots representing very small units throughout the area of operations. Those to the north and west of the DMZ represent the Homeland Defense Force (HDF). This force was composed of several thousand dismounts capable of reacting to local insertions. Also included are the hardened artillery sites in which theater artillery was manned by the HDF. Finally, south and east of the DMZ were the Reserve Military Training Unit (RMTU) divisions which surrounded the city of Seoul and were fighting with TROKA forces at that time.

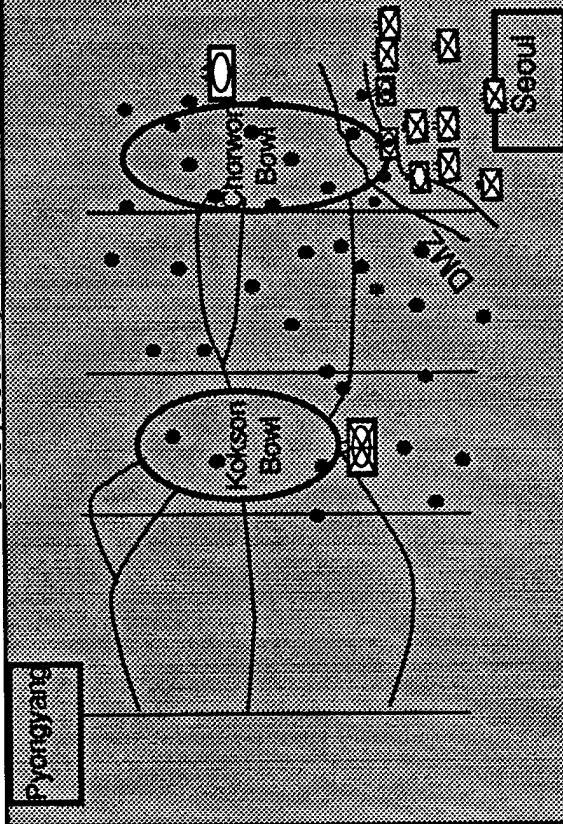
The OEF's mission was to conduct an operational move of nearly two hundred kilometers from Pyongyang to the crossing sites on the Imjin River, secure those sites, and permit the safe withdrawal of orange land forces. The equipment of the OEF included the T62-M, the M1983 (a BMP variant), the 240 mm Multiple Rocket Launcher (MRL), the Crotale, and the 152 mm and 122 mm self-propelled artillery.

On the map on the right, nine brigades are depicted as they were arrayed after thirty hours of relatively unopposed movement with two mechanized brigades and one armor brigade in the north, one mechanized brigade and two artillery brigades in the center and three mechanized brigades in the south. These brigades only moved during hours of darkness to protect themselves from the Blue air force, and they hid in pre-established underground sites during daylight hours. A 12 kilometer per hour rate of march was assumed based on ST100-9. Thirty hours after the lead brigade began to move lead reconnaissance elements were estimated to be entering the Chorwon bowl.

The first brigade's advanced guard just entered the Chorwon as the trail brigade was uncoiling from the initial hide position. The SP 152 mm/122 mm and 240 mm MRL brigades were postured to provide mutual support to the OEF.

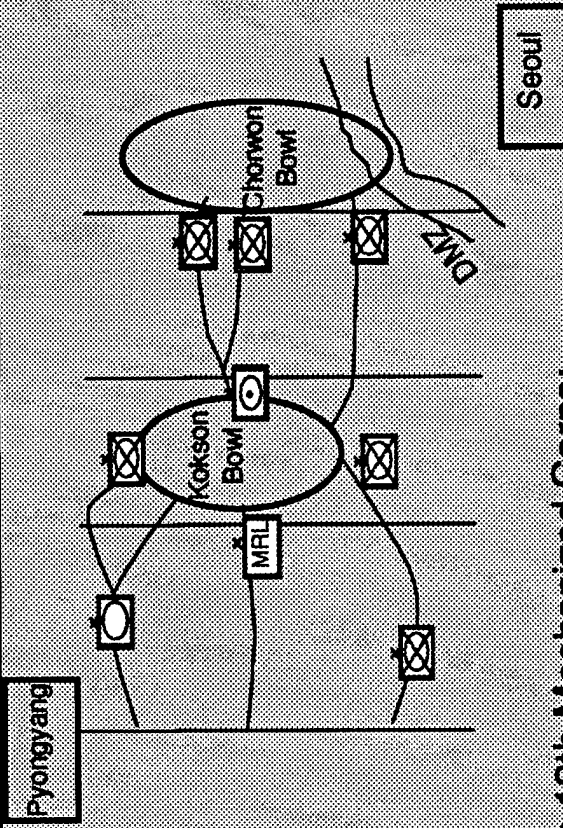
Enemy Situation

HDF/RTMU



- Homeland Defense Force (HDF): includes 7000 dismounted soldiers.
- National-Level Artillery assets: have limited capability to target a moving force.
- Reserve Military Training Unit (RMTU): 60% strength division obstructs path of MSF to DMZ.

OEF



- 12th Mechanized Corps:
 - ▶ Nine brigade Operational Exploitation Force (OEF)
 - Each brigade possesses a distinct number of combat systems.
 - ▶ Moving only at night, lead units will reach Chorwon at H+30.
 - ▶ They are equipped with former Warsaw Pact vehicles.

MSF Mission and Commander's Intent

The MSF's mission was to destroy the 12th Mechanized Corps or Operational Exploitation Force (OEF). It accomplished this mission by using a full range of MSF capabilities in a simultaneous in-depth attack. This operation was conducted in five phases: reconnaissance, positioning attack assets, simultaneous ambush, exploitation, reconstitution and repositioning. The next five slides will discuss each of these phases.

Mission and Commander's Intent

MISSION

On order, the MSF attacks as the JFLCC operational reserve to destroy (reduce to 40% strength) 12th Mechanized Corps (OEF) in the vicinity of the Kokson/Chorwon valleys to deny the 2AG reinforcement.

COMMANDER'S INTENT

The purpose of the operation is to destroy the OEF, thus denying the 2AG reinforcement. I expect to incorporate the full range of MSF and CFC air, naval, and SOF capabilities to execute a simultaneous, in-depth attack. I expect the end state to leave the MSF at 85% or better, vicinity of the DMZ, ready for follow-on missions.

Phase I: Reconnaissance

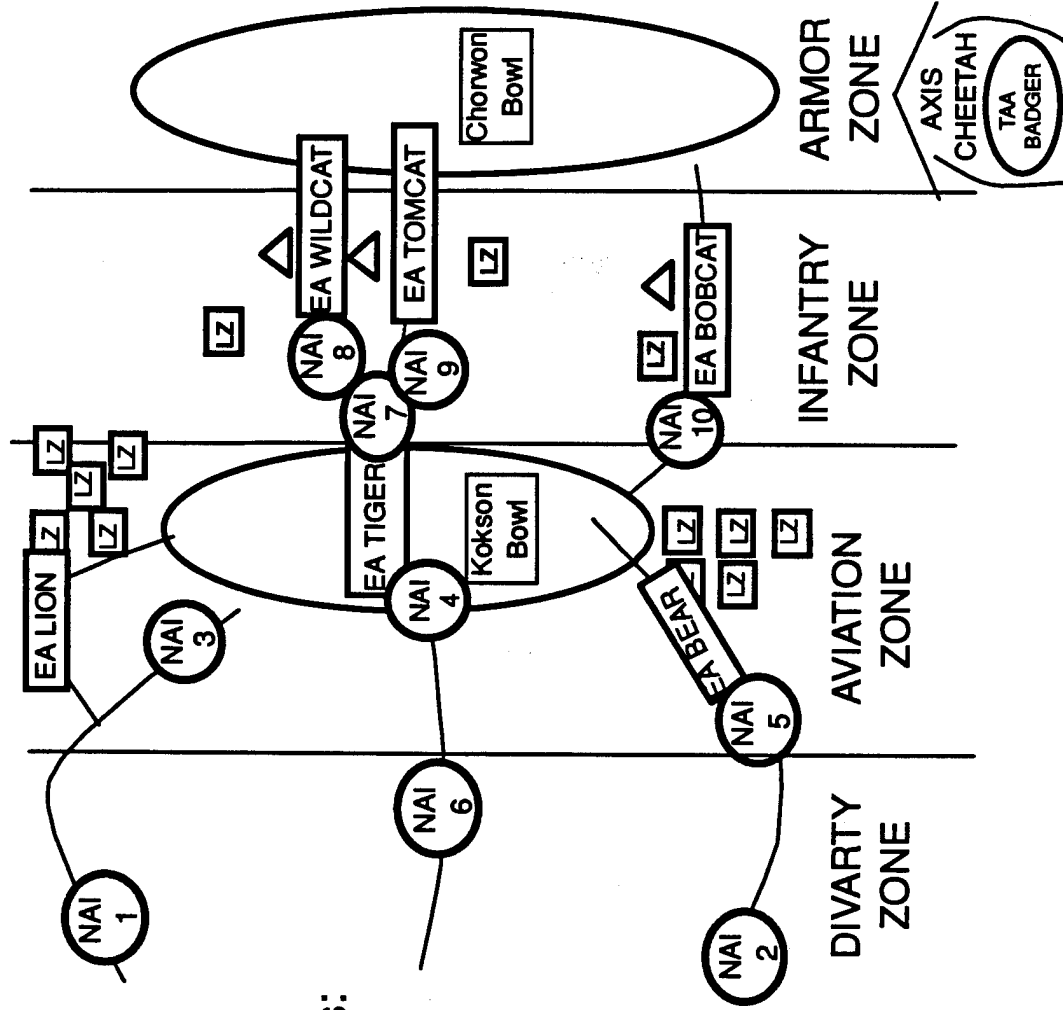
Phase I was the reconnaissance phase. Special operations forces (SOF) teams were used in the western named areas of interest (NAIs) 1, 6, and 2 to provide constant, uninterrupted observation. This determined H-hour, which was when the OEF began to move from their hide positions. The SOF teams were under the operational control of DIVARTY.

The 33rd Air Cavalry squadron flew a scout troop from the tactical assembly area (TAA) Badger, vicinity of Seoul, to the Chorwon Bowl to conduct a route recon along three avenues of advance to the Kokson bowl. These aircraft were preceded by a single Ferret on each avenue to seek and destroy threatening air defense assets. Upon reaching the Kokson bowl, the initial air troop returned to Badger. Following immediately after the first air troop, a second air troop conducted an area recon of the Kokson bowl and a route recon of the three avenues of advance until it found the lead elements of the OEF's lead brigades. The third air troop then conducted a screen, maintaining contact with the lead brigades while coordinating CAS to disrupt them.

UAVs were used to observe NAIs 3, 4, and 5. Three of the MSF's four GCSs were under the operational control of the aviation brigade commander to facilitate his control of these UAVs. These NAIs provided the trigger for engagement areas (EAs) Lion, Tiger, and Bear.

The MSF's Long Range Surveillance Detachments (LRSDs) were under the operational control of the light infantry brigade task force. They watched NAIs 7, 8, 9, and 10 which trigger EAs Wildcat, Bobcat, and Tomcat.

Phase I Reconnaissance (H to H+6)



- Reconnaissance assets will be OPCON'D to Brigades and positioned to observe NAIS throughout the area of operations:
 - ▶ Prior to H hour, SOF forces to DIVARTY zone.
 - ▶ H+00:30, RAS recons forward to lead element of OEF. On contact, screens and displaces as necessary.
 - ▶ H+3, UAVs to Aviation zone.
 - ▶ H+6, LRSD to Light Infantry zone.

Phase II: Positioning Attack Assets

Phase II was the Positioning of Attack Assets Phase. During phase II the MSF positioned its attack assets throughout its area of operations to prepare an ambush. Light infantry platoons were air assaulted into ten landing zones (LZs) just east of the Kokson bowl. These platoons secured the LZs and reported enemy contact. ATCAS and HIMARS batteries were flown to three of the ten LZs (those without enemy contact.)

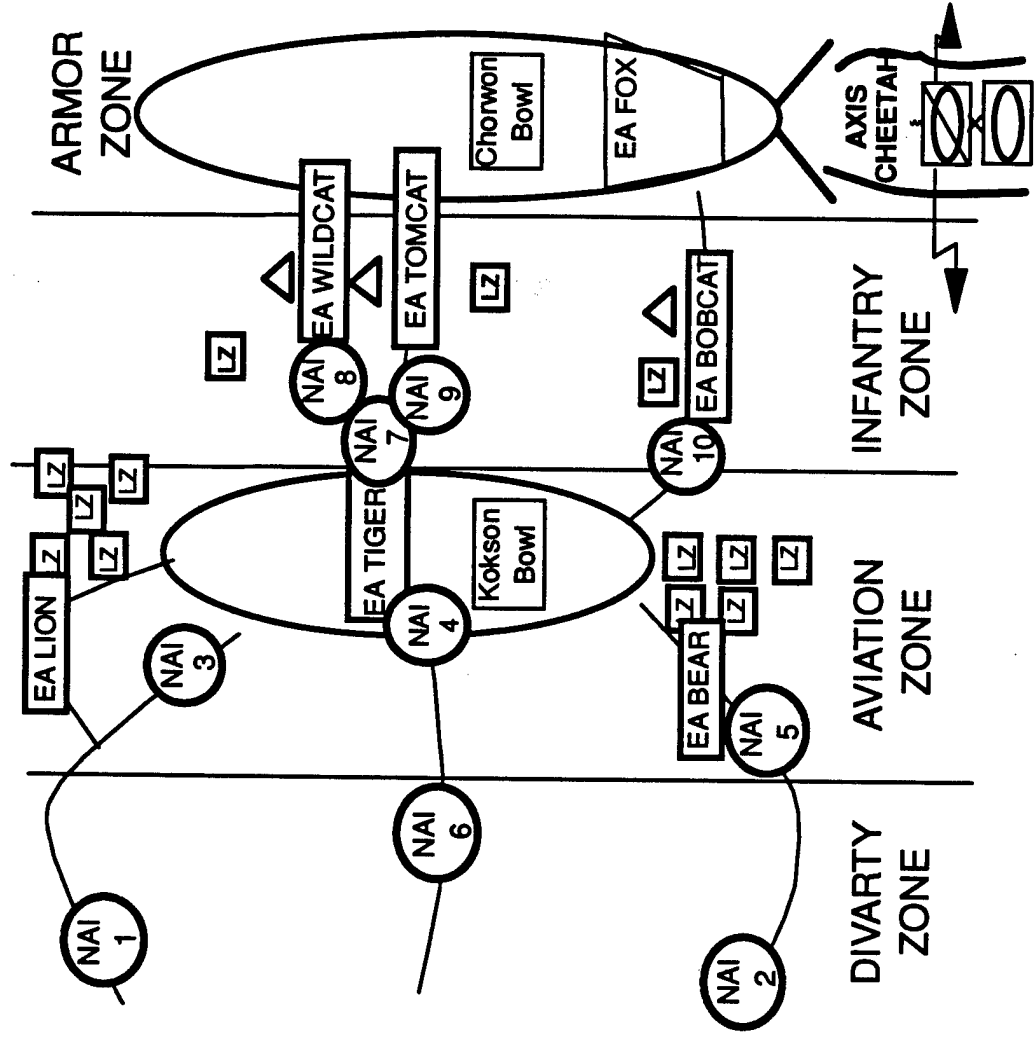
Pathfinders were flown into LZs around EAs Wildcat, Tomcat, and Bobcat. A light infantry company was air assaulted into the LZs to establish fire bases for precision guided 120 millimeter mortars. A light infantry company (-) was then air assaulted to establish observation positions around each EA.

The armor brigade task force moved along Axis Cheetah six and one half hours prior to the attack to position the Advanced Field Artillery System (AFAS), Paladin, ATCAS, and MLRS battalions around EA Fox.

Phase II

Positioning Attack Assets (H+23 to H+29)

- Attack assets are positioned in three zones, just in time:
 - Aviation - 1 HIMARS, and 2 ATCAS batteries inserted two hours before ambush.
 - Light Infantry - 3 EFOGM, and PGM platoons air assault into fire bases established by 3 light companies. Also 3 light companies will air assault into OP positions.
 - Armor - Brigade moves 6 1/2 hours prior to ambush, with remaining artillery, to establish a hasty defense.



Phase III: Ambush

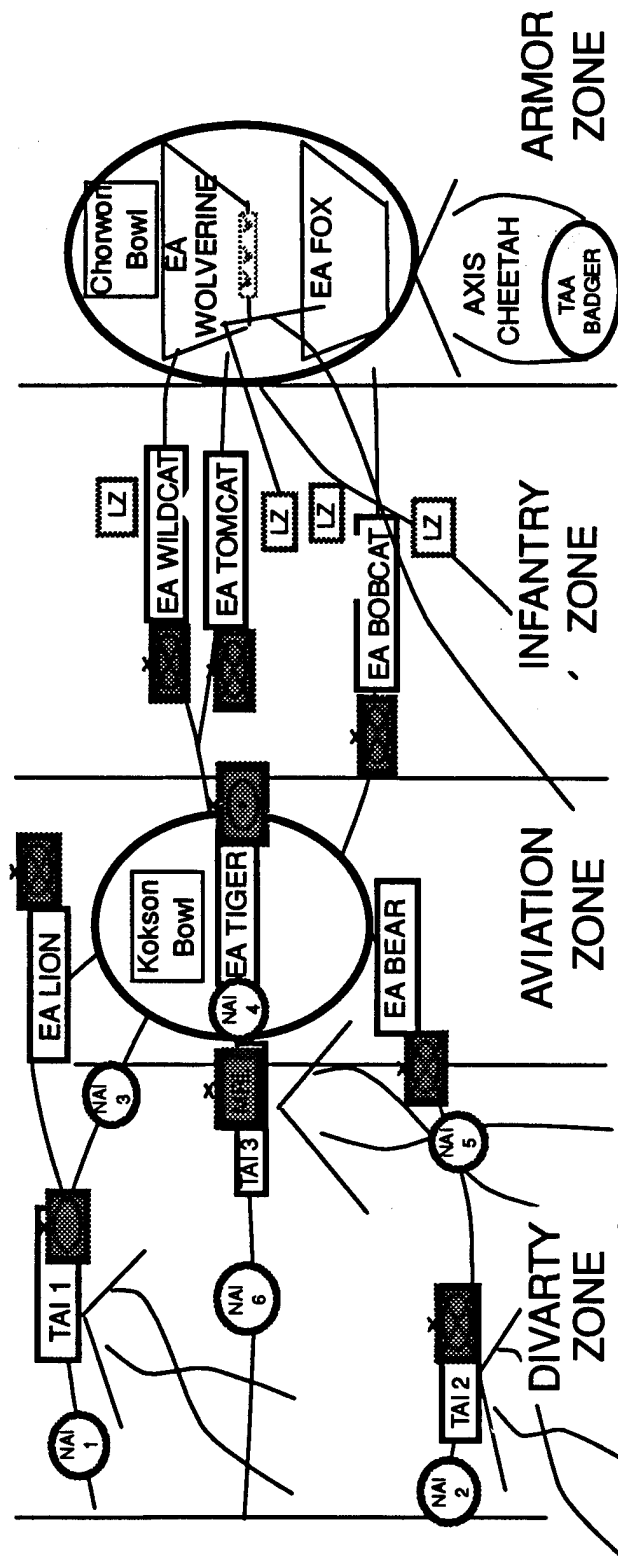
Phase III was the ambush. The ambush took place from H+30 (the time when the MSF's lead brigade recon troops entered the Chorwon) to about H+31.

The infantry brigade task force received priority of fires during this phase. The infantry zone was the most decisive point in the battle. Once committed, infantry which has been air assaulted is only foot-mobile and would have limited mobility, particularly in this terrain. Therefore, the timing for the ambush will be governed by the events in the infantry zone by the trigger being that at least two of the three OEF brigades must have entered the EAs within the infantry zone before the MSF's ambush could begin. The third OEF brigade was to be destroyed by the MSF's armor brigade task force in EA Fox as necessary.

The engagements coordinated by DIVARTY and the attack aviation brigade task force were flexible in the location of engagement areas. Attack aviation and ATACMS fires could be moved if their OEF brigade was farther east or west when the ambush was triggered. The DIVARTY ambush consisted of ATACMS, Intelligent wide area munitions (IWAM) and air interdiction. The aviation ambush included Apache and Comanche attack helicopters, HIMARS-delivered wide area munitions (WAM), ATCAS-delivered SADARM, and extended range enhanced fiber-optic guided missile (ER EFOG-M). The Infantry ambush included Crusader-delivered family of scatterable mines (FASCAM), ATCAS-, Paladin-, and MLRS-delivered SADARM, light weight 120 MM mortars firing precision guided munitions, and ER EFOG-M. The Armor ambush is to include close air support, JATT, RAH-66 Comanches, Volcano minefields, direct fire systems, and indirect fire engagements by Crusader and Paladin.

Phase III

Ambush (H+30 to H+31)



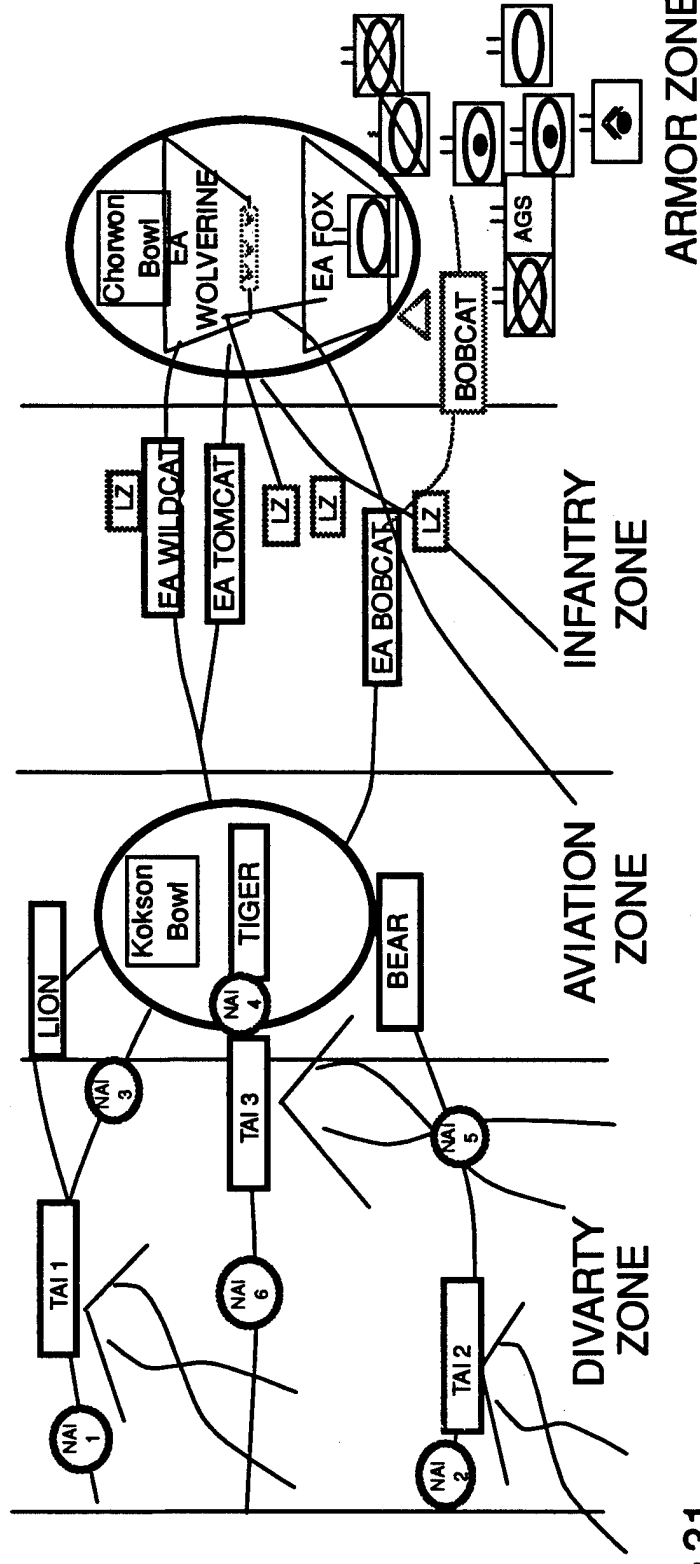
- The critical point in the ambush is in the infantry zone. At least two of three OEF brigades must be in infantry EAs to trigger ambush.
- The attack took place near simultaneously in four zones:
 - ▶ Light Infantry: PGM, ER EFOG-M, SADARM and FASCAM.
 - ▶ Aviation: 3 Attk Bns, SADARM, and WAM.
 - ▶ DIVARTY: 60-120 AI sorties, ATACMS, and IWAM.
 - ▶ Armor: CAS, JATT, Volcano, DF systems.

Phase IV: Exploitation

Phase IV was the exploitation phase. During this phase all remnants, battalion-sized or larger, were destroyed by attack aviation, close air support, and air interdiction. These strikes were synchronized by the brigade commanders in their respective zones. It was also during this phase that the armor brigade task force might have been required to fight the OEF's lead southern mechanized brigade, and therefore, would receive priority of fires.

Phase IV

Exploitation(H+31 to H+34)



- H+31,
 - ▶ DIVARTY synchronizes CAS and AI as needed to destroy remnants in zone.
 - ▶ The Aviation and Infantry Brigades commit attack aviation to destroy remnants in zone.
 - ▶ The Armor brigade on order destroys a mech brigade in EA Fox or remnants in the Chonwon bowl.

Phase V: Reconstitution/Repositioning

Phase V was the Reconstitution and Repositioning phase. During this phase all of the MSF returned to the TAA Badger to prepare for follow-on missions. This phase was complete when all units were at 90 percent strength and had 90 percent of their combat load restored.

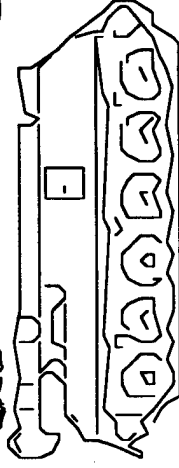
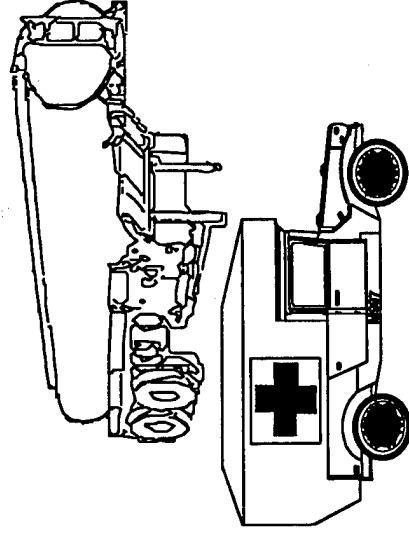
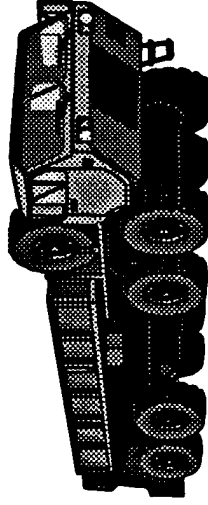
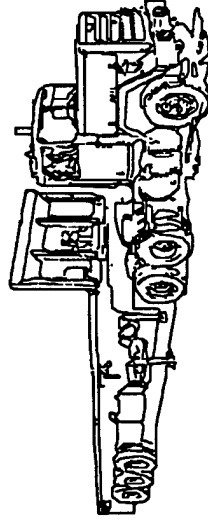
In summary, the MSF's mission was to destroy the OEF, 12th Mechanized Corps. It did this by conducting a simultaneous in-depth attack with four brigades while retaining over 85 percent combat power.

Phase V

Reconstitution/Repositioning

(H+34 to H+38)

- All emplaced assets will withdraw during phase 5.
 - ▶ Priority for extraction of deep assets is:
 - ATCAS
 - HIMARS
 - LRSD
 - Air assault companies
 - ▶ Assets will begin extraction after ambush is complete.
- The Armor brigade withdraws to TAA Badger.
- The MSF prepares for future operations.



Alternatives

Five alternatives were addressed during this analysis. The first was the reference case, which consisted of the same MSF force structure that was used in the Prairie Warrior 95 student exercise. This run was made at the request of the study customer, BLITCD. The intention of this run was to establish a reference against which the base case MSF could be compared. Although beyond the scope of this analysis, it could also be used as a benchmark against which any comparisons to PW 95 could be made.

The second run was the base case which consisted of the reference case force structure plus the technologies indicated. These technologies originally had been intended to be in the PW 95 student exercise, but were unable to be adequately represented in the software supporting that exercise. Thus, they were included in this analysis at the request of the study customer, BLITCD. Although available for the operation, not all technologies were used (e.g., Advanced Precision Airborne Delivery System (APADS) was not used because there was no requirement for that kind of resupply). The systems not used in the operation are indicated by an asterisk. A comparison of the base case with the reference case was intended to provide the study customer a general measure of the changes in lethality, survivability and tempo due to the added technologies. The main purpose of the base case, however, was to serve as the basis of comparison for the three remaining tailoring runs. See Appendix C, Additional 2010 Technologies, for a list and brief description of the additional weapons systems.

The three tailoring runs were made to determine changes to the MSF force structure to improve tempo, survivability and lethality. The tailoring runs were made by repeatedly applying the TRAC developed FORT-T and VIC. A detailed description of this process is presented in subsequent charts. The intention of each of the tailoring runs was to identify changes to the MSF that were necessary to improve each warfighting characteristics (i.e., tempo) where it was considered three times more important than the other two characteristics (i.e., survivability and lethality). This was repeated until the MSF structure was tailored, in turn, for each of the three warfighting characteristics.

Alternatives

- Reference case - PW organization and technologies
- Base case - Reference case plus ...
 - ▶ Enhanced Land Warrior
 - ▶ Tank 1080
 - ▶ Command Guided 2.75" Rocket
 - ▶ MLRS w/GPS Guidance
 - ▶ LCCM
 - ▶ Improved FOX
 - ▶ Chem/BIO Standoff Detection
 - ▶ Multi-spectral Smoke *
 - ▶ Intelligent Minefield/WAM
 - ▶ Deep Attack WAM
 - ▶ ASTAMIDS / GSTAMIDS *
 - ▶ APADS *
 - ▶ Common Ground Station
 - ▶ IEW Common Sensor
- Alternative 1 - Base case tailored for tempo
- Alternative 2 - Base case tailored for survivability
- Alternative 3 - Base case tailored for lethality

* Not used in the scenario

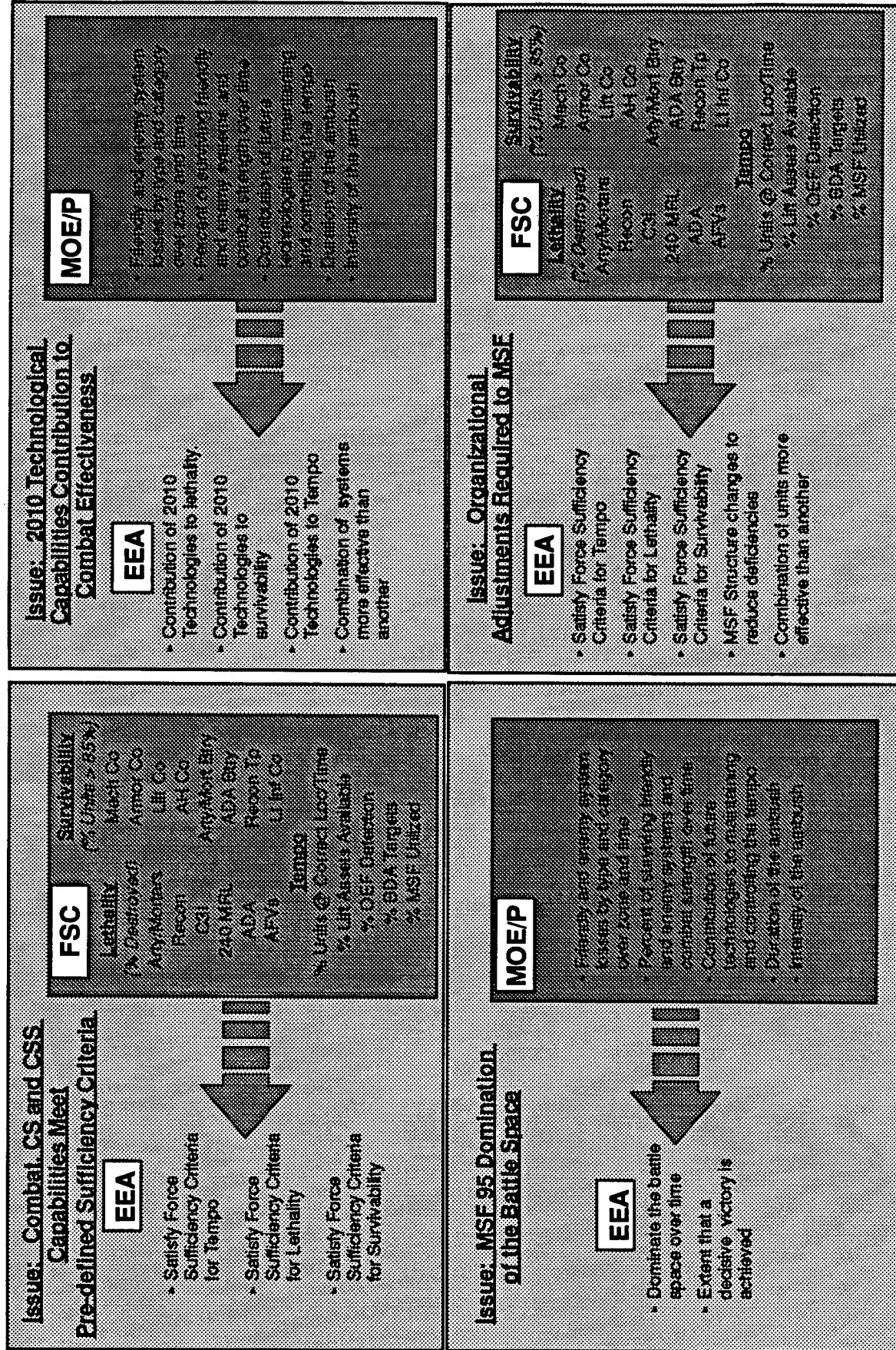
Analysis Approach

The analytical structure for this analysis employed essential elements of analysis (EEA) for each of the four issues, and then determined what measurements could be made by the VIC constructive simulation to evaluate each of the EEA. Some EEA were used to address multiple issues. The measurements generally fell into three classes: measures of performance (MOP), measures of effectiveness (MOE), and force sufficiency criteria (FSC). The MOP and MOE used in this analysis examined losses, surviving combat strength, duration of the ambush, and FSC goals met. See Appendix F, VIC Description, for a description of the VIC model.

The first study issue was addressed by three EEA which examined the extent to which the various alternative MSF structures satisfied pre-defined sufficiency criteria for tempo, lethality and survivability. The second issue was addressed by three issues which examined the contribution of 2010 technologies to tempo, lethality and survivability and one issue to examine whether combinations of systems employed together were more effective than employed separately. The third issue was addressed by two issues that examined the degree the MSF dominated the battle space and achieved a decisive victory. The fourth issue utilized the EEA from issue one that examined the extent to which the various alternative MSF structures satisfied pre-defined sufficiency criteria, plus the EEA from issue two that examined combinations of systems, and an EEA that examined force structure changes to reduce deficiencies.

The FSC goals are a set of values for various aspects of the warfighting characteristics of lethality, survivability and tempo. The FSC were developed by examining the scenario, the MSF commander's mission statement and intent, and input from SMEs. In his mission statement, the MSF commander directed the MSF to reduce the OEF to 40 percent combat strength. This was further subdivided by experienced Army officers into specific FSC lethality goals for destruction of OEF systems by type. The OEF losses were compared with the FSC lethality goals to see if they were met. Through a similar process, the FSC goal for survivability became 100 percent of the MSF units to survive at 85 percent of their combat strength or better. Tempo is not quantifiable as a single value. Accordingly, four different factors were measured in an effort to get a handle on tempo. After comparing the FSC goals with the scenario and results, it was found that the percent of units at the correct location and time was based on input from the operation plan and did not vary. Also, the percent of MSF units utilized and percent of OEF units detected were derived from the same set of data which was the list of MSF units which fired on OEF units. It was assumed that if a OEF unit was fired on it had been detected by the firing unit and also the firing unit was engaged in the battle. A fifth factor designed to measure a unit's ability to conduct battle damage assessment (BDA) was not used in the analysis due to the difficulty in obtaining reliable measurements from the VIC output. It was decided that the duration of the ambush was the best available measure of Tempo.

Analysis Approach



Vector-in-Commander

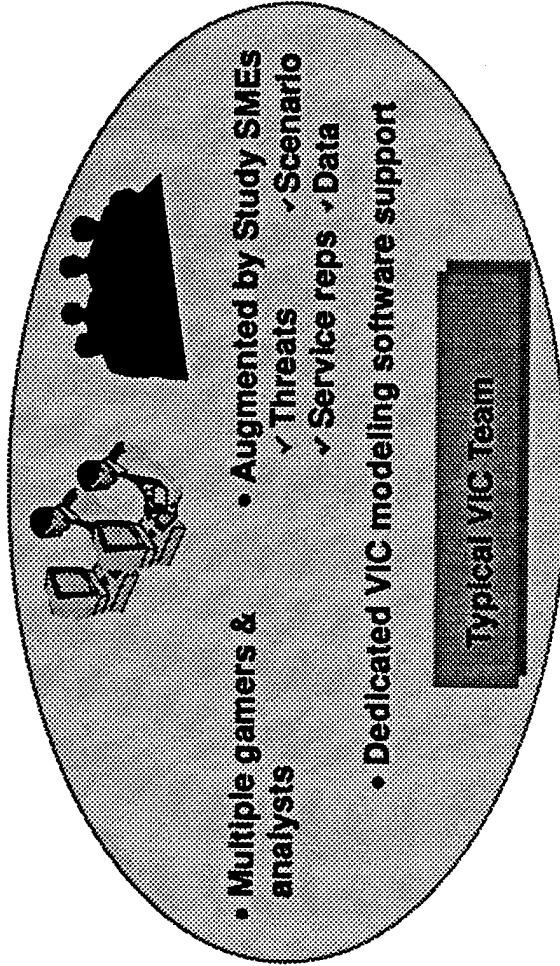
The constructive simulation used in this analysis was the Vector-in-Commander (VIC) model. The VIC model is an automated, combined arms, force-on-force simulation representing land and air forces at the U.S. Army corps and division levels. VIC is deterministic, event-sequenced, and Lanchester equation based. The normal level of resolution is battalions for maneuver units, batteries for artillery and air defense units, troops for cavalry units, and companies for helicopter units. The model portrays ground maneuver units, whose movement through a pre-defined network of unit paths is controlled by a set of tactical decision rules (TDRs). The TDRs determine the actions (e.g., advance, attack, call for fire, defend, withdraw) of a unit based on its perception of a number of dynamic parameters such as local force ratio, unit strength, and loss rate. Additionally, there are decision rules for brigade, division, army, corps, and front to control reserves, combat support, and combat service support. VIC is modular which allows the user to control system representation level in the various functional areas. See Appendix F, VIC Description, for a description of the VIC model.

Enhancements made to the VIC model for the MSF analysis include portrayal of the Ferret missile, improved minefields with new representations for intelligent wide area minefields (IWAM), 'Proactive' Logistics, Airborne Standoff Minefield Detection System (ASTAMIDS), Improved FOX - Nuclear, Biological, and Chemical (NBC) detections, and the development of a corridor methodology improving C2, situational awareness, and survivability for army aviation.

Vector-in-Commander (VIC)

Characteristics

- Corps w/Theater slice in Joint context
- Represents: maneuver, fire support, C4I, CSS, engineer, ADA, NBC
- Resolution:
 - Maneuver - Co/Bn
 - TACAIR - Flight
 - Aviation - Co
 - Artillery & ADA - Launchers
 - Intel - Sensor Platform
 - Engr - Teams
 - CSS - Convoy's & Repair Teams
- AMSAA/ARL data and algorithms
- Deterministic, event-sequenced
- Mode of operation: batch, interruptible
- ALSP compliant, DIS in development



Specifications

- 350K lines of code
- SIMSCRIPT language
- SUN, HP, SGI, VAX, CRAY
- Graphical-user interfaces
- 2-4 Gamer/Analysts per Study

Joint Representation

<u>Air Force</u>	<u>Navy</u>	<u>Marines</u>
Fixed Wing	Fixed wing	Fixed wing
Guardrail	Rotary wing	Rotary wing
JSTARS	UAV	LAV
	Naval gunfire	Hawk - ADA

Force Tailoring Tools (FORT-T)

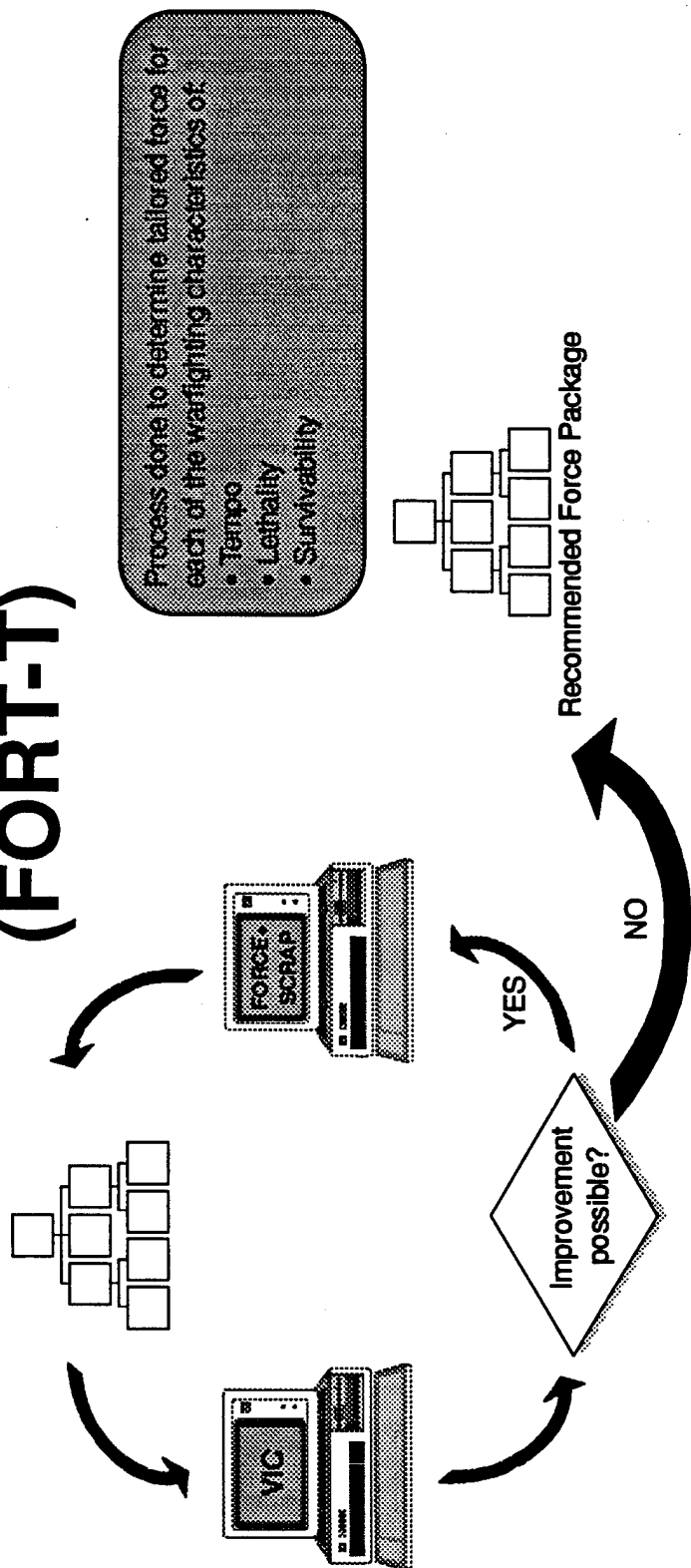
FORT-T were used to assist the analyst in determining the force structure for the MSF with the best lethality, best survivability, and best tempo. The base case was the starting force package. The force was portrayed in the constructive simulation VIC. If the force met all of the FSC goals, it was determined to be the best force package. If the force performed less than the previous force package, the previous force package was determined to be the best force package. If the force performed better than the previous force package, but not all FSC goals were satisfied, two tools of FORT-T were used to determine what changes to the force package were necessary.

Sufficiency Criteria for Realignment Adjustment Processor (SCRAP), a spreadsheet tool, was used to determine how well each of the units contributed to each of the FSC goals. The contributions were summed to get an overall assessment for each type of unit. This assessment then permitted identification of those units contributing the least to the force. This analysis, in conjunction with military judgment, was used to determine which units to delete from the force package.

Force Package Logic Utility System (Force-PLUS), an expert system, was used to determine which units to add to the force package. Unit capabilities were determined with coordination from respective SMEs. The expert system was searched to find units most capable of improving the force in the FSC where it performed the poorest. Again, military judgment was used in conjunction with Force-PLUS to determine which units to add to the force package.

Typically, no more than four iterations are required to find the best force package. This process was done to find the MSF with the best survivability, then the MSF with the best lethality, and then the MSF with the best tempo.

Force Tailoring Tools (FORT-T)



Sufficiency Criteria Realignment Adjustment Processor (SCRAP)

- Use SCRAP for each type of unit to:
- Determine contribution to each FSC goal
 - Calculate improvement to goal if deleted
- Identify candidates for deletion
- Elimination would improve force's achievement of goals

Force Package Logic Utility System (Force-PLUS)

- An expert system capturing subject matter expertise.
- Each unit has an associated significance level that measures its contribution to an FSC.
- Search for units that improve the force in the areas where it performed the worst.

Analysis of Results

The analyses of the results of the base case VIC run is presented next. The base case results are the basis of comparison for the VIC results of the alternative force structures suggested by the FORT-T process. They are reported in detail by warfighting characteristics. Following the base case is a brief, top-level contrast of the base case results to the reference case results. Next, the results of tailoring the MSF for the three warfighting characteristics (tempo, lethality, and survivability) are presented. Each iteration of the process to adjust the structure of the MSF to reach the recommended force package is described. Finally, the findings are summarized with respect to the four major issues addressed by this analysis and a summary of the findings.

Analysis Results

- Base Case
 - ▶ Survivability
 - ▶ Lethality
 - ▶ Tempo
 - ▶ Battlespace Domination
 - ▶ Comparison with Ref Case
- Tailored Force Packages
 - ▶ Survivability
 - ▶ Lethality
 - ▶ Tempo
- Results by Study Issue
- Summary

Base Case Survivability

While executing a very high risk operation, the base case MSF force survived at rate of 96%, losing less than 10 combat systems overall. The FSC survivability goal is for 100% of company-sized units to survive at or above 85 percent strength. The survivability goal was set without considering RAM losses to unit strength. When RAM losses were added to combat losses, the base case MSF still achieved 96% of its FSC goal.

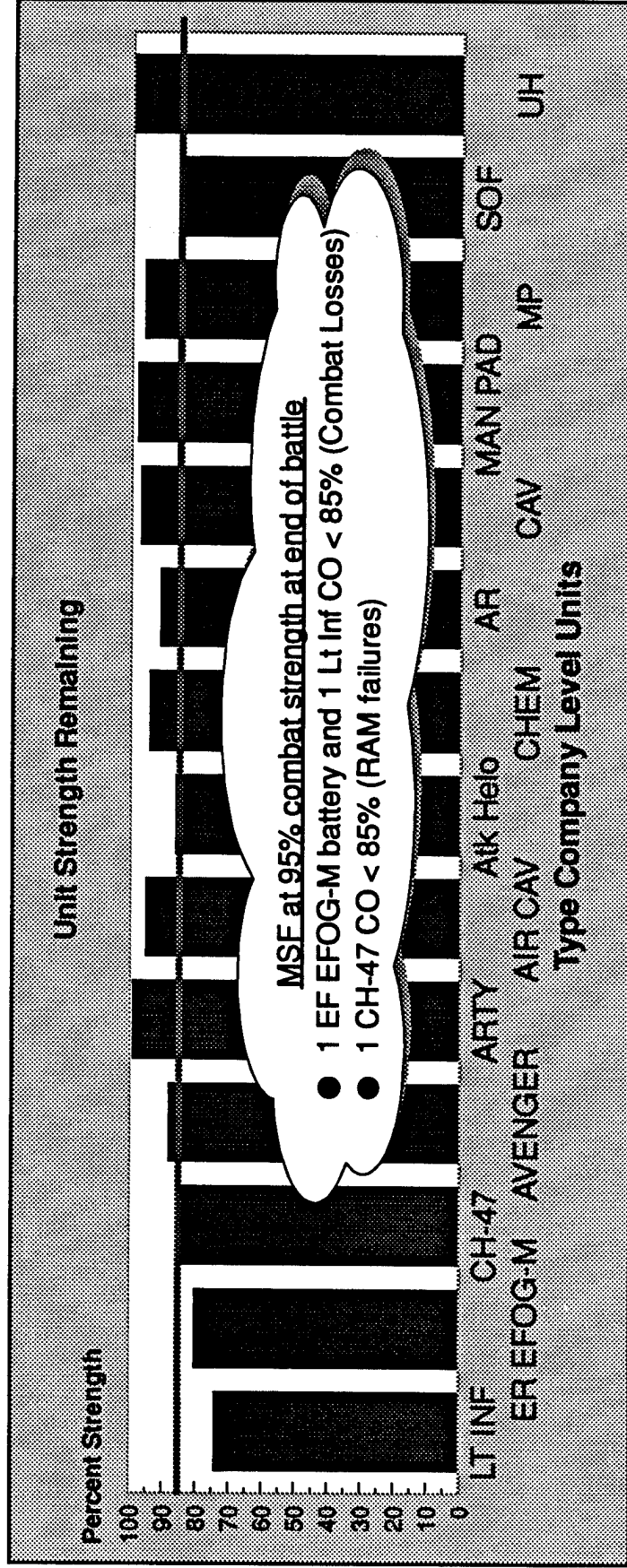
The chart below shows the strength remaining of the lowest strength company level unit by type. The line is the minimum strength goal of 85% for each company.

Losses occurred from combat and reliability, availability, and maintainability (RAM) failures. Combat losses occurred when a ER EFOG-M section with 8 systems and its defending light infantry company were air assaulted into a deep strike position very near one or more Homeland Defense Force (HDF) units. These deep strike positions had been cleared before the troops were brought in, however, in this case the HDF was close enough to detect these blueland units and reacted to their presence by attacking them. The ER EFOG-M section lost half of its systems (4) and the infantry lost 26% of its strength. The ER EFOG-M battery that section was from survived with 80% of its combat strength overall. These HDF units are small, lightly equipped, foot-mobile, and not detectable by JSTARS. With so many of these units spread across the area of operations, it was virtually impossible to detect them and avoid contact with some of them.

One CH-47D company fell below 85% to 84% strength due to RAM failures. Lift helicopters were utilized within accepted norms for their employment. Attack helicopters met the FSC survivability goal with 99.5% of the attack helicopters operational at the end of the operation. Even though the FSC survivability goal was established with only combat losses in mind, the MSF achieved 96% of its FSC survivability goal considering both RAM and combat losses.

Note: See Appendix I, Base Case Results.

Base Case Survivability



The Base Case MSF was very survivable

Base Case Lethality

The MSF reduced the OEF to 50 percent strength in five hours. Although the OEF was combat ineffective; it possibly retained enough combat power to reorganize and continue the mission. A review of the results revealed not all FSC goals were met, e.g., OEF C3I vehicles were reduced by 28 percent, not 70 percent as planned. The goal of the MSF commander was to reduce the force to 40 percent strength in as short a period of time as possible.

The armor brigade task force was considered a "catcher's mitt" for the ambush by SMEs from the armor and infantry centers. Its primary purpose was to "catch" and defeat any forces which escaped the ambush and continued east into the Chorwon bowl. This zone, surprisingly, witnessed no direct fire battle, despite the fact that the MSF fought a full strength mechanized OEF brigade in that zone. The indirect fires provided by the Paladin and Crusader battalions, coupled with a FASCAM minefield, succeeded in defeating this brigade. The most significant kills in the armor zone came from SADARM cannon fires.

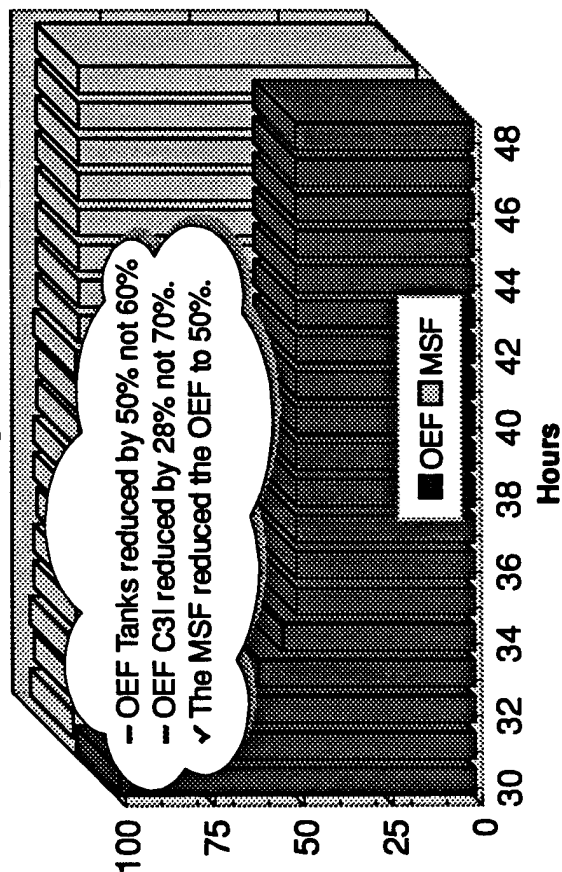
In the infantry zone, the precision munitions fired by the light weight 120 MM mortars resulted in a surprising 124 OEF systems kills. Also, the ATCAS battery, which was air assaulted to a fire base supporting the northern engagement area in this zone, provided a significant quantity of kills (62). Because the two remaining brigades in the infantry zone were defeated, the criteria for the commitment of the brigade reserve was not met and it was not employed.

In the aviation brigade task force zone, attack aviation proved highly lethal and was responsible for the greatest number of kills (683). It engaged targets in two major surges during the ambush and exploitation phases.

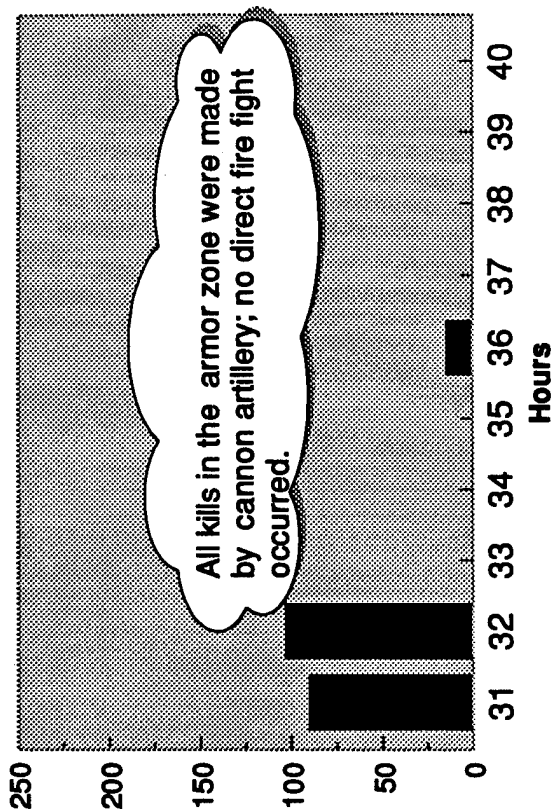
The DIVARTY task force fired their missions in two periods during hour 30 and 33. These represented hours in which 54 ATACMS struck the OEF within the three target areas of interest (TAIs) which resulted in 207 kills of OEF systems.

Base Case Lethality

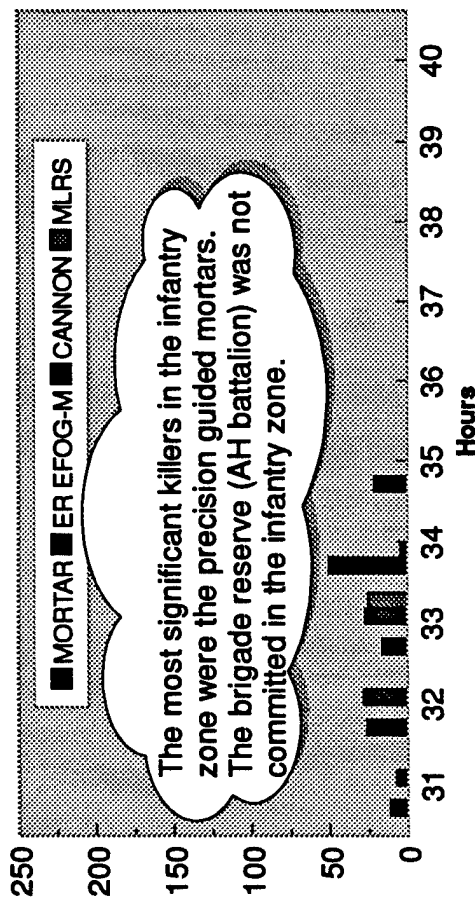
Percent Remaining Combat Strength



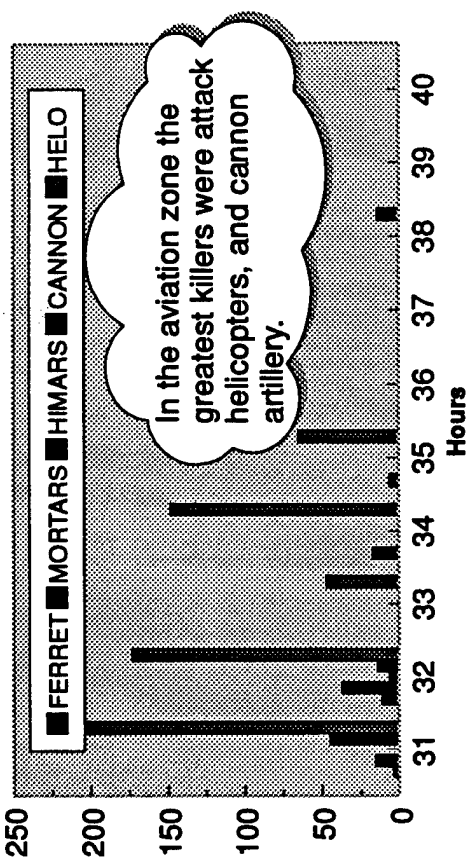
Armor Zone Kills by Hour



Infantry Zone Kills by Hour



Aviation Zone Kills by Hour



Lethal Base Case Systems

The most lethal system in the MSF was the attack helicopter (AH). It killed a large quantity of systems with direct fire precision munitions and has range and mobility unequaled by all systems except ATACMS and Air Force fixed wing. AH kills were double those of cannons, the next most lethal systems.

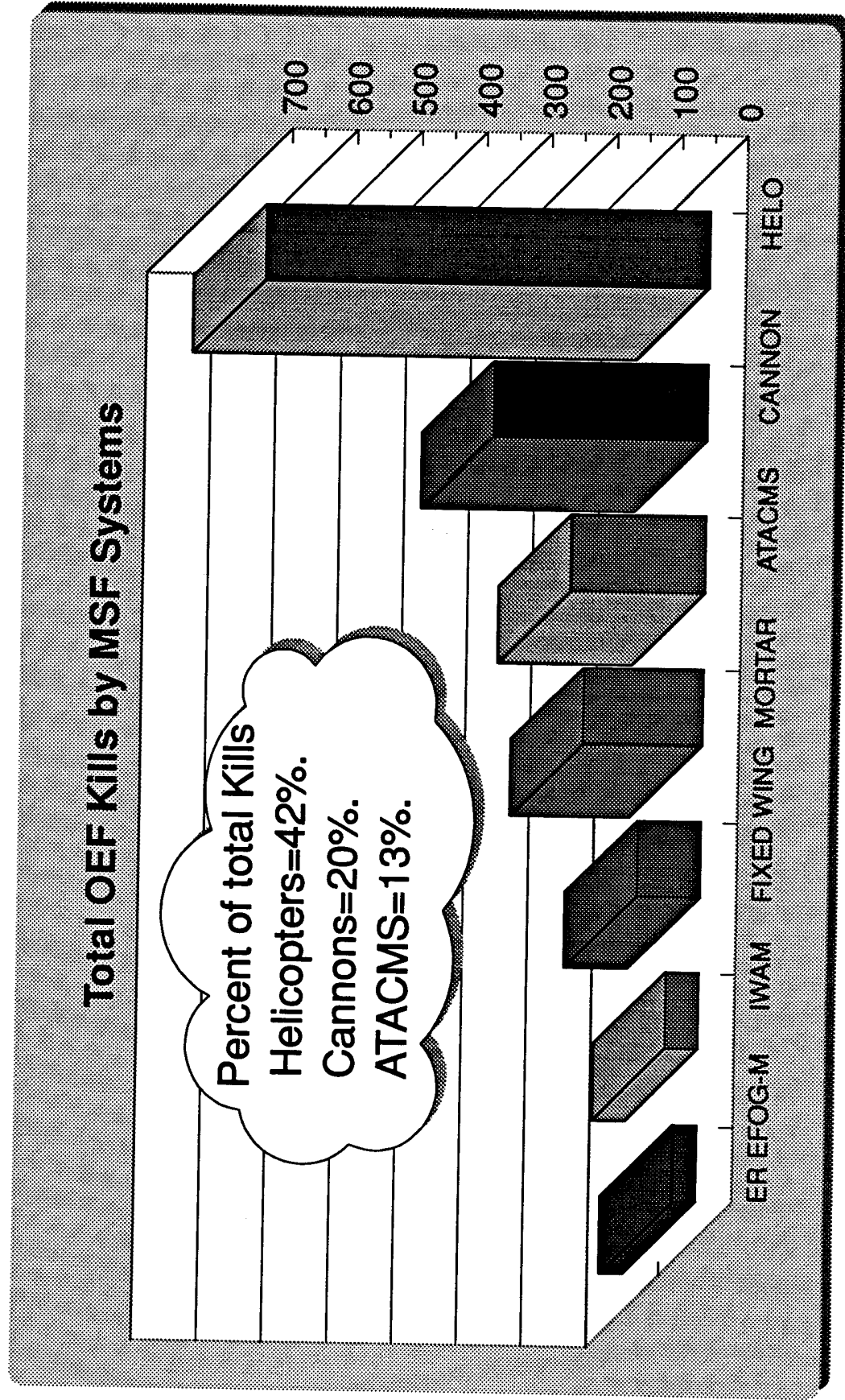
Several factors contributed to the success of the AH. The AH was used only at night after suppression of enemy AD (SEAD) missions cleared the way for them. Also, the OPFOR was moving only at night on a very restricted road network with only a few radar directed AD systems. The ferret guided missile was flown ahead of the AH missions to detect and surgically remove the remaining radar directed AD systems. The AD systems were either killed or avoided because the on digitized battlefield, the AH were aware of any remaining areas of dense AD systems. The non-radar equipped systems belonging to the HDF had very limit night target acquisition capability which was the eyes of the crewmen.

Cannons were very lethal, and the air assaultable ATCAS was the most lethal. By deploying ATCAS in deep fire bases, the number of available targets was greatly increased. SADARM was the primary munition for MSF cannons fired against tanks, armored fighting vehicles (AFVs), and SP artillery pieces. Additionally, forward observers were equipped with laser target designators or in the case of the light infantry, the enhanced Future Land Warrior (FLW).

ATACMS produced a very high percentage of the total kills, 13%, considering that only 54 block II rounds were fired. These engagements were combined with the delaying and shaping effects of IWAM to produce high results in a very short time frame. It is arguable that an increase in ATACMS would increase the lethality of the force; however the study was constrained as to the number of ATACMS allocated to the MSF in theater in 2010.

The ER EFOG-M was employed in a deep fire base. Three factors affected the contribution by the ER EFOG-M. First, there were only eight systems placed in the deep fire base and then four of these systems were destroyed in a close battle with the HDF units. Also, the extended range capability was not an advantage because the average line of sight was about 900 meters in the mountainous terrain. The ER EFOG-M did contribute 37 kills to the base case results.

Lethal Base Case Systems

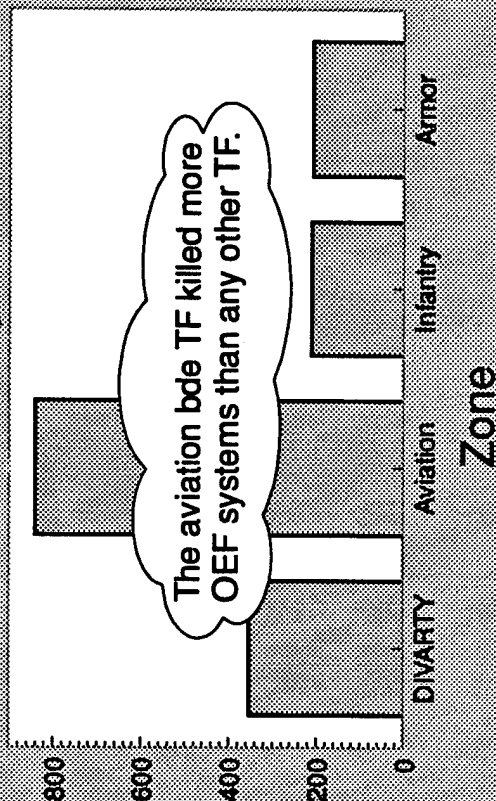


Effective Combinations

Attack helicopters (AH) were the most lethal system in the MSF, but they were not employed alone. The ATCAS and HIMARS also fired into the aviation zone. UAVs were the triggering mechanism for the aviation brigade task force to launch their attack companies. Targeting for the AH companies as well as the ATCAS and HIMARS batteries was also done by UAVs. ATCAS and HIMARS fired FASCAM and WAM and AH emplaced volcano into engagement areas. These mines slowed the targeted units permitting more systems to be killed by the precision munitions. The synergistic effects of these systems produced the largest number of systems kills than in any other zone, over 800 OEF systems. The greatest combined arms effect was produced in the aviation zone.

Effective Combinations

MSF Total Kills by Zone



Aviation Zone

- AH most lethal system
- ATCAS (SADARM) killed systems.
- Mines delayed systems, providing more targets to AH and ATCAS.
- UAV provided precision targeting for indirect fires and launch timing to AH.

Attack aviation very effective when combined with:

Indirect Fire (ATCAS/HIMARS)

Targeting sensors (UAV)

Countermobility systems (WAM/FASCAM)

Base Case Tempo

Analysis of tempo was difficult to accomplish since it takes different forms depending on the situation at hand. There is no one thing to measure to determine tempo. Generally, tempo is thought of as the timing associated with an operation and can be manifested as decision cycle time, situational awareness, tactical mobility, and the ability to get a high percentage of the force into the fight. For this analysis, the measures for tempo were taken to be percent units at the correct location at the correct time, percent lift assets available, percent OEF detected, percent BDA of OEF targets, and percent of MSF units utilized in the operation. In actuality, we were not able to collect meaningful measurements on all five of these data elements. As the analysis unfolded, it became apparent that the most important measure of tempo in this operation was the duration of the ambush. For this analysis, the duration of the ambush was defined to be the time it took for the ambushing units to fire their combat loads of precision munitions they took to the ambush. Once these combat loads were fired, these units could be extracted from behind enemy lines. Thus, the time these forces were at risk was directly related to the duration of the ambush.

The MSF had adequate sensors, target analysis and processing systems to monitor all of the NAs designated in the intelligence collection plan and provide situational awareness of the OEF. Since this entire operation was based on the MSF's capability to fire precision munitions, the duration of the fire missions were investigated by comparing the times the systems were capable of firing their combat loads (assuming immediate availability of targets) to the times actually measured during the combat simulation runs. The finding was that it took significantly longer to actually fire the combat loads than planned. The implication is that the capability of the MSF to fire precision munitions exceeds its capability to find and/or process targets which ultimately results in increasing the duration of the ambush. The impact of additional precision sensors on the ambush time was investigated during the tailoring runs.

The MSF possessed the mobility required to execute the Counterattack Plan in Northeast Asia (NEA). All units, planned to be deployed, were deployed to their forward positions at the right times, but not all the MSF units were planned to be deployed. One of the major criteria in the evaluation of tempo was the maneuver of fires and effects. The MSF O&O concept, on which the counterattack plan was based, called for a placement of just enough assets, just in time. However, there was no attempt to commit 85% of the MSF to the fight - the FSC goal. It was possible to add more units to the ambush than was planned as the analysis will show. These additional units did increase the lethality of the force in their particular zones and improved tempo by decreasing the time required for the ambush.

Base Case Tempo

Tempo FSCs

- % Units Correct Loc/Time
- % Lift Available
- % OEF Detected
- % BDA of Targets
- % MSF Utilized

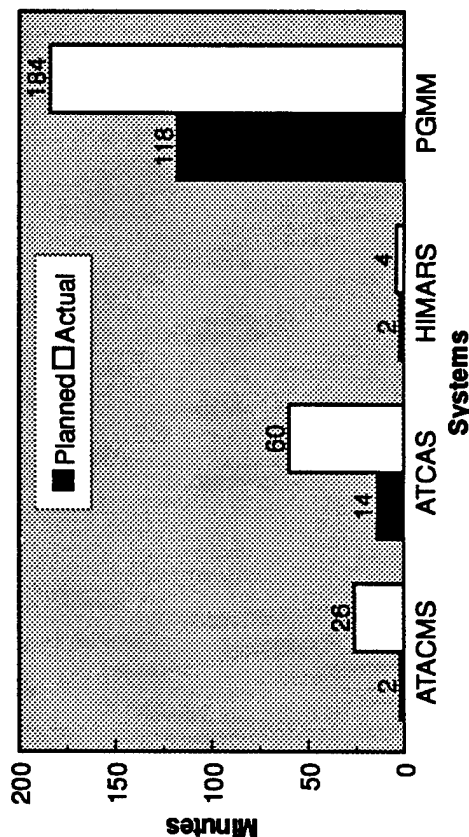
Ambush Duration

Situational Awareness

- ✓ Adequate assets to cover all NALs.
- ✓ Able to conduct some BDA and precision targeting within engagement areas

Increased time to accomplish ambush

Duration of Fire Missions



Mobility

MSF possessed mobility required to execute plan.

- ✓ All units planned to be deployed, were deployed.
- ✓ Just enough, just in time.
- ✓ No attempt to commit 85% (FSC goal).

Maintaining and Controlling Tempo

The primary systems which influenced tempo included the Comanche and Apache attack helicopters, HIMARS, ATCAS, the UH-60, the CH-47 and ATACMS Block II. It was their contribution which provided the MSF the mobility and agility required to strike the OEF after it was deployed over a battlespace of more than one hundred kilometers in depth. The CH-47D and UH-60 lift helicopters were key systems for tempo in terms of mobility that rapidly positioned combat systems to effectively strike the OPFOR. The high level of tempo provided by these systems enabled the MSF to dominate the battlespace and achieve a decisive victory.

The importance of achieving such a high level of tempo is best exemplified by the extremely high volume of ATACMS kills in the DIVARTY zone and attack aviation kills in the aviation zone during the first two hours of the ambush (hours 31 and 32). In both of these zones, it was key that these strikes occur at the beginning of the ambush against massed convoys of OEF units because, after the first two hours, kills slowed due to the fact that the OEF units were much less dense due to dispersion and attrition.

The ambush lasted notably longer in the infantry zone than in the others. In fact, it lasted six times longer than the aviation zone and twelve times longer than the DIVARTY zone. This can be explained by the limited mobility of the primarily sensors applied in the infantry zones. Given the very restrictive terrain and short line of sight, HUMINT provided by dismounted infantry soldiers was severely limited in terms of the quantity of targets visible to the observer at any one time. The ambush duration was measured in the infantry zone by the length of time required to expend the planned combat load of precision guided mortar. Exploitation did not occur in the infantry zone because preconditions (the survival of an OEF battalion sized element after the ambush in sector) were not met for the commitment of the aviation reserve.

Maintaining and Controlling Tempo

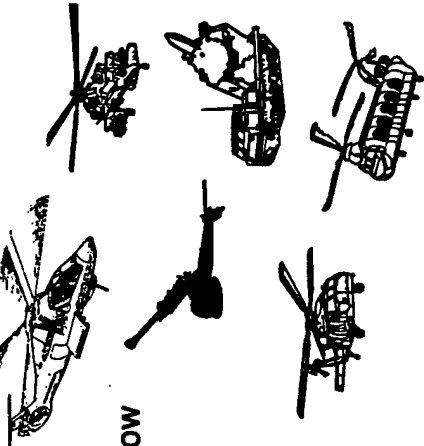
SYSTEMS INFLUENCING TEMPO

LETHALITY

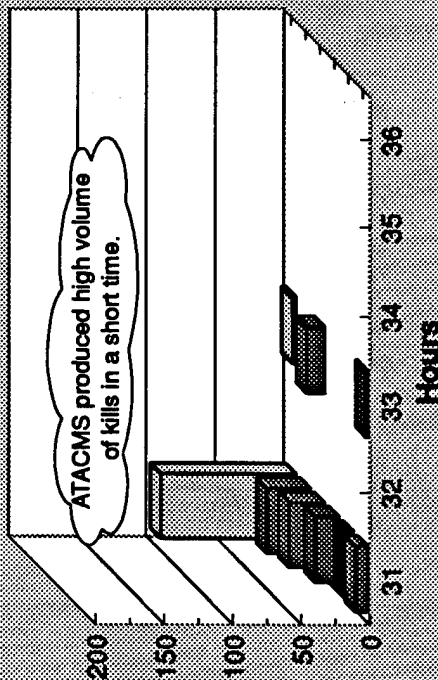
- RAH-66 Comanche
- AH-64 Apache Longbow
- HIMARS
- ATCAS
- ATACMS Block II

MOBILITY

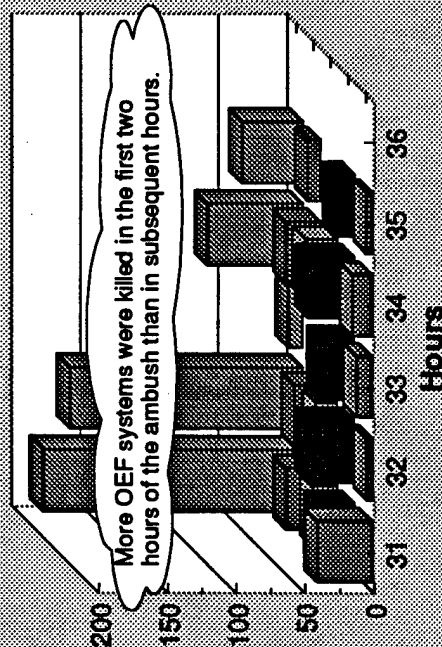
- UH-60 Blackhawk
- CH-47D Chinook



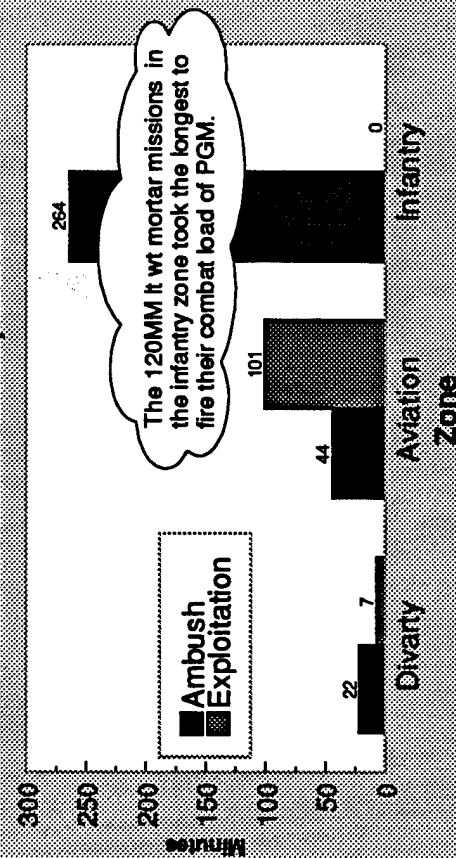
OEF Losses DIVARTY Zone



OEF Losses Aviation Zone



Time for Ambush and Exploitation



Battlespace Domination

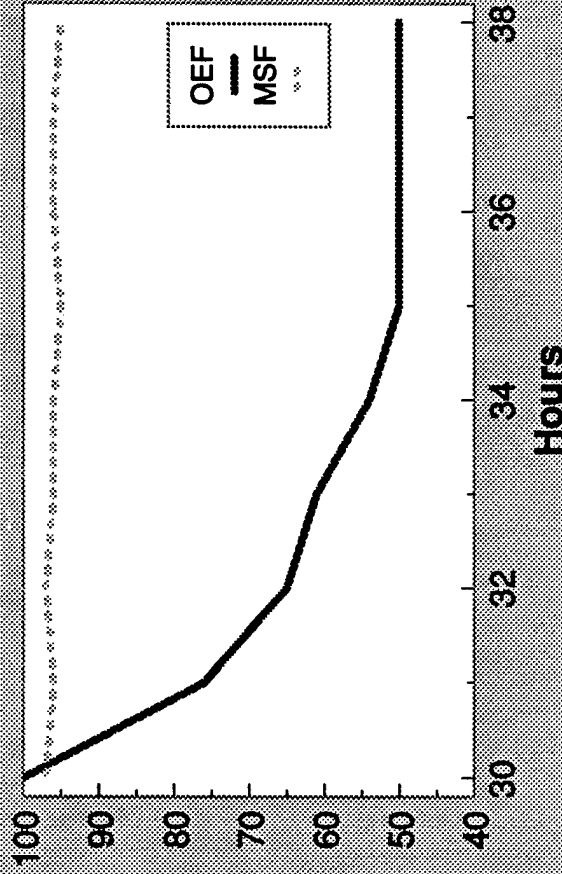
The base case MSF dominated the battle space during a six-hour attack, attacking the OEF simultaneously and with violent results. The steep decline of OEF combat power between hours 30 and 31 represented a tremendous shock effect upon the command and control of the OEF. To properly assess this effect, one should remember that at hour 31 the OEF is extended over 100 kilometers from hide sites just south of Pyongyang all the way to the Chorwon bowl. The OEF commander, after such an attack, lacked the capability to respond by committing a reserve or firing counter battery fire. His only efforts could be the reorganization of the remaining force and an attempt to continue the mission.

The OEF was reduced to 50 percent strength in five hours. The MSF goal was to reduce the OEF to 40 percent strength. Improvements in this base case force should come from the most lethal assets including attack aviation and cannon artillery.

A victory is decisive when a unit accomplishes its mission quickly and with minimum casualties. While this is a subjective definition, it is very evident that the MSF won its battle very decisively. The MSF succeeded in reducing the OEF, a corps sized element, by 50 percent in five hours, while retaining 95 percent of its own forces. It returned to TAA Badger and stood ready to conduct future missions. This unquestionable superiority defines decisive victory.

Battlespace Domination

Percent Remaining Combat Strength



OEF

- Huge losses over a short time. -- down 50% in 5 hours
- The OEF was not able to recover from loss of 50% strength
- No change to strength after hour 38.

MSF

- Decisive victory.
- Insignificant losses.
- Maneuvered forces and fires quickly and effectively.
- Chose the time and place of battle.
- Brought devastating combat power to bear on nine ambush sites over a battlespace 100 by 160 km.

Base Case versus Reference Case

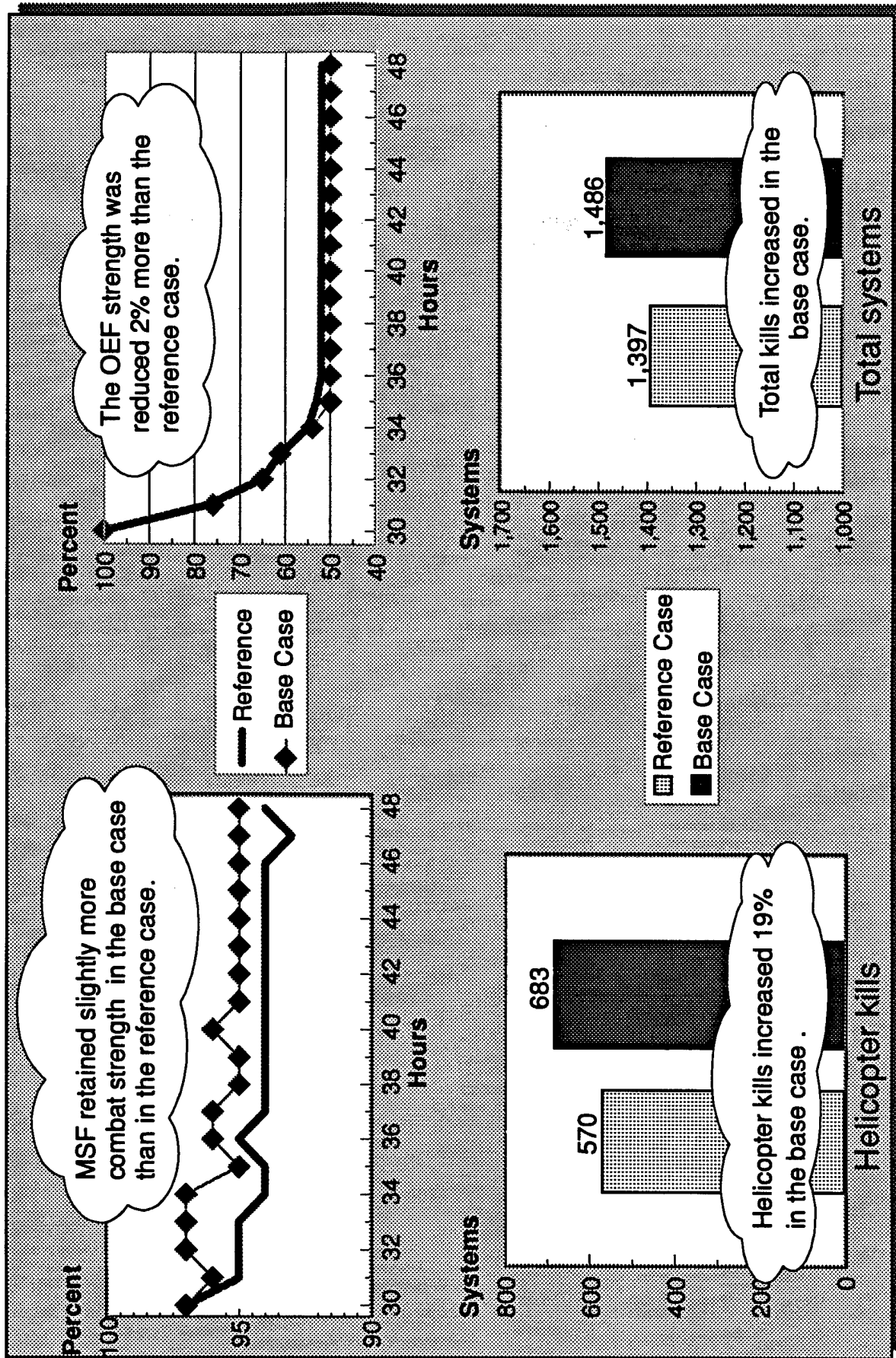
The reference case was a high tech case which had the high tech systems which were the most lethal in the MSF, attack helicopters (Apache, Comanche), SADARM fired by all cannon systems, and ATACMS block II, and the 120 MM light weight mortar firing precision guided munitions. The reference case was upgraded to the base case by adding several technologies as explained earlier. These technologies improved the MSF lethality by reducing the OEF combat strength to 50 percent in the base case versus 52 percent in the reference case. Also, the base case MSF survived at 95 percent compared to 94 percent for the reference case.

The MSF attack helicopters (AH) killed 19 percent more OEF systems in the base case than in the reference case. This was attributed to two factors. First, the command guided 2.75" rocket was added to the AH mission load. This provided more munitions to attack lightly armored targets. The increased kills in the base case were lightly armored targets: AFVs, artillery, mortars, and air defense artillery (ADA) systems. Second, a new employment technique was introduced. The ability to acquire targets in the AH company sector were limited by a very short line of sight (LOS) caused by the very restricted terrain in which AH companies were employed. To counter this problem, each AH company was employed in two helicopter teams plus one helicopter overseeing the formation. Each team covered the same-sized sector as the company had before. Thus, the base case AH company covered twice the sector than in the reference case and was able to target more OEF systems.

Some of the other technologies added were enhanced future land warrior (FLW), tank 1080, MLRS w/Global Positioning System (GPS) and low cost competent munitions (LCCM), a munition designed with greatly enhanced accuracy, but no seeking capability. The lack of any direct fire fight precluded major contributions by the enhanced FLW or tank 1080 to lethality. Because the ambush was fought very effectively with SADARM, there were few targets left for striking with LCCM. Also, in the armor zone battle, the brigade-sized OPFOR, after being reduced by SADARM missions, provided limited targets for striking with LCCM. These two factors combined to produce no measurable increase in kills from the introduction of the LCCM. Overall, the MSF survived at the slightly higher rate of 95 percent in the base case.

The base case total OEF system kills increased over the reference case. The increase was attributed to the increase in helicopter kills of OEF systems. See Appendix H, Reference Case Results.

Base Case vs Reference Case



Base Case (Survivability)

The MSF force package shown in the upper left quadrant, known as the base case package, was used in the constructive simulation VIC to begin the process of tailoring the force for survivability. The output from the VIC simulation provided the FSCs for evaluating the base case in the warfighting characteristics of lethality, survivability, and tempo.

The MSF performance, shown on the chart at the upper right, was measured against the FSC goals for each warfighting characteristic. The FSC goals used to evaluate lethality were; destroy 60 percent of the OEF anti-tank (mounted), tanks, and armored fighting vehicles, destroy 70 percent of OEF C3I systems, destroy 70 percent of OEF 240 MRL systems, destroy 60 percent of OEF artillery and mortars (120 mm and higher), destroy 70 percent of OEF mounted ADA systems, destroy 60 percent of OEF reconnaissance vehicles and systems, and destroy 40 percent of dismounted infantry/MANPADS. The FSC goal used to evaluate survivability was for the MSF to have 100 percent of its company-level units survive with 85 percent or more of their combat systems. The FSC goals used to evaluate tempo were; 75 percent of MSF units at the correct location at the time required, 90 percent of MSF lift assets available when required, 85 percent of MSF units detected OEF units, and 85 percent of the MSF units committed. The base case MSF accomplished an average of 77 percent of its lethality goals, 96 percent of its sole survivability FSC goal, and an average of 76 percent of its FSC tempo goal. The MSF accomplished 88 percent of its goals overall when weighting the survivability goal three times as much as those for lethality and tempo.

In order to delete units, SCRAP identified the units in the order of their contribution to the FSC goals. As shown at the lower left, units were broken into two categories: high contribution and low contribution. The attack helicopter troop had the highest relative contribution followed by the ATACMS battery. The units with the lowest relative contribution are in the shaded region. Using SCRAP list as a recommendation and military judgment, one AGS company, one light infantry battalion, two M1 companies, and two mechanized infantry companies were deleted.

The chart at lower left shows how units were added. Force-PLUS was used to identify units to add to the MSF. Improvement was desired in the shown lethality, tempo, and survivability FSC. Since tailoring for survivability was the goal, the survivability FSC were given the highest priority. An attack helicopter battalion was added based on the Force-PLUS output and military judgment.

These changes to the base case resulted in the adjustment 1 force package.

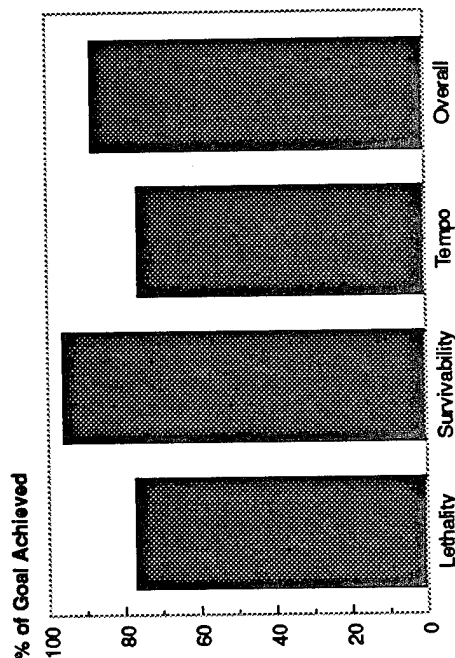
Force Package

<u>1-52nd AR TF</u>	<u>4-52nd AVN TF</u>	<u>1-51st INF TF</u>	<u>52nd DIVARTY TF</u>
1-5 (AGS)	1-88 IN	2-507 AVN	A/2-252 AT
B/1-524 (LOSAT)	A/1-8 FA	5-22 EN	1-1 FA (MLRS)
1-40 FA (DS)	C/1-52 CAV	A/1-842 ADA	2-37 FA (GSR)(MLRS)
5-21 EN	2-47 FA (DS)	B/1-52 CAV	1-6 FA (GSR) (Paladin)
A/B/1-441 ADA		1-41 FA (D)	
A/1-52 CAV			

111 AVN

MSF TROOPS

14 EN (C) (W)	33 AIR CAV
19 EN (C) (M)	52 MI
652 CSE	52 SIG CO
5022 BRIDGE CO	52 CHEM CO
5023 BRIDGE CO	52 MP CO
22 PSYOP DTCH	A/3-4 (CORPS SAM)
610 TERRAIN DET	A/6-58 (CORPS AV)



Additions of Units

Improvement Needed In:

- | Survivability | Lethality | Tempo |
|---|---|---|
| <ul style="list-style-type: none"> unit strength above 85% | <ul style="list-style-type: none"> destroying armor destroying C3I destroying artillery destroying 240MRL destroying mounted ADA | <ul style="list-style-type: none"> detect RED commit BLUE units |

Highest priority Lowest priority

Add:
• 1 Attack Helo Bn

Deletions of Units

Rank Order of Units by Overall Performance

Attack Helo Trip
ATACMS Btry
Lt Inf Wpns Co
UH60 Co
CH47 Co

High Contribution

✓ **Delete:**

- 1 AGS Co
- 1 Lt Inf Bn
- 2 M1 Co
- 2 Mech Inf Co

Low Contribution

→ CUTLINE

LOSAT Btry
AGS Co
M1 Co
L1 inf HHC
Mech Inf Co
L1 inf Co

Adjustment 1 (Survivability)

In the adjustment 1 force, the mechanized infantry battalions and the M1 battalions each were left with three companies. This force was evaluated using VIC output for the warfighting characteristics of lethality, survivability, and tempo. In comparing the adjustment 1 MSF to the base case MSF, adjustment 1 accomplished an average of 81.9 percent of its lethality goals, 99 percent (2.7 percent improvement) of the survivability FSC goal, and an average of 77.6 percent of its tempo FSC. There was a 3 percent improvement (91.3 percent) over the base case in meeting its overall goal when weighting the warfighting characteristic of survivability three times as much as lethality and tempo.

Again, deletion candidates were from the SCRAP output. As listed, the attack helicopter troop had the highest relative contribution followed by the ground cavalry troop. The units with the lowest relative contribution are in the shaded region. One M1 company, one mechanized infantry company, and one light infantry company were removed from the force based on the recommendation from SCRAP and military judgment.

To add units, Force-PLUS was ran with improvement desired in survivability and lethality with priority given to survivability FSC. The list from Force-PLUS recommended that an ATCAS battery be added. Since there were three MSF ATCAS batteries in the TAA that were not employed, two CH-47 companies were added to the MSF to forward position two of these ATCAS batteries.

These additions to and deletions from Adjustment 1 resulted adjustment 2.

Adjustment 1 (Survivability)

Force Package

1-52nd AR IE 4-52nd AVN IE 1-51st INF IE 52nd DIVARTY IE
 1-5 (AGS) 1-88 IN 2-507 AVN A/2-252 AT
 B/1-524 (LOSAT) A/1-8 FA 5-22 EN 1-1 FA (MLRS)
 1-40 FA (DS) C/1-52 CAV A/1-842 ADA 2-37 FA (GSR) (MLRS)
 5-21 EN 2-47 FA (DS) B/1-52 CAV 1-6 FA (GSR) (Paladin)
 A/B/1-441 ADA 1-41 FA (D)
 A/1-52 CAV

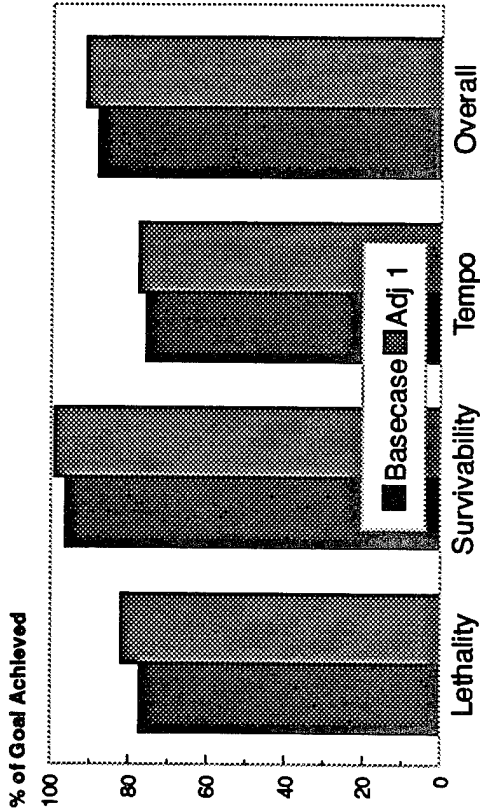
52nd EN BDE

14 EN (C) (W) 33 AIR CAV
 19 EN (C) (M) 52 MI
 652 CSE 52 SIG CO
 5022 BRIDGE CO 52 CHEM CO
 5023 BRIDGE CO 52 MP CO
 22 PSYOP DTCH A/3-4 (CORPS SAM)
 610 TERRAIN DET A/6-58 (CORPS AV)

111 AVN

Changes from basecase:
 • Delete 1 AGS Co
 • Delete 1 Lt Inf Bn
 • Delete 2 M1 Co
 • Delete 2 Mech Inf Co
 • Add 1 Attack Helo Bn

Performance



Deletion of Units

Bank Order of Units by Overall Performance

Attack Helo Trp
Ground Cav Trp
ATACMS Btry
UH60 Co
CH47 Co

High Contribution

Delete:
 • 1 M1 Co
 • 1 Mech Inf Co
 • 1 Lt Inf Co

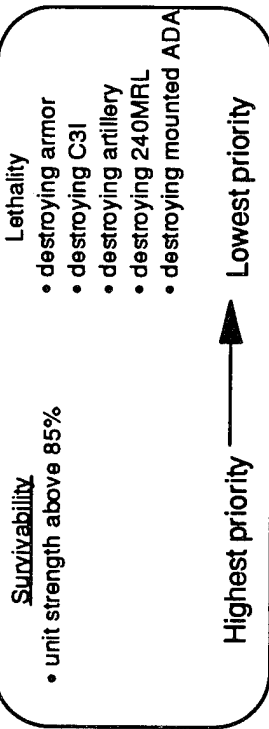
AGS Co
M1 Co
Lt Inf HHC
Mech Inf Co
Lt Inf Co

CUTLINE

Low Contribution

Addition of Units

Improvement needed in:



Add:

• 2 CH47 Co to forward position
 2 existing ATCAS Btry

Adjustment 2 (Survivability)

In the adjustment 2 force package the remaining five mechanized infantry companies and five M1 companies were configured into one pure mechanized infantry battalion of three companies, one pure M1 battalion of three companies, and one balanced task force of two mechanized infantry companies and two M1 companies. This force was simulated in VIC and the results were used to evaluate the MSF force package shown in the warfighting characteristics of lethality, survivability, and tempo.

The adjustment 2 force met an average of 85.1 percent of the MSF's lethality goals, 97 percent (2 percent decrement) of its sole survivability FSC goal, and an average of 80.2 percent of its tempo FSC goals. The adjustment 2 MSF accomplished 91.2 percent (0.1 percent decrement) of its overall goal with the warfighting characteristic of survivability weighted three times as much as lethality and tempo. Because adjustment 2 accomplished less of its survivability FSC goal, adjustment 1 was determined the survivability force package.

SCRAP and Force-PLUS were not used because adjustment 1 was determined to be the most survivable force package and no changes were required.

Adjustment 2 (Survivability)

Force Package

1-52nd AR TF	4-52nd AVN TF	1-51st INF TF	52nd DIV ARTY TF
1-5 (AGS)	1-88 IN	2-507 AVN	A/2-252 AT
B/1-524 (LOSAT)	A/1-8 FA	5-22 EN	1-1 FA (MLRS)
1-40 FA (DS)	C/1-52 CAV	A/1-842 ADA	2-37 FA (GSR)(MLRS)
5-21 EN	2-47 FA (DS)	B/1-52 CAV	1-6 FA (GSR) (Paladin)
A/B/1-441 ADA		1-41 FA (D)	
A/1-52 CAV			
52nd EN BDE			
14 EN (C) (W)	MSF TROOPS		
19 EN (C) (M)	33 AIR CAV	111 AVN	
652 CSE	52 MI	Changes from adjustment 1:	
5022 BRIDGE CO	52 SIG CO	• Delete 1 Lt Inf Co	
5023 BRIDGE CO	52 CHEM CO	• Delete 1 M1 Co	
22 PSYOP DTCH	52 MP CO	• Delete 1 Mech Inf Co	
610 TERRAIN DET	A/3-4 (CORPS SAM)	• Add 2 CH47 Co	
	A/6-58 (CORPS AV)		

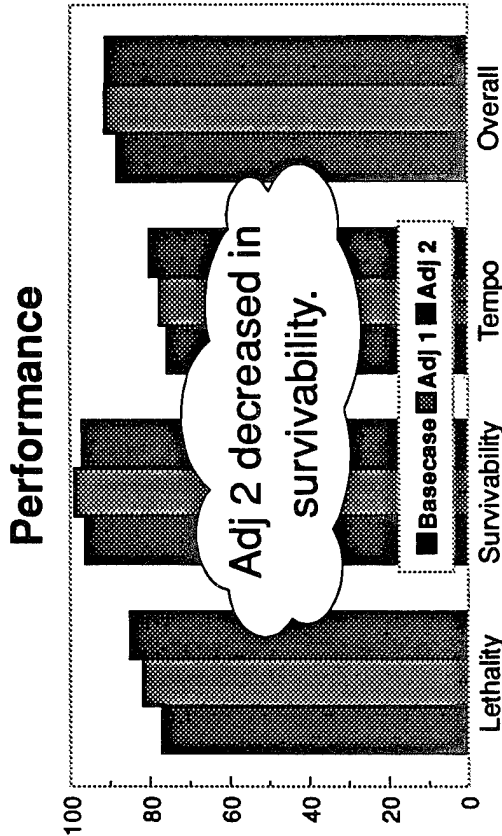
Deletion of Units

No deletions

Addition of Units

- Tailoring for survivability complete.
- Adj 1 most survivable.

No additions

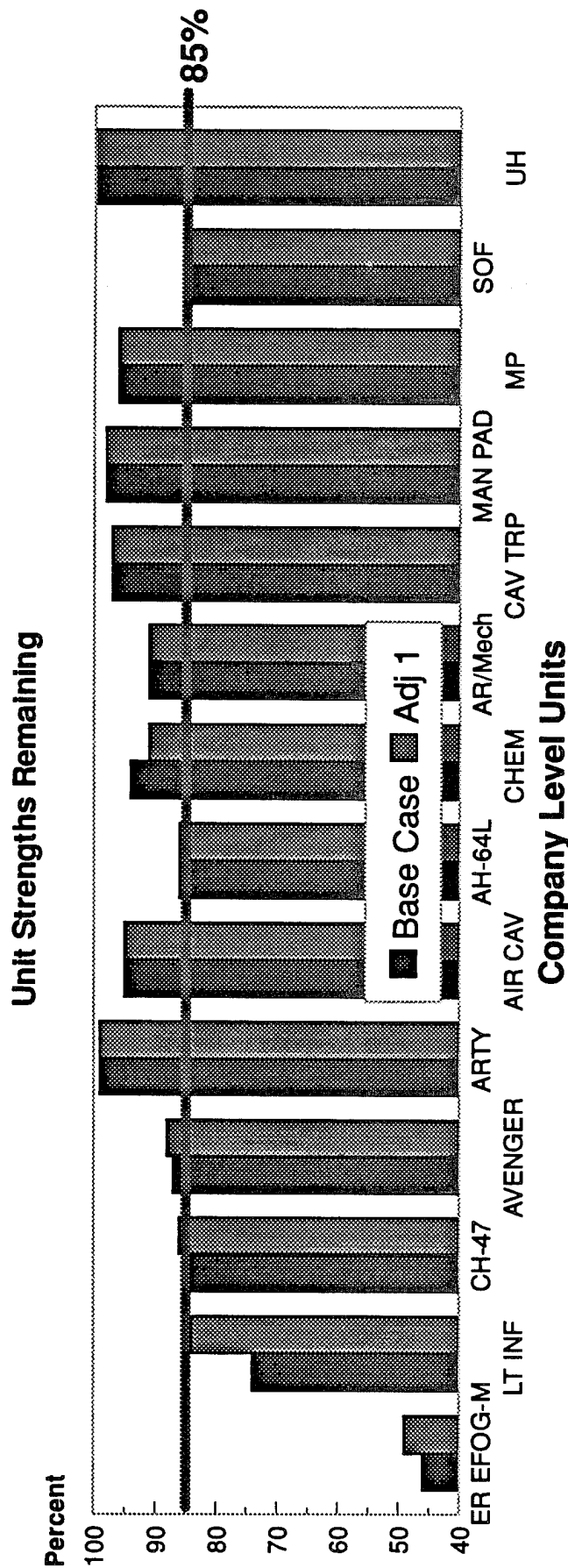


Adjustment 1 (Survivability Force Package)

In adjustment 1, the survivability force package, the MSF achieved the highest survival rate. Although the MSF experienced a slight reduction in over all force combat strength from the base case, adjustment 1 is still the best survivability adjustment according to the FSC goal which is the number of MSF company level units above 85 percent strength. As the chart shows, only two of the MSF units are below 85 percent strength as opposed to three in the base case. These units, an ER EFOG-M section and its defending light infantry company, suffered losses when attacked by dismounted Homeland Defense Forces in the infantry zone. This force package had the fewest number of units which fell below 85 percent strength, and demonstrated a 6 percent improvement in lethality.

Adjustment 1

Survivability Force Package



Adjustment 1 Results:

- Only two units lost more than 15%.
- MSF is at 95% force readiness.
- ER EFOG-M battery (81% strength).
- Light Infantry company (84% strength).

Survivability Insights

The base case MSF had a cross-section of combat units from light infantry to main battle tanks. This MSF design did not emphasize survivability. The base case force did not emphasize survivability over lethality or tempo. Even when tailoring for survivability, the units removed included the most survival types in the MSF, the heavy forces, MBTs and FIFVs. The MSF turned out to be very survivable. What seemed to make the difference was the employment of combat systems deep in enemy territory coupled with the notion of sending in just enough combat power to accomplish the mission along with extracting it just as soon as the ambush was over. The successful execution of this plan proved to be a very survivable course of action. By extracting the systems as soon as the mission was completed, the risk was mitigated and survival was enhanced. By killing the enemy deep, a close battle of attrition was avoided. Also, by moving the systems to within range of the enemy, the requirement for long, range precision systems was reduced.

The attack helicopter units were able to find, target and eliminate enemy ADA. This aviation mission and artillery SEAD missions greatly reduced the risk to the lift units moving the combat units into deep positions and contributed to the overall survivability of the MSF. The lethality of the attack aviation systems was very important to the survival of the MSF.

The cannon artillery systems accounted for all of the kills in the armor zone and 23.5% of all the kills for all the zones.

See Appendix, Survivability Tailored Results.

Survivability Insights

Forward positioning of combat systems and extracting them immediately after the attack, enhanced survivability and the capability to kill the enemy deep in its own territory.

- The MSF met 99% of the FSC survivability goal and survived with 94% of its combat power.
- The lack of a close battle caused the removal of highly survivable heavy systems from the MSF.
- Adding an attack helicopter bn enhanced survivability by destroying OEF radar-directed ADA.
- Attack aviation and precision munitions (SADARM, ATACMS Block II) enhanced force survivability through decisive deep operations.

Systems' lethality, and to a lesser extent tempo, was the key discriminator in tailoring the force for survivability.

Base Case (Lethality)

Like the survivability tailoring process, the base case MSF was used as the starting point to tailor the force for lethality. The force was again evaluated for the warfighting characteristics of lethality, survivability, and tempo using VIC results. The FSC goals were the same as in the survivability tailoring process. As before, the MSF accomplished an average of 77.1 percent of its lethality goals, 96.3 percent of its sole survivability FSC goal, and an average of 75.6 percent of its tempo FSC. However, when the warfighting characteristic of lethality was weighted three times as much as survivability and tempo, the MSF attained 80.6 percent of its goals overall.

In this application of SCRAP, the lethality FSC goals were weighted the highest. Even with the different weighting, the 6 units which were candidates for removal were the same as in the survivability case. After considering these results and applying military judgment, the same types units were again removed: one AGS company, one light infantry battalion, two M1 companies, and two mechanized infantry companies. Although these combat units are very lethal, their removal was predicated on their having not contributed to the fight since there was no direct fire battle.

The listed lethality, tempo, and survivability FSC were given priority in Force-PLUS with the lethality FSC given the highest priority. Like the survivability iteration, an attack helicopter battalion was added based on the Force-PLUS recommendation and military judgment.

Base Case (Lethality)

Force Package

<u>1-52nd AR IF</u>	<u>4-52nd AVN IF</u>	<u>1-51st INF IF</u>	<u>52nd DIV ARTY IF</u>
1-5 (AGS)	1-88 IN	2-507 AVN	A/2-252 AT
B/1-524 (LOSAT)	A/1-8 FA	5-22 EN	1-1 FA (MLRS)
1-40 FA (DS)	C/1-52 CAV	A/1-842 ADA	2-37 FA (GSR)(MLRS)
5-21 EN	2-47 FA (DS)	B/1-52 CAV	1-6 FA (GSR) (Paladin)
A/B/1-441 ADA		1-41 FA (D)	
A/1-52 CAV			
<u>52nd EN BDE</u>	<u>MSF TROOPS</u>		<u>111 AVN</u>
14 EN (C) (W)	33 AIR CAV		
19 EN (C) (M)	52 MI		
652 CSE	52 SIG CO		
5022 BRIDGE CO	52 CHEM CO		
5023 BRIDGE CO	52 MP CO		
22 PSYOP DTCH	A/3-4 (CORPS SAM)		
610 TERRAIN DET	A/6-58 (CORPS AV)		

Deletion of Units

Rank Order of Units by Overall Performance

Ground Cav Trip
Attack Helo Trip
ATACMS Btry
Lt Inf Wpns Co
ER-EFOG-M Btry

High Contribution

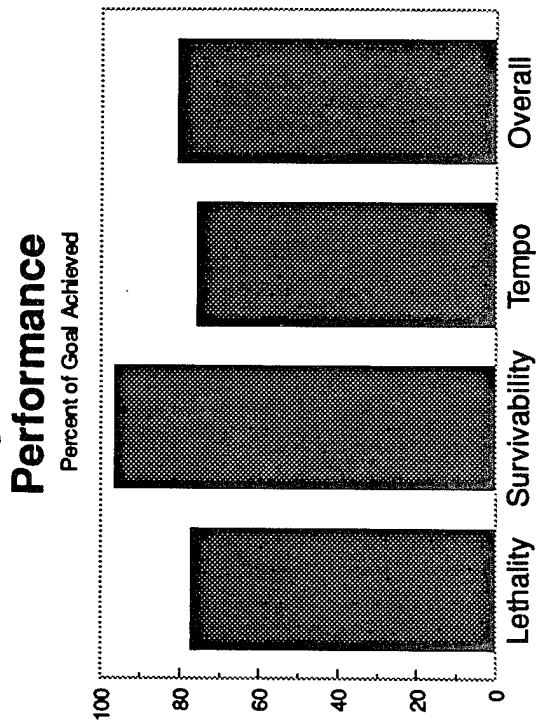
Delete:

- 1 AGS Co
- 1 Lt Inf Bn
- 2 M1 Co
- 2 Mech Inf

CUTLINE →

Low Contribution

LOSAT Btry
AGS Co
M1 Co
Lt Inf HHC
Mech Inf Co
Lt Inf Co



Addition of Units

Improvement needed in:

<u>Lethality</u>	<u>Tempo</u>	<u>Survivability</u>
• destroying armor	• detect RED	• unit strength above 85%
• destroying C3I	• commit BLUE units	
• destroying artillery		
• destroying 240MRL		
• destroying mounted AD		

Highest priority

Lowest priority

Add:

- 1 Attack Helo Bn

Adjustment 1 (Lethality)

Since this is the same force package as adjustment 1 for survivability, the outcomes for the individual warfighting characteristics from the VIC output were the same: an average of 81.9 percent (4.8 percent improvement) of its lethality goals, 99 percent of its sole survivability FSC goal, and an average of 77.6 percent of its tempo FSC goals. When weighting the warfighting characteristic of lethality three times as much as survivability and tempo, the MSF accomplished 84.5 percent (3.9 percent improvement) of its goals overall.

Again, applying SCRAP on the same force package and with the lethality FSC weighted the highest, the last 10 units on list of units in the order of their contribution were same as in the survivability iteration. Therefore, using the same output and military judgment, the same adjustments were made to adjustment 1 as in the survivability iteration which were to remove: one M1 company, one mechanized infantry company, and one light infantry company from adjustment 1 which resulted in adjustment 2. Military judgment prevailed in retaining the Lt. Inf. HHC since removing the HHC would leave a Lt. Inf. Bn without its staff and commander.

As in the survivability iteration where survivability FSCs were weighted the highest, in this iteration with the lethality FSC given the highest priority, Force-PLUS again recommended the addition of more artillery. Because there were three ATCAS batteries still in the TAA and not being used, the decision was made to forward deploy two of them. To deploy these two batteries within the time period available, two CH-47 companies to the force had to be added.

Adjustment 1 (Lethality)

Force Package

1-52nd AB IE 4-52nd AVN IE 1-51st INF IE 52nd DIVARTY IE
 1-5 (AGS) 1-88 IN 2-507 AVN A/2-252 AT
 B/1-524 (LOSAT) A/1-8 FA 5-22 EN 1-1 FA (MLRS)
 1-40 FA (DS) C/1-52 CAV A/1-842 ADA 2-37 FA (GSR)(MLRS)
 5-21 EN 2-47 FA (DS) B/1-52 CAV 1-6 FA (GSR) (Paladin)
 A/B/1-441 ADA 1-41 FA (D)
 A/1-52 CAV

52nd EN BDE

MSF TROOPS
 14 EN (C) (W) 33 AIR CAV
 19 EN (C) (M) 52 MI
 652 CSE 52 SIG CO
 5022 BRIDGE CO 52 CHEM CO
 5023 BRIDGE CO 52 MP CO
 22 PSYOP DTCH A/3-4 (CORPS SAM)
 610 TERRAIN DET A/6-58 (CORPS AV)

111 AVN

Changes from basecase:
 • Delete 1 AGS Co
 • Delete 1 Lt Inf Bn
 • Delete 2 M1 Co
 • Delete 2 Mech Inf Co
 • Add 1 Attack Helo Bn

Deletion of Units

Rank Order of Units by Overall Performance

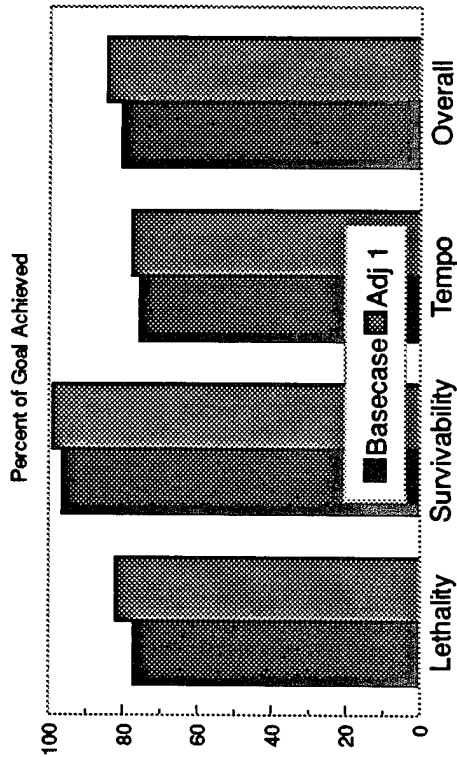
Attack Helo Trp	High Contribution
Ground Cav Trp	
ATACMS Btry	
ER-EFOG-M Btry	

LOSAT Btry	
AGS Co	
M1 Co	
Lt Inf HHC	
Mech Inf Co	
Lt Inf Co	

CUTLINE
 Low Contribution

Delete:
 • 1 M1 Co
 • 1 Mech Inf Co
 • 1 Lt Inf Co

Performance



Addition of Units

Improvement needed in:

Lethality
 • destroying armor
 • destroying C3I
 • destroying artillery
 • destroying 240MRL
 • destroying mounted AD

Highest priority → Lowest priority

Survivability
 • unit strength above 85%

Add:

• 2 CH47 Cos to forward position 2
 existing ATCAS Batteries

Adjustment 2 (Lethality)

Although adjustment 2 did not perform as well measured against the survivability goal, there was a 3.2 percent improvement in the average of the lethality FSC goals. In addition, there was a 2 percent improvement in the attainment of the overall goal with the warfighting characteristic of lethality weighted three times as much as survivability and tempo.

SCRAP was used again to place units in two categories; high contribution and low contribution to the FSC. The ground cavalry troop had the highest relative contribution followed by the attack helicopter troop. The units with the lowest relative contribution were the light infantry company and the mechanized infantry company. Military judgment was applied in reviewing this list and it was decided that none of these units could be eliminated without hindering the effectiveness of the MSF. So, no units were removed.

The list of possible additions from Force-PLUS was composed mainly of artillery units. No artillery units were added since military judgment suggested there already was sufficient artillery in the MSF. In the view of the military advisors precision targeting for existing artillery units could be improved by adding three ground control stations to permit the employment of three more UAVs.

Adjustment 2 (Lethality)

Force Package

1-52nd AB TF	4-52nd AVN TF	1-51st INF TF	52nd DIVARTY TF
1-5 (AGS)	1-88 IN	2-507 AVN	A/2-252 AT
B/1-524 (LOSAT)	A/1-8 FA	5-22 EN	1-1 FA (MLRS)
1-40 FA (DS)	C/1-52 CAV	A/1-842 ADA	2-37 FA (GSR)(MLRS)
5-21 EN	2-47 FA (DS)	B/1-52 CAV	1-6 FA (GSR) (Paladin)
A/B/1-441 ADA		1-41 FA (D)	
A/1-52 CAV			
52nd EN BDE			
14 EN (C) (W)	MSF TROOPS		
19 EN (C) (M)	33 AIR CAV	111 AVN	
652 CSE	52 MI	Changes from adjustment 1:	
5022 BRIDGE CO	52 SIG CO	• Delete 1 Lt Inf Co	
5023 BRIDGE CO	52 CHEM CO	• Delete 1 M1 Co	
22 PSYOP DTCH	52 MP CO	• Delete 1 Mech Inf Co	
610 TERRAIN DET	A/3-4 (CORPS SAM)	• Add 2 CH47 Co	
	A/6-58 (CORPS AV)		

Deletion of Units

Rank Order of Units by Overall Performance

Ground Cav Trp
Attack Helo Trp
ATACMS Btry
Lt Inf Wpns Co
ER-FOG-M Btry

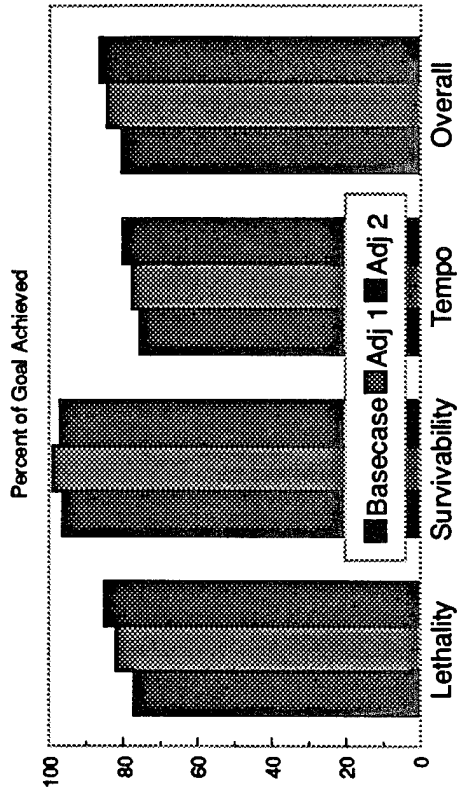
High Contribution

LOSAT Btry
AGS Co
M1 Co
Lt Inf HHC
Mech Inf Co
Lt Inf Co

Low Contribution

No deletions

Performance



Addition of Units

Improvement needed in:

Lethality

- destroying armor
- destroying C3I
- destroying artillery
- destroying 240MRL
- destroying mounted ADA

Survivability

- unit strength above 85%

Highest priority → Lowest priority

Add:

3 Ground Control Stations to employ 3 more UAVs to increase precision targeting.

Adjustment 3 (Lethality)

The addition of three GCSs resulted in the MSF accomplishing an average of 88.7 percent (3.6 percent improvement) of its lethality goals, 99 percent of its sole survivability FSC goal, and an average of 80.5 percent of its tempo FSC goals. In the accomplishment of its goals overall, when weighting the warfighting characteristic of lethality three times as much as survivability and tempo, the MSF improved another 2.6 percent.

Although SCRAP and Force-PLUS listed units to delete and add, none of the suggested changes would have been militarily sound. Adjustment 3 was determined to be the most lethal force package with a lethality improvement of 11.6 percent over the base case and an overall improvement of 8.5 percent over the base case.

The Adjustment 3 force also achieved survivability equal to Adj. 1, which was the most survivable.

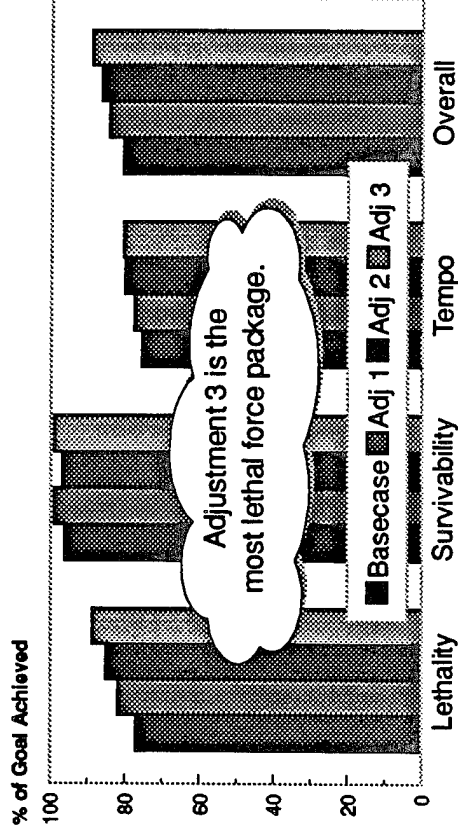
Adjustment 3 (Lethality)

Force Package

1-52nd AR IE	4-52nd AVN IE	1-51st INF IE	52nd DIVARTY IE
1-5 (AGS)	1-88 IN	2-507 AVN	A/2-252 AT
B/1-524 (LOSAT)	A/1-8 FA	5-22 EN	1-1 FA (MLRS)
1-40 FA (DS)	C/1-52 CAV	A/1-842 ADA	2-37 FA (GSR)(MLRS)
5-21 EN	2-47 FA (DS)	B/1-52 CAV	1-6 FA (GSR) (Paladin)
A/B/1-441 ADA		1-41 FA (D)	
A/1-52 CAV			
52nd EN BDE	MSF TROOPS	111 AVN	
14 EN (C) (W)	33 AIR CAV		
19 EN (C) (M)	52 MI		
652 CSE	52 SIG CO		
5022 BRIDGE CO	52 CHEM CO		
5023 BRIDGE CO	52 MP CO		
22 PSYOP DTCH	A/3-4 (CORPS SAM)		
610 TERRAIN DET	A/6-58 (CORPS AV)		

Changes from adjustment #2:
• Add 3 Ground Control Stations

Performance



Deletion of Units

Addition of Units

No deletions

- Tailoring for lethality complete.
- Adj 3 most lethal.

No additions

Adjustment 3 (Lethality Force Package)

The MSF achieved a decisive victory. The OEF was crippled by a rapid and violent ambush, losing 59 percent of its force. The MSF retained 95 percent of its combat power, returned to TAA Badger and stood ready to continue the mission. The MSF demonstrated a nine percent improvement from the base case (50 percent) reducing the OEF to 41 percent strength. Lethality improved across a broad spectrum of weapons systems including attack helicopters, ATCAS, Paladin, and AFAS cannons, as well as ER EFOG-M. An attack aviation battalion was added to the infantry zone as well as an additional ATCAS battery. The most significant killer in the infantry zone was the attack aviation battalion which fired into EAs Tomcat and Wildcat. The results were outstanding. Kills in the infantry zones from aviation went from zero to 278. Kills from cannons went from 62 to 103. The lethality force package also included three additional UAV GCSs. These GCSs positioned more precision sensors in the MSF's battle space resulting in more kills for the total force. Interestingly, as the total force killed more OEF systems, fewer targets were available in the aviation zone.

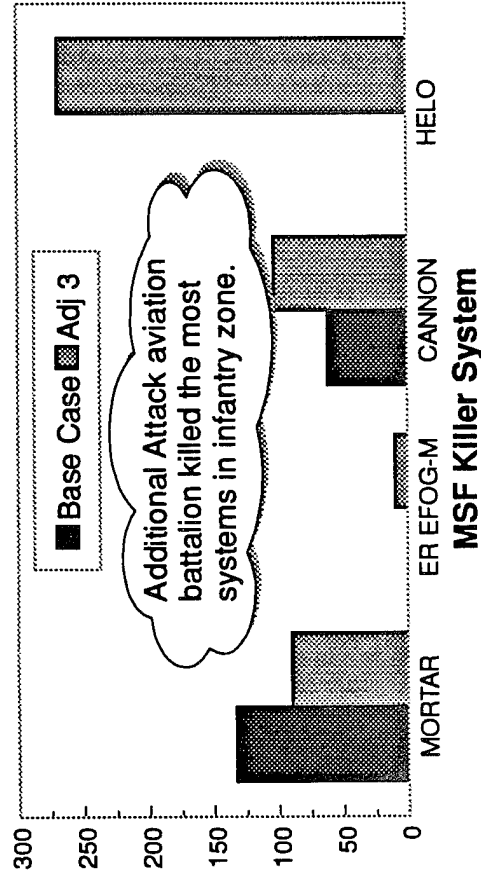
Although the armor zone demonstrated slightly higher lethality initially, there no significant change in the total kills. This was because there was no direct fire combat in armor zone and the deletions of the ground maneuver units from the base case force resulted in no change in the lethality of the MSF.

The most lethal technologies of the lethality force package were cannons and helicopters. Kills from these two systems increased dramatically in this force package. Kills for three other systems also increased: ER EFOG-M, mines, and fixed wing. The ATCAS are able to fire their missions in a much shorter time and a considerably longer range than the 120 MM lightweight mortar and were able to kill the OEF systems before they came within range of the mortars reducing the number of kill the mortars were able to make.

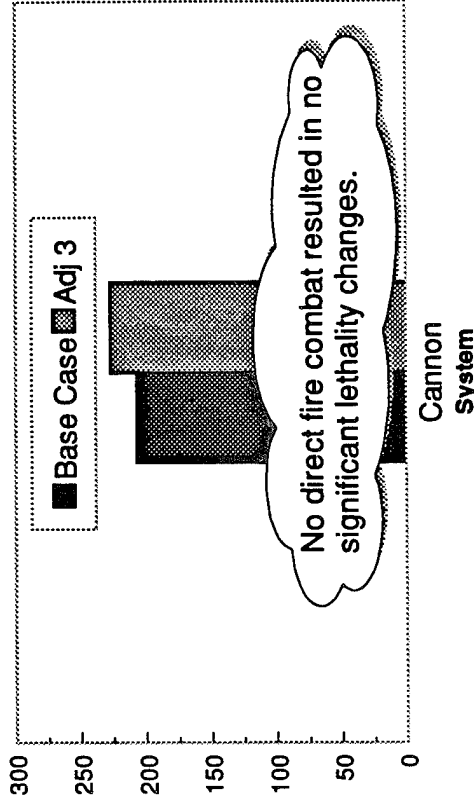
Adjustment 3

Lethality Force Package

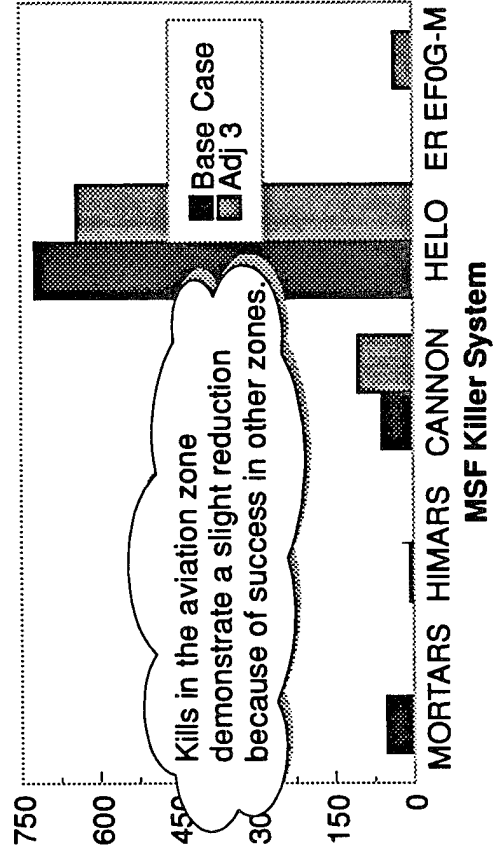
Infantry Zone Kills by System



Armor Zone Kills



Aviation Zone Kills by System



Effective Combinations Adjustment 3

The lethality force package demonstrated that aviation and artillery, when combined with UAVs, and minefields, form a deadly team. These systems combined, not only in the aviation zone as in the base case, but also with great effect in the infantry zone. The infantry zone doubled its kills from the base case by adding an additional attack aviation battalion and an ATCAS battery to the systems striking its engagement areas. Like the base case these systems were highly effective in the aviation zone. Combining them in other areas produced a similar effect.

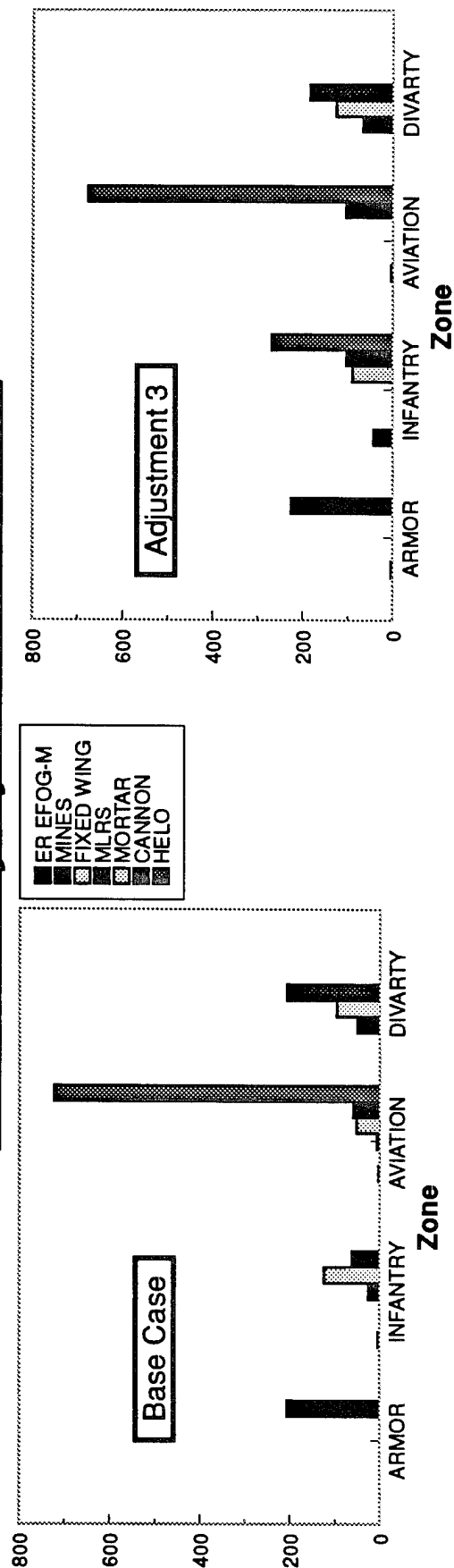
The balance of systems in the aviation and infantry zones should be considered here. In the infantry zone one attack aviation battalion, two ATCAS batteries, one ER EFOG-M platoon and two PGM platoons combined for nearly 450 kills. In the aviation zone three attack aviation battalions, three ATCAS batteries, one HIMARS battery, and one ER EFOG-M section produced nearly 800 kills. This difference of nearly 350 kills can be accounted for by two reasons. First, there were three OEF brigades in the aviation zone and only two OEF brigades in the infantry zone. Second, as is seen on the charts below, the AH-64L accounted for most of the killing in the MSF, and the aviation zone committed three times as many AH-64Ls as the infantry zone did.

See Appendix K, Tempo and Lethality Tailored Results

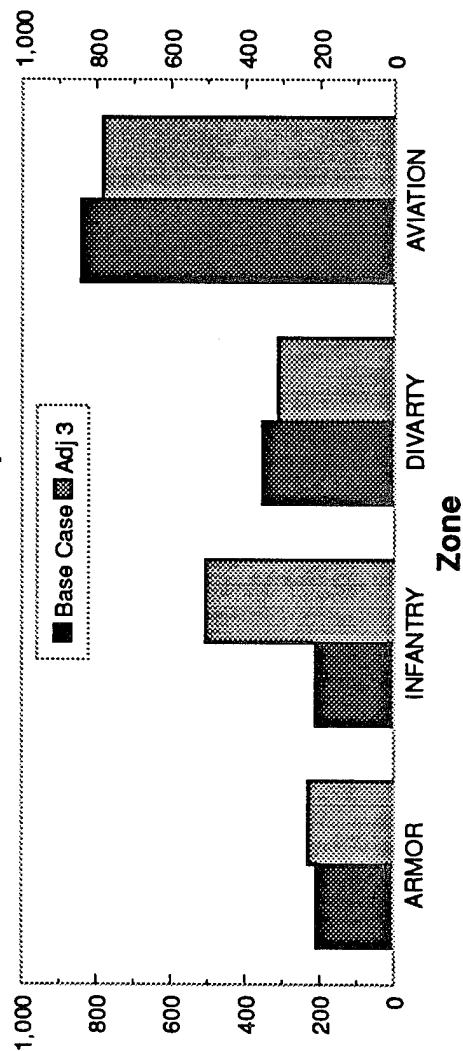
Effective Combinations

Adjustments 3

MSF Kills by Systems and Zone



MSF Total Kills by Zone



Aviation combined with artillery, UAVs and minefields makes for a highly lethal force package.

Base Case (Tempo)

Using the output from the VIC simulation, the base case force was again evaluated in all three warfighting characteristics using the same FSC goals. Once again, an average of 77.1 percent of its lethality goals, 96.3 percent of its sole survivability FSC goal, and an average of 75.6 percent of its tempo FSC goals were accomplished by the MSF. However, for this round of the tailoring, the warfighting characteristic of tempo was weighted three times as much as lethality and survivability which resulted in the MSF accomplishing 80 percent of its goals overall.

In SCRAP for this analysis the tempo FSC goals were weighted highest. The outcome did not drastically change from the survivability and the lethality analyses. Once more the same deletions from the base case of one AGS company, one light infantry battalion, two M1 companies, and two mechanized infantry companies were recommended. Military judgment prevailed in retaining the Lt. Inf. HHC since removing the HHC would leave a Lt. Inf. Bn without its staff and commander.

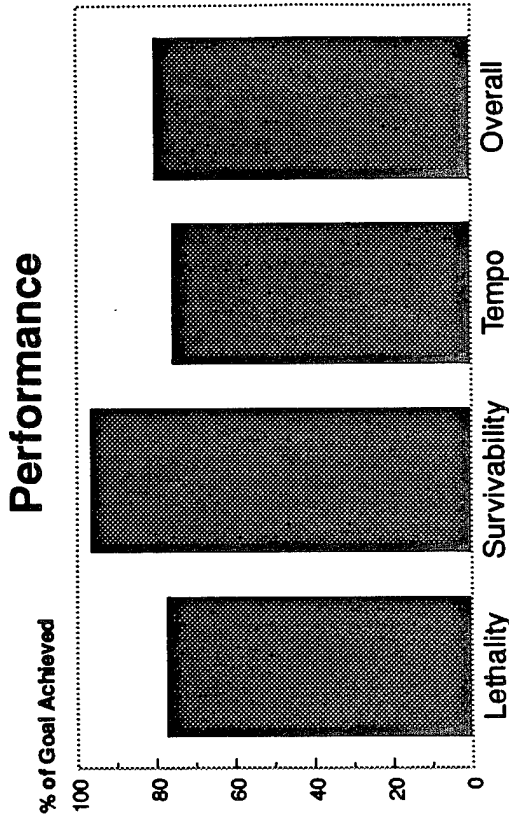
The same situation existed with the use of Force-PLUS even though the tempo FSC had the highest priority. An attack helicopter battalion was added to improve the force tempo. In effect, the alterations to the base case did not vary in any of the tailoring processes, and adjustment 1 was the same force package for all.

Base Case (Tempo)

Force Package

1-52nd AR TF 4-52nd AVN TF 1-51st INF TF 52nd DIV AR TF
 1-5 (AGS) 1-88 IN 2-507 AVN A/2-252 AT
 B/1-524 (LOSAT) A/1-8 FA 5-22 EN 1-1 FA (MLRS)
 1-40 FA (DS) C/1-52 CAV A/1-842 ADA 2-37 FA (GSR)(MLRS)
 5-21 EN 2-47 FA (DS) B/1-52 CAV 1-6 FA (GSR) (Paladin)
 A/B/1-441 ADA 1-41 FA (D)
 A/1-52 CAV

52nd EN BDE **MSF TROOPS** **111 AVN**
 14 EN (C) (W) 33 AIR CAV
 19 EN (C) (M) 52 MI
 652 CSE 52 SIG CO
 5022 BRIDGE CO 52 CHEM CO
 5023 BRIDGE CO 52 MP CO
 22 PSYOP DTCH A/3-4 (CORPS SAM)
 610 TERRAIN DET A/6-58 (CORPS AV)



Deletion of Units

Rank Order of Units by Overall Performance

Attack Helo Trp
ATACMS Btry
CH47 Co
Lt Inf Wpns Co
UH60 Co

High Contribution

Delete:

- 1 AGS Co
- 1 Lt Inf Bn
- 2 M1 Co
- 2 Mech Inf Co

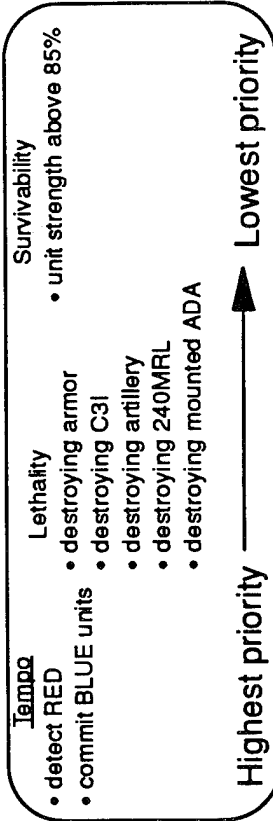
CUTLINE

Low Contribution

LOSAT Btry
AGS Co
Lt Inf HHC
M1 Co
Mech Inf Co
Lt Inf Co

Addition of Units

Improvement needed in:



Adjustment 1 (Tempo)

As mentioned above, this was the same force package used for adjustment 1 in the lethality and survivability procedures. The results from the VIC output for the individual warfighting characteristics were identical: an average of 81.9 percent attainment of the lethality goals, 99 percent of the sole survivability FSC goal, and an average of 77.6 percent (2 percent improvement) of the tempo FSC goals. The MSF accomplished 82.7 percent (2.7 percent improvement) of its goals overall when weighting the warfighting characteristic of tempo three times as much as survivability and lethality.

The outputs from SCRAP and Force-PLUS resulted in the deletion and addition of the same units as in the lethality and survivability cases. The removal of one M1 company and one mechanized infantry company left five companies of each type in the force. A light infantry company was also taken out of the force package. Two ATCAS batteries, which were already a part of the force, were positioned forward by two CH-47 companies added to the force package for that purpose.

Adjustment 1 (Tempo)

Force Package

1-52nd AB IE	4-52nd AVN IE	1-51st INF IE	52nd DIVARTY IE
1-5 (AGS)	1-88 IN	2-507 AVN	A/2-252 AT
B/1-524 (LOSAT)	A/1-8 FA	5-22 EN	1-1 FA (MLRS)
1-40 FA (DS)	C/1-52 CAV	A/1-842 ADA	2-37 FA (GSR)(MLRS)
5-21 EN	2-47 FA (DS)	B/1-52 CAV	1-6 FA (GSR) (Paladin)
A/B/1-441 ADA		1-41 FA (D)	
A/1-52 CAV			
52nd EN BDE	MSF TROOPS	111 AVN	
14 EN (C) (W)	33 AIR CAV		Changes from basecase:
19 EN (C) (M)	52 MI		• Delete 1 AGS Co
652 CSE	52 SIG CO		• Delete 1 Lt Inf Bn
5022 BRIDGE CO	52 CHEM CO		• Delete 2 M1 Co
5023 BRIDGE CO	52 MP CO		• Delete 2 Mech Inf Co
22 PSYOP DTCH	A/3-4 (CORPS SAM)		• Add 1 Attack Helo Bn
610 TERRAIN DET	A/6-58 (CORPS AV)		

Deletion of Units

Bank Order of Units by Overall Performance

Attack Helo Trp
Ground Cav Trp
ATACMS Btry
CH47 Co
UH60 Co

High Contribution

Delete:

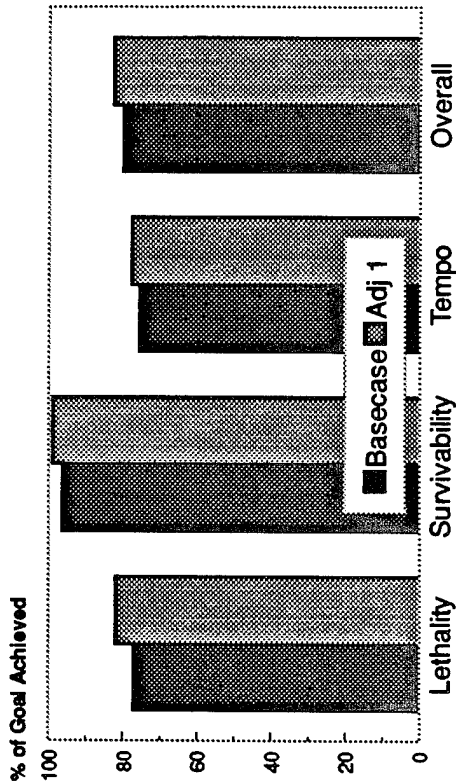
- 1 M1 Co
- 1 Mech Inf Co
- 1 Lt Inf Co

CUTLINE

Low Contribution

AGS Co
Lt Inf HHC
M1 Co
Mech Inf Co
Lt Inf Co

Performance



Addition of Units

Improvement needed in:

- | | | |
|---------------------|--------------------------|---------------------------|
| Tempo | Lethality | Survivability |
| • commit BLUE units | • destroying armor | • unit strength above 85% |
| | • destroying C3I | |
| | • destroying artillery | |
| | • destroying 240MRL | |
| | • destroying mounted ADA | |

Highest priority

Lowest priority

Add:

- 2 CH47 Co to forward position
- 2 existing ATCAS Btry

Adjustment 2 (Tempo)

A 2.6 percent improvement in the average accomplishment of the tempo goals was seen with the VIC output from adjustment 2. With the warfighting characteristic of tempo weighted three times as much as lethality and survivability the attainment of the goals overall improved 2.8 percent.

As in the lethality adjustment before, SCRAP and Force-PLUS outputs suggested the deletion of light infantry and mechanized infantry companies and the addition of artillery. Again, the determination was no deletions or additions of the above units could be made. Instead, three GCSs were added to increase the number of UAVs. By augmenting the precision targeting, more of the MSF units were committed to the battle.

Adjustment 2 (Tempo)

Force Package

1-52nd AR IE 4-52nd AVN IE 1-51st INF IE 52nd DIVARTY IE
 1-5 (AGS) 1-88 IN 2-507 AVN A/2-252 AT
 B/1-524 (LOSAT) A/1-8 FA 5-22 EN 1-1 FA (MLRS)
 1-40 FA (DS) C/1-52 CAV A/1-842 ADA 2-37 FA (GSR)(MLRS)
 5-21 EN 2-47 FA (DS) B/1-52 CAV 1-6 FA (GSR) (Paladin)
 A/B/1-441 ADA 1-41 FA (D)
 A/1-52 CAV

52nd EN BDE

MSF TROOPS
 14 EN (C) (W) 33 AIR CAV
 19 EN (C) (M) 52 MI
 652 CSE 52 SIG CO
 5022 BRIDGE CO 52 CHEM CO
 5023 BRIDGE CO 52 MP CO
 22 PSYOP DTCH A/3-4 (CORPS SAM)
 610 TERRAIN DET A/6-58 (CORPS AV)

111 AVN

Changes from adjustment 1:
 • Delete 1 Lt Inf Co
 • Delete 1 M1 Co
 • Delete 1 Mech Inf Co
 • Add 2 CH47 Co

Deletion of Units

Rank Order of Units by Overall Performance

Attack Helo Trp
CH47 Co
ATACMS Btry
UH60 Co

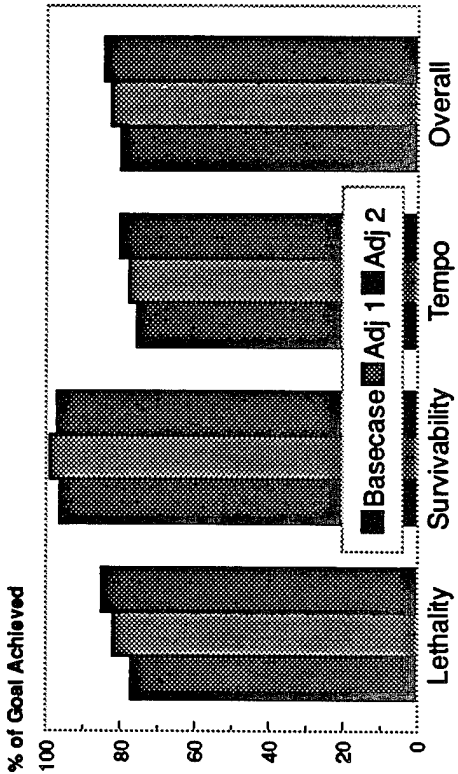
High Contribution

M1 Co
Lt Inf HHC
Mech Inf Co
Lt Inf Co

Low Contribution

No deletions

Performance



Addition of Units

Improvement needed in:

Tempo

- commit BLUE units

Lethality

- destroying armor
- destroying C3I
- destroying artillery
- destroying 240MRL
- destroying mounted ADA

Survivability

- unit strength above 85%

Highest priority → Lowest priority

Add:
 • 3 Ground Control Stations to employ 3 more UAVs to increase precision targeting.

Adjustment 3 (Tempo)

The addition of three GCSs resulted in a 0.3 percent improvement in the accomplishment of the tempo goals with a 1.3 percent improvement in the goals overall. Since there were no possible deletions in the list from SCRAP and no possible additions in the list from Force-PLUS, Adjustment 3 was determined to be the force package with the best tempo. The improvement in the accomplishment of the tempo FSC goals was 4.9 percent over the base case, and the overall improvement over the base case was 5.8 percent.

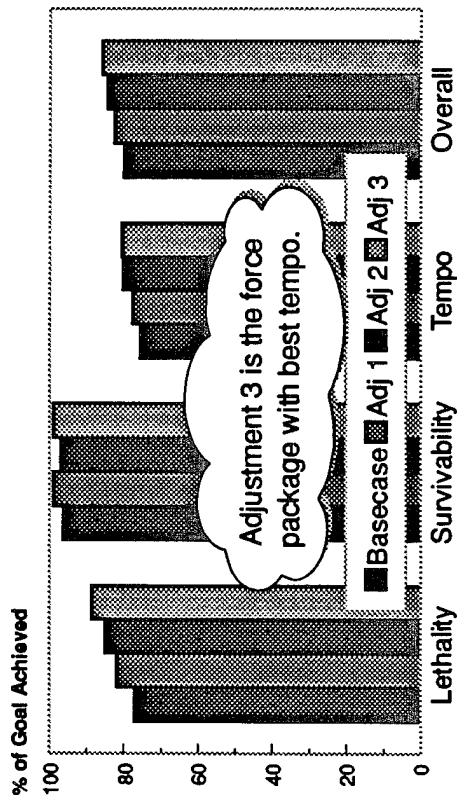
Adjustment 3 (Tempo)

Force Package

1-52nd AR IE	4-52nd AVN IE	1-51st INF IE	52nd DIVARTY IE
1-5 (AGS)	1-88 IN	2-507 AVN	A/2-252 AT
B/1-524 (LOSAT)	A/1-8 FA	5-22 EN	1-1 FA (MLRS)
1-40 FA (DS)	C/1-52 CAV	A/1-842 ADA	2-37 FA (GSR)(MLRS)
5-21 EN	2-47 FA (DS)	B/1-52 CAV	1-6 FA (GSR) (Paladin)
A/B/1-441 ADA		1-41 FA (D)	
A/1-52 CAV			
52nd EN BDE	MSF TROOPS	111 AVN	
14 EN (C) (W)	33 AIR CAV		
19 EN (C) (M)	52 MI		
652 CSE	52 SIG CO		
5022 BRIDGE CO	52 CHEM CO		
5023 BRIDGE CO	52 MP CO		
22 PSYOP DTCH	A/3-4 (CORPS SAM)		
610 TERRAIN DET	A/6-58 (CORPS AV)		

Changes from adjustment 2:
 • Add 3 Ground Control Stations

Performance



Deletion of Units

Addition of Units

No deletions

- Tailoring for Tempo complete.
- Adj 3 Best Tempo.

No additions

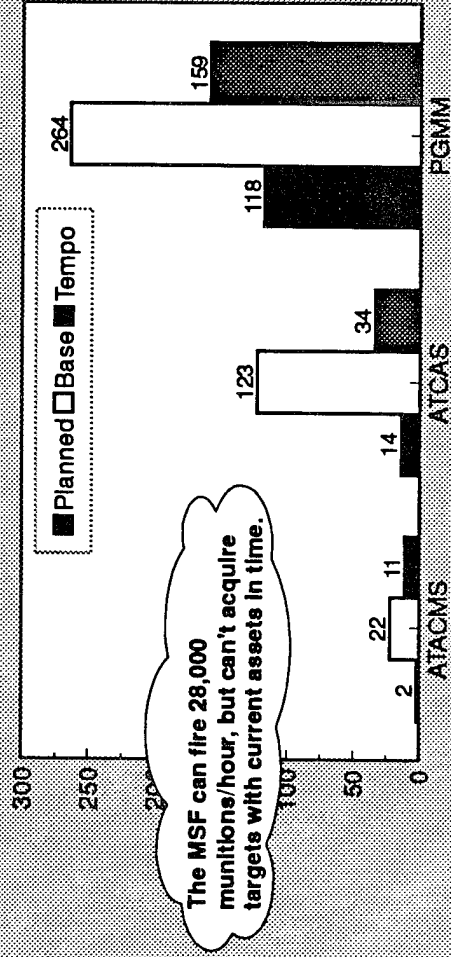
Adjustment 3 (Tempo Force Package)

The tempo package was able to reduce the duration of the ambush and the exploitation. The use of additional attack aviation enabled the MSF to attack more OEF systems and kill them faster in the first two hours of the ambush in the infantry zone where the 120 mm mortars missions were the longest in execution. The addition of the UAVs added a faster shooter to sensor link and added in the reduction in duration of the ambush and the exploitation phases of the operation. The additional coverage provided by these UAVs reduced the queue or the time spent searching for targets by available MSF sensors. These sensors could now directly and quickly link targets to shooters reducing the time to fire the planned missions. This high volume ambush nearly achieved the commander's intent of a reducing the OEF to 40% combat strength. It did this by striking with unprecedented violence in the two initial hours of the attack.

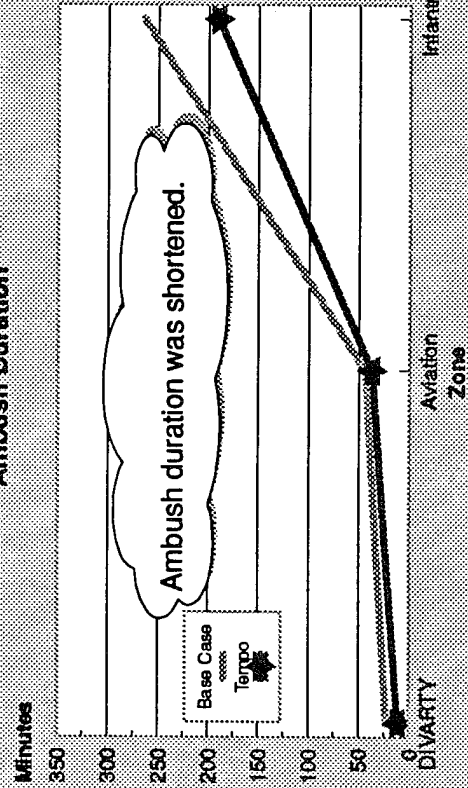
Adjustment 3

Tempo Force Package

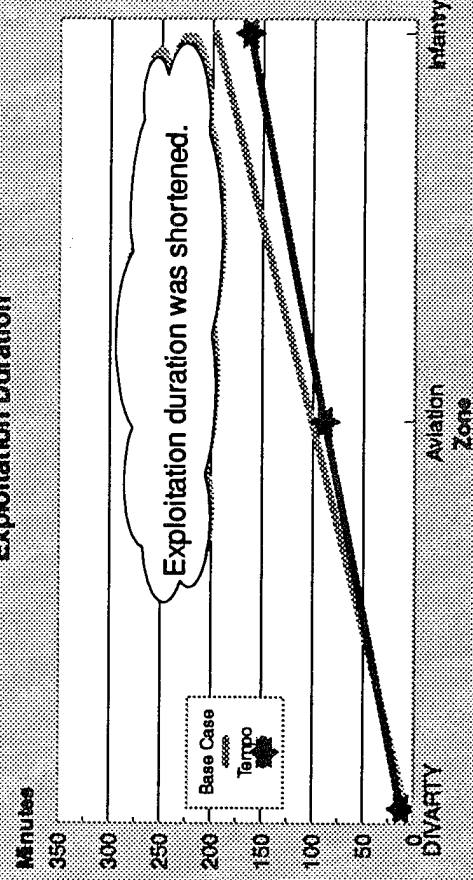
Duration of Fire Missions



Ambush Duration



Exploitation Duration



Tempo Insights

The additions made to the base case to improve survivability and lethality also improved tempo. The addition of the AH battalion added a very mobile, lethal force to the MSF. This force could move into the forward areas very quickly and rapidly engage and kill the OEF combat systems. In doing this, it reduced the time for the attack in the infantry zone from 264 to 184 minutes while doubling the number of kills in that zone.

While the MSF had enough sensors to monitor all of the NAs designated in the intelligence collection plan and provide a picture of the OEF their targeting capability in this type of mountainous, and restrictive terrain could not keep up with the shooters capability to fire missions. The base case organization of the MSF had only four UAV GCSs which limited the number of mobile, precision sensors available to the MSF. The addition of 3 ground control stations added 3 more UAVs to the targeting capability of the MSF. The impact of additional precision sensors was to find more units which were then able to be targeted.

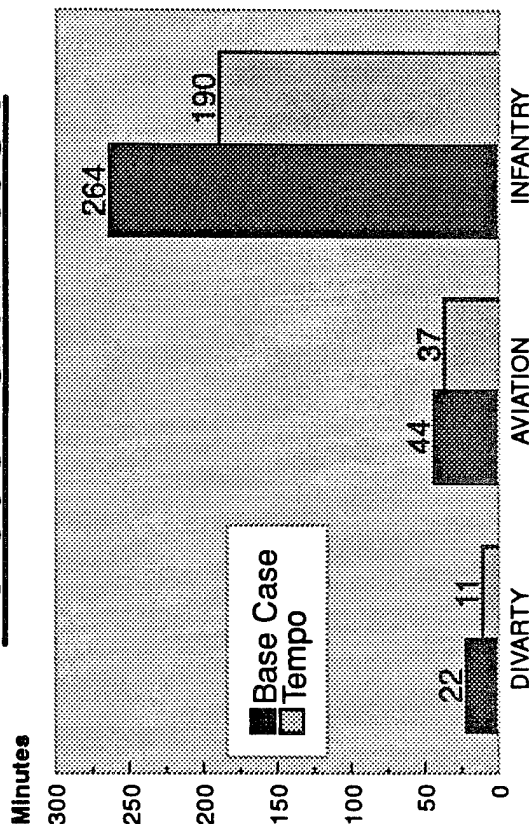
The forward positioning of the two ATCAS batteries made possible by the addition of the two CH-47 companies also improved the tempo. These CH-47 companies enabled more of the MSF force to quickly get into the fight contributing to improving tempo. The positioning one of the ATCAS batteries in the infantry zone also contributed to increased kills.

As the tailoring progressed, it became apparent that when the base case was tailored for survivability and lethality, tempo was also improved. As was shown, adjustment 3 was the lethality adjustment as well as the tempo adjustment. Adjustment 3 had the same survivability performance as adjustment 1, that is. adjustment 3 met 99% of the FSC goal of all company level units surviving at 85% or more combat strength. Also, adjustment 3 killed more OEF systems than any of the others cases.

See Appendix K, Tempo and Lethality Tailored Results

Tempo Insights

Duration of Ambush



Situational Awareness

- Base Case
 - ✓ Adequate assets to cover all NAls.
- Tempo (Added 3 Ground Control Stations for UAVs)
 - ✓ Found more units
 - ✓ Improved targeting

Mobility Considerations

- Added 1 AH Bn, a highly mobile, very lethal capability which enabled the MSF to retain the Inf Bde AH reserve.
- Added 2 CH-47 Cos which lifted 2 additional ATCAS batteries into forward positions within range of the OEF.

Summary

To provide a summary of the insights to the MSF O&O analysis, the four study issues will be reviewed. The analysis of the output provides the basis of the insights as well as the analysis of the results from the Force Tailoring Tool used to development the final force package for each of the warfighting characteristics of survivability, lethality and tempo.

MSF O&O Analysis

Study Issues

- 1d: Does the mix of combat, combat support, and CSS capabilities provide a balanced Mobile Strike Force design which meets pre-defined sufficiency criteria in each area?
- 1e: What Mobile Strike Force 2010 technological capabilities contribute most to its effectiveness?
- 2a: Does the Mobile Strike Force have the assets necessary to conduct operations which result in domination of its battle- space as defined by the Mobile Strike Force operational concept?
- 2b: What organizational adjustments, if any, are required to the Mobile Strike Force to allow it to better execute the operational concept?

Combat, Combat Support and CSS Capabilities Meet Pre-defined Sufficiency Criteria

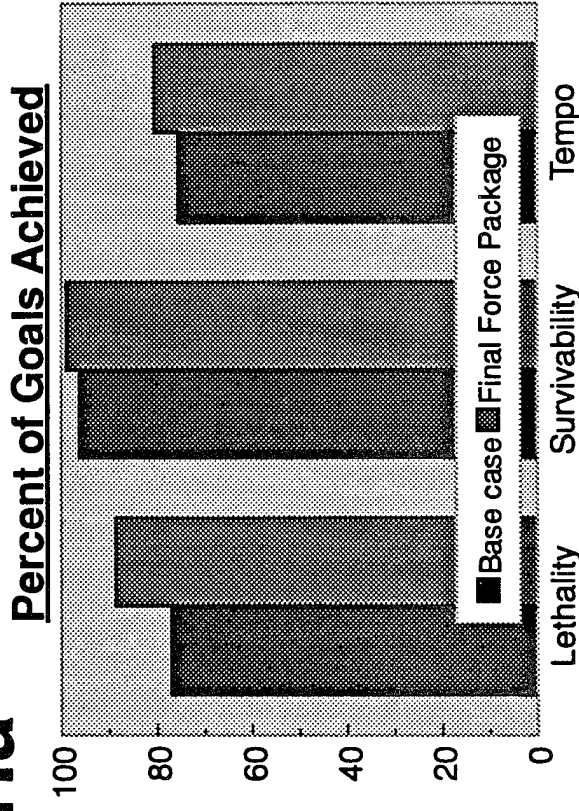
This issue required the O&O analysis team to measure how well the MSF performed in terms of its combat, combat support and CSS capabilities in comparison to a set of FSC based goals. CSS was provided to the MSF by a new CSS doctrine. TRAC Lee's MSF CSS Concept Analysis examined CSS and will report separately. CSS did not limit the scenario execution. In the resulting MSF design the mix of combat and combat support capabilities provided a balanced MSF design which was highly successful in accomplishing its mission within the scenario.

The FSC goals are a set of values measuring the lethality, survivability and tempo of the force. The FSC survivability goal was set independent of the effects of RAM failures. The FSC goals were set high to assure there would be room to tailor the MSF. The MSF was not expected to reach the FSC goals. The MSF performance is reported as the percent achieved of these goals. The percentage was computed with the warfighting characteristic being examined weighted three times the weight of each of the other two.

In the base case, the MSF came very close to reaching the tempo, survivability and lethality FSC goals. There was improved performance for each of the three warfighting characteristics with the most improvement in adjustment three which was the force package for both tempo and lethality. This force package improved lethality 11.6 percent and tempo 4.9 percent over the base case. The decision for the first adjustment to be the survivability adjustment was based on the survivability performance decreasing in the second adjustment. Survivability was the same in the third adjustment as in the first adjustment. Although the final force package did not achieve the goals set for it, the final force package improved in performance over the base case in all three of the warfighting characteristics. It should also be very apparent the MSF in its base case form as well as in the final force package is a very capable force. The MSF destroyed the OEF, a corps with nine brigades, in an ambush lasting only slightly over 3 hours while losing only 5 percent of its own combat power. The MSF won decisively and very much dominated its battlespace.

The adjustments to get from the base case to the final force package was to remove 8 ground maneuver companies and one light infantry battalion which were not in a direct fire battle and add one battalion of attack helicopters which had proven to be very lethal, 2 CH-47 helicopter companies for lift and 3 ground control stations for control of 3 additional UAVs. Two of the ATCAS batteries, which had not yet been employed, were moved into the ambush area by the CH-47 companies and two air cavalry companies, which had been in reserve, were assigned a guard mission. This final force package, adjustment 3, with its mix of combat and combat support capabilities, turned out to be the most lethal with the best tempo. Further adjustments would result in only very marginal returns and the mix in adjustment 3 was the closest to meeting the FSC goals that could be designed within reasonable bounds.

Combat, Combat Support and CSS Capabilities Meet Pre-defined Sufficiency Criteria



FSC Goals		
Lethality	Tempo	Survivability
(% Destroyed)	% Units @ Correct Loc/Time	(% Units > 85%)
Any/Mortars	% Lift Assets Available	Mech Co
Recon	% OEF Detection	Armor Co
C3i	% BDA Targets	Lift Co
240 MRL	% MSF Utilized	AH Co
ADA		Any/Mort Btry
AFVs		ADA Btry
		Recon Tp
		Lt Inf Co

Force Package		
Base Case		
1-52nd AB	4-52nd AVN	1-51st LINE
1-5 (AGS)	1-88 IN	2-507 AVN
B/1-524 (LOSAT)	A/1-6 FA	5-22 EN
1-40 FA (DS)	C/1-52 CAV	A/1-842 ADA
5-21 EN	2-47 FA (DS)	B/1-52 CAV
A/B/1-441 ADA		1-41 FA (D)
A/1-52 CAV		
52nd DIVARTY		
A/2-252 AT	52nd EN BDE	MSE TROOPS
1-1 FA (MLRS)	14 EN (C) (W)	33 AIR CAV
2-37 FA (GSR)(MLRS)	19 EN (C) (M)	52 MI
1-6 FA (GSR) (Pakadin)	652 CSE	52 SIG CO
	5022 BRIDGE CO	52 CHEM CO
	5023 BRIDGE CO	52 MP CO
	22 PSYOP DTCH	A/3-4 (CORPS SAM)
	610 TERRAIN DET	A/6-58 (CORPS AV)
111 AVN		
Changes for final Force Package		
DELETE		
1 AGS Co, 1 Lt Inf Bn + 1 Lt Inf Co, 3 Mech Cos, 3 Ar Cos		
ADD		
1 AH Bn, 2 CH-47 Cos, 3 Ground Control Stations		

- The MSR did dominate its battlespace
- The MSF did win a decisive victory

2010 Technological Capabilities Contribution to Combat Effectiveness

The primary contributors to combat effectiveness for a digitized MSF viewed in terms of lethality, survivability, and tempo were Army attack aviation, cannon/mortars with precision munitions, MLRS with ATACMS, UAVs and lift aviation. One should note that, since the MSF survived at such a high rate in all runs, no one system stood out with respect to survivability, nor did any system perform overly poor in the area either.

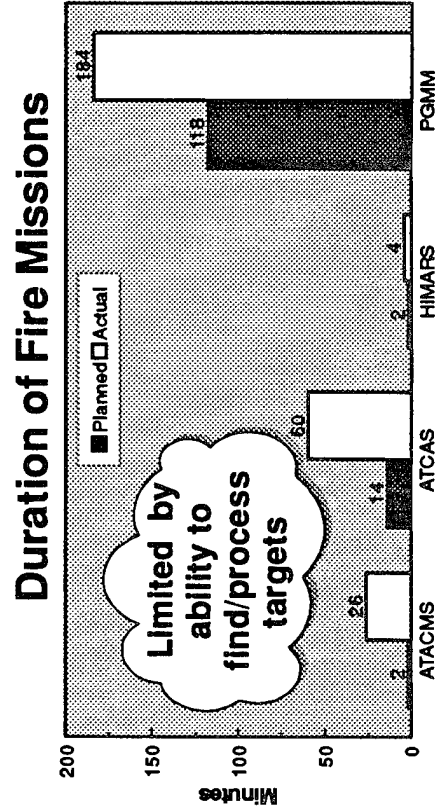
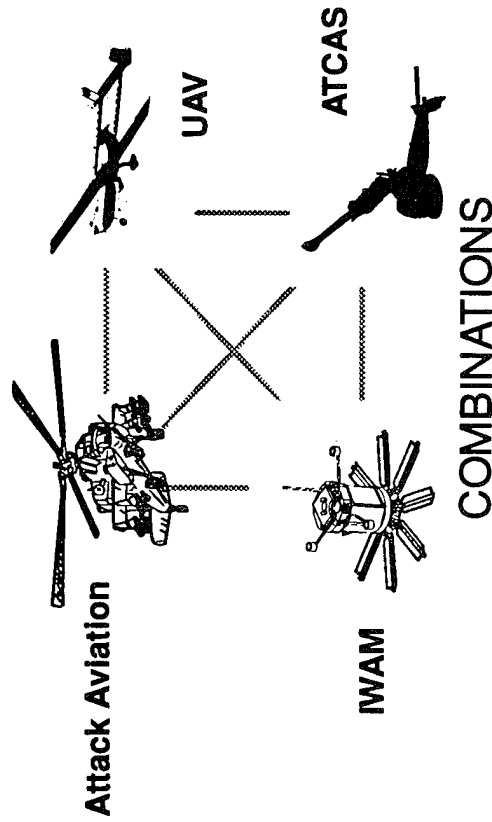
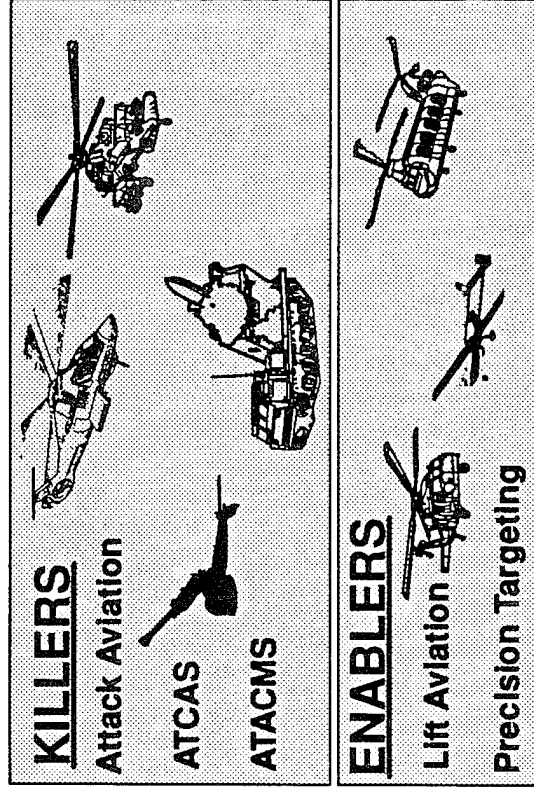
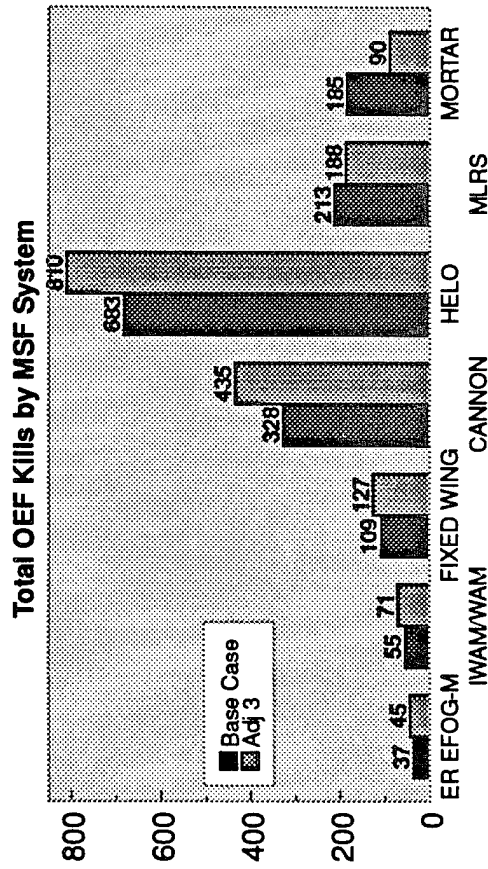
Attack aviation, consisting of Apache Longbow and Comanche, were the most lethal systems on the battlefield. They accounted for between 45 and 50 percent of the OEF kills. Their superb tactical mobility along with their deadly lethality made them the key systems for enabling the MSF to maintain a high tempo and destroy the OEF in a short, intense battle. The cannon artillery and mortars using precision munitions were the next greatest contributors. They combined for between 27 and 31 percent of the OEF kills. Cannon and mortars also fired conventional munitions, but they resulted in less than 1 percent of the OEF kills. The ATCAS and lightweight 120 mm mortars proved to be the systems of choice for this operation because of their SADARM and PGM capabilities and their ability to be air assaulted which allowed the MSF to position these technologies forward where they could fully employ their lethality. MLRS ATACMS was also a major contributor to the operation. It provided perhaps the most lethal punch in the shortest period of time. With only 54 rounds, ATACMS was able to account for between 10 and 15 percent of the losses inflicted on the OEF in less than 25 minutes. Arguably, an increased allocation of ATACMS could enable the MSF to conduct this operation with fewer air assault operations and the corresponding reduction in risk. The significant contributions of these killing systems were enabled by two other technologies: lift aviation and the precision targeting capabilities of the UAV. Lift Aviation (UH-60 and CH-47) was vital to achieving the high tempo required to accomplish the ambush. The MSF needed every lift asset to conduct this operation; in fact, in Adjustment 2 when the force tailoring tools recommended adding additional artillery, two companies of heavy lift helicopters were added to the force to allow forward positioning of two ATCAS batteries that had not been used. The UAVs provided a degree of precision for targeting that allowed the better use of the precision (smart) munitions. The zone in which the UAVs provided the targeting proved to be the zone in which the most casualties were inflicted on the OEF. A case could easily be made that by increasing the number of UAV by a factor of two or more would have a direct result in improving lethality through more precision targeting and possibly improving tempo through better BDA.

The suite of technologies that consistently worked together to synergistically improve each other's effectiveness were attack aviation and ATCAS/SADARM with mines (WAM and FASCAM) to fix enemy formations in predetermined kill zones and with UAVs and Ferrets to provide precision targeting. This again was reinforced in Adjustment 1 when the force tailoring tools recommended adding a battalion of attack aviation and again in Adjustment 2 when the force tailoring tools recommended adding more artillery.

The ambush employed by the MSF was built around its awesome capability to fire precision munitions. The MSF can fire over 28,000 precision submunitions in an hour. However, the MSF positioned just enough delivery assets (including ATCAS, HIMARS, extended range EFOG-M, and the light weight 120 mm mortars) just in time to execute the ambush. The goal was to expend the precision munitions as fast as possible in order to maintain the surprise factor of the ambush and to limit the time these systems were exposed. The constructive modeling results indicated that it took significantly longer to execute the precision fire missions than planned. It seems at this point that the MSF's capability to fire precision munitions exceeds its ability to find and process targets. Higher resolution analysis and experimentation needs to be conducted to determine whether the MSF needs more precision targeting capability, an improved ability to process targeting information, or both.

2010 Technical Capabilities Contribution to Combat Effectiveness

Assumes a Digitized Force



MSF 95 Domination of the Battle Space

The MSF clearly dominated the battle space in all adjustments. It lost only 4-6 percent of its force while destroying 50-59 percent of the OEF. The MSF defeated the OEF in the first two hours of the ambush, and OEF destruction was accomplished in five to six hours. The bottom line is that the OEF commander lacked the capability to respond with the assets an orange land commander would normally have.

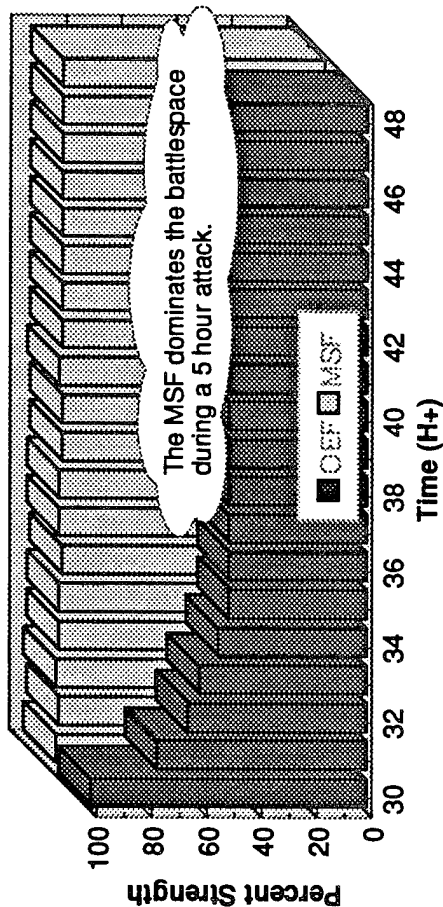
The OEF commander would normally have reacted to an attack with assets such as a reserve, counter battery artillery or rockets, and fixed or rotary wing aircraft. Fixed or rotary wing aircraft had been stripped from the orange land forces by blue land prior to D+30 (commitment of the MSF). The two OEF regimental artillery groups were attacked by ATACMS and AH-64L at the same time as the other OEF brigades were being attacked. No mounted reserve was capable of attacking the MSF; these forces had neither the equipment, the mobility, nor the location from which to launch a counterattack.

Adhering to the ambush dynamic the MSF allowed the OEF to move unopposed through 100 kilometers of mountainous and restrictive terrain for thirty hours. It was the terrain in this scenario which initially placed the OEF commander at risk. To accomplish his mission the OEF commander had to move nine brigades along three battalion-sized mobility corridors for 130 kilometers. The MSF plan attacked the OEF when the force was fully extended from hide sites south of Pyongyang to the Chorwon bowl. The attack occurred nearly simultaneously using a combination of army and air force assets.

Attack aviation and forward positioned ATCAS, HIMARS and precision guided mortars struck OEF brigades in two different zones. ATACMS Block II with IWAM and a fixed wing strike crippled three brigades in less than an hour. All assets relied upon intelligence collection and sensor-to-shooter links provided by SOF, Joint Surveillance Target Attack Radar System (JSTARS), UAVs, LRSD and hunter teams equipped with the Future Land Warrior system.

Dominate Battlespace

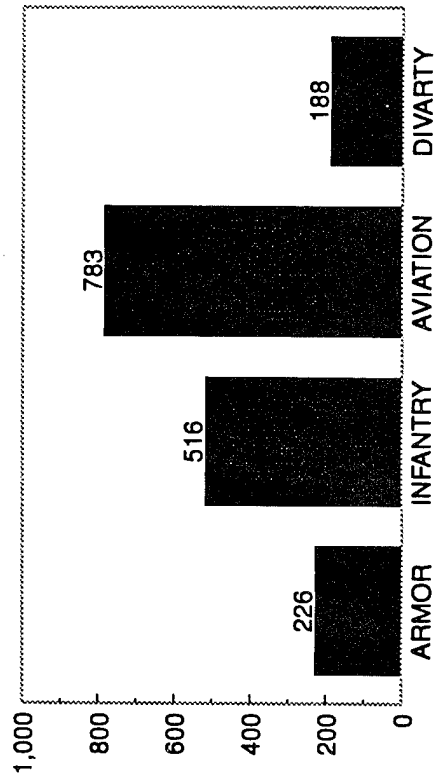
Remaining Combat Strength



Maneuver of Fires and Effects

The MSF employed the planned force just in time at the right location to destroy the OEF.

OEF Systems Losses by Zone



- ✓ Atk avn, cannon artillery and ATACMS enabled the MSF to dominate battlespace.
- ✓ The simultaneous ambush concept appears to be effective in NEA.

Organizational Adjustment Required to MSF

The force tailoring methodology was used to determine what organizational adjustments were required to allow the MSF to better execute the operational concept. Analysis was synthesized on the runs to tailor for respective survivability, lethality, and tempo. The force tailoring for each of the adjustments is shown.

The force tailoring from the base case to adjustment 1 was the same for the lethality, the survivability, and the tempo force packages. The use of SCRAP resulted in the deletion of one light infantry battalion (including an HHC, three light infantry companies, and a light infantry weapons company), two M1 companies, two mechanized infantry companies, and one AGS company. This resulted in pure battalions of three companies for the M1, mechanized infantry, and AGS. As a consequence of the use of Force-PLUS an AH-64L battalion was added to the force package. In the tempo alternative, the effect was a 2.7 percent improvement in the accomplishment of the overall FSC goals from the base case. There was a 3 percent improvement in the accomplishment of the overall FSC goals in the survivability alternative. Improvement in the lethality alternative was 3.9 percent in the overall FSC goals.

From adjustment 1 to adjustment 2 the tailoring of force was again the same for all three force packages. A light infantry company, an M1 company, and a mechanized infantry company were deleted from the force. The five M1 companies and five mechanized infantry companies remaining in the force were arranged into one pure battalion of three M1 companies, one pure battalion of three mechanized infantry companies, and a balanced battalion of two M1 companies and two mechanized infantry companies. Force-PLUS output recommended the addition of artillery. Since three batteries of ATCAS had not been committed in the previous runs, the decision was made to add two CH-47 companies and commit two of these ATCAS Batteries. Although there was a slight improvement in the accomplishment of the overall FSC goals in the survivability alternative, the adjustment 2 force package was less survivable. As a result the adjustment 1 force package was designated as the most survivable force package. No further survivability tailoring will be done. Improvement in the tempo alternative over adjustment 1 was 2.8 percent in the overall FSC goals, and in the lethality alternative the improvement accomplished was 2 percent in the overall FSC goals.

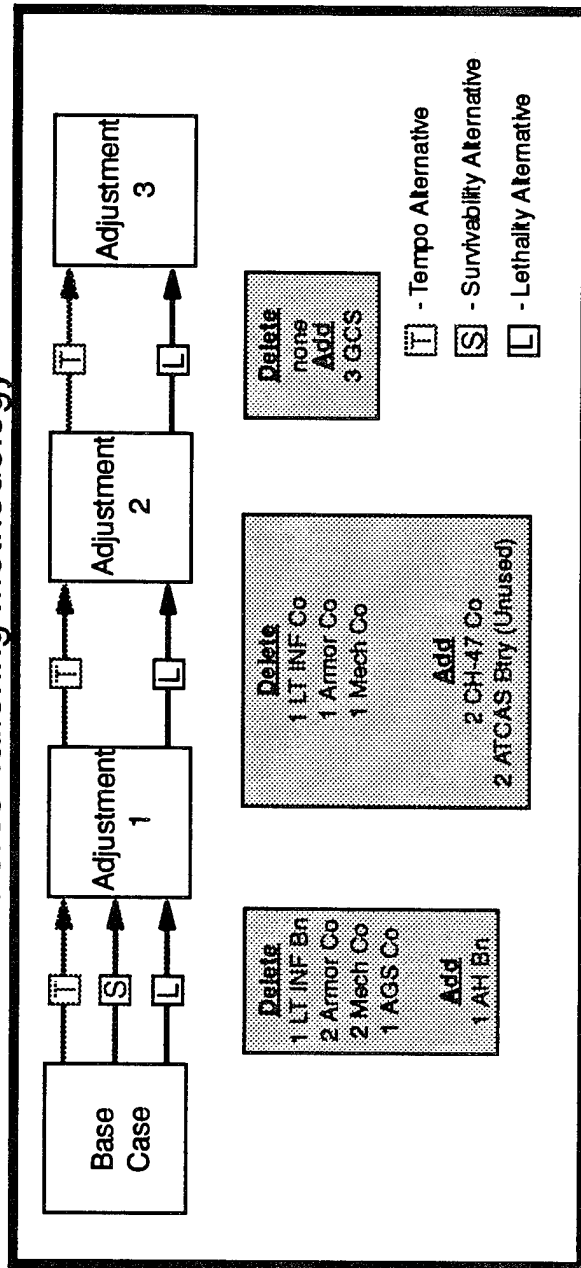
Force tailoring for the tempo force package and the lethality force package was done from adjustment 2 to adjustment 3 and again the tailoring was the same. Although there were units with low contributions to the accomplishment of the FSC goals, no units were deleted from the force package. Artillery was again the top choice for addition according to the Force-PLUS output. To enhance the capabilities of the artillery units already in the force package to acquire targets, three ground control stations to support the use of three more UAVs were added. In the accomplishment of the overall FSC goals the tempo alternative improved 1.3 percent and the lethality alternative improved 2.6 percent over adjustment 2. adjustment 3 was accepted as the best force package in terms of lethality and tempo because there were no more recommended changes. When compared to the base case, the lethality alternative improved 11.6 percent in the accomplishment of the overall FSC goals, and the tempo alternative improved 5.8 percent overall.

The ATCAS, AH-64L, and UAVs were the main contributors to improved lethality from the analysis of SCRAP. The additional attack aviation also contributed to improved survivability of the MSF. Improved tempo was attributed to the attack aviation, ATCAS, ATACMS, UH-60, CH-47, and UAVs.

MSF Organizational Adjustments

What organizational adjustments, if any, are required to the Mobile Strike Force to allow it to better execute the operational concept?

Force Tailoring Methodology



- An increase in ATCAS, attack aviation, and UAVs contributed the most to improved lethality.
- An increase in attack aviation contributed the most to improved survivability.
- Attack aviation, ATCAS, ATACMS, UH-60, CH-47, and UAVs contributed the most to improved tempo when combined with the ambush dynamic.

Summary

The application of the operational concept of simultaneity, that is, fighting from dispersed battle positions while massing the effects of fires on nine OEF brigades was very successful. The execution of the concept was to move the MSF forces forward to deep strike positions so that the OEF would move into the range of MFS combat power deep in their own territory rather than the MSF waiting for the OEF to move forward to a battle line drawn along the dividing line between the two forces. The concept included the idea of moving just enough systems and munitions to accomplish the mission at the last possible moment so that risk of early discovery and losses was minimized and then extracting the forces as soon as possible after the ambush.

The MSF, with its array of precision attack systems and lift helicopters, is a formidable force. The MSF survived with 95% of its combat power while reducing the OEF to 41% of its combat power. The lethality of the MSF is directly attributable to the combination of the attack aviation resource, the precision attack of SADARM, and the ability of the IWAM and WAM minefield to slow down the OEF and shape the battle. Adding more attack aviation and ATCAS to the MSF improved its lethality 13% over the base case MSF.

Tempo was improved by increasing the percentage of the MSF units that were in contact with the OEF as well as shortening the duration of the ambush and the exploitation.

It was not completely unexpected that when the design of the force was changed with the goal of improving the performance of the force in one of the war fighting characteristics there was an improvement in all three of them. When the force was made more lethal, the tempo was improved and survivability increased. Adjustment 3 was the most lethal, had the best tempo, and was the most survivable of the three adjustments and the base case. The survivability did decline 0.1% in adjustment 2 over adjustment 1, but improved over adjustment 1 and 2, as well as, the base case, in adjustment 3.

Summary

- Survivability

- Simultaneously attacking the OEF from dispersed positions while focusing the massed effects of fires on each of nine OEF brigades increased survivability.
- Forward positioning and retrieving "just enough" precision attack assets "just in time" greatly increased survivability.

- Lethality

- Combination of the mobile, precision strike systems, lift helicopters and the ambush dynamic made the MSF a very lethal force.
- Increasing the triple threat of artillery, attack aviation, and precision targeting produced the most lethal MSF organization.

- Tempo

- Adding attack and lift aviation, artillery systems, and precision targeting improved tempo.

Whenever tailoring was done for any of the three warfighting characteristics an improvement in all of them was observed.

Distribution

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	Project Manager, SADARM
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	Rand Corporation

APPENDIX A
REFERENCES

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Appendix A References

FORCE XXI OPERATIONS, A Concept for the Evolution of Full-Dimensional Operations for the Strategic Army of the Early Twenty-First Century, Training and Doctrine Command, TRADOC PAM 525-5, 1 August 1994 Headquarters, U.S. Army Training and Doctrine Command, Fort Monroe, VA., 23651.

Force XXI O&O (draft); 28 October 1994, Headquarters, U.S. Army Training and Doctrine Command, Fort Monroe, VA., 23651

MSF 2010 Analysis, TRAC Technical Memorandum, TRAC-TM-0194, September 1994: Mr. Timothy Bailey, Mr Roland Groover, MAJ Sherrie George, CPT Brenden Sheehan, Study and Analysis Center, TRADOC Analysis Center, Fort Leavenworth, KS 66027

Early Entry Force Analysis Final Report, TRAC Technical Report, TRAC-TR-1494, September 94, COL Thomas J. Pawlowski, III, MAJ David Rodgers, CPT Thomas Cioppa, MS Carol Mullen. Fort Leavenworth, KS, 66048

PW/MSF 95 AWE Support Plan, TRAC Study Plan 0794, October 1994, Mr Donald Kroening, Study and Analysis Center, TRADOC Analysis Center, Fort Leavenworth, KS, 66027

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APPENDIX B

GLOSSARY

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Appendix B

Glossary/Definitions

ACCJPO	Air Combat Command Joint Project Office
ADA	Air Defense Artillery
AFAS	Advanced Field Artillery System
AFV	Armored Fighting Vehicle
AGS	Armored Gun System
AH	attack helicopters
AI	air interdiction
APADS	Advanced Precision Airborne Delivery System
ASTAMIDS	Airborne Standoff Minefield Detection System
ATACMS	Army Tactical Missile System
ATCAS	Advanced Towed Cannon Artillery System
AWE	Advanced Warfighting Experiment
BCBL	Battle Command Battle Lab
BDA	battle damage assessment
BDAR	battle damage assessment and repair
BLITCD	Battle Lab Integration, Technology, and Concepts Directorate
BSFV	Bradley Stinger Fighting Vehicle
CAS	close air support
CASCOM	Combined Arms Support Command
CFC	Combined Forces Command
CG	command guided
CLC	combat logistics company
CGSC	Command and General Staff College
COA	course of action
DEW	Directed Energy Weapons
DMZ	demilitarized zone
DS	direct support
EA	engagement area
EEA	Essential Elements of Analysis
EFFORT	Early Entry Force Tailoring Tool
ER EFOG-M	Extended Range Enhanced Fiber-Optic Guided Missile
FARP	forward area refuel point
FASCAM	Family of Scatterable Mines
FIFV	Future Infantry Fighting Vehicle
FLB	forward logistics battalion
FLW	Future Land Warrior
Force-PLUS	Force Package Logic Utility System

FORT-T	Force Tailoring Tools
FSC	Force sufficiency criteria
FSV	Future Scout Vehicle
GBCS	ground based common sensor
GCS	ground control station
GPS	Global Positioning System
GSTAMIDS	Ground Standoff Minefield Detection System
HDF	Homeland Defense Force
HIMARS	High Mobility Artillery Rocket System
IEW	intelligence electronic warfare
IMF	intelligent minefield
IPR	in-progress review
IR	infrared
IVIS	Inter-vehicular Identification System
IWAM	Intelligent Wide Area Minefield
JAAT	Joint Air Attack Team
JFLCC	Joint Forces Land Component Commander
JSTARS	Joint Surveillance Target and Reconnaissance Radar System
LAM	Louisiana Maneuvers
LAM BOD	LAM Board Of Directors
LCCM	low cost competent munition
LPI	low probability of intercept
LRSD	Long Range Surveillance Detachment
LSCD	Laser Standoff Chemical Detector
LZ	landing zone
MANPADS	Man-Portable Air Defense System
METT-T	mission, enemy, terrain, troops, and time available
MLRS	Multiple Launch Rocket System
MMW	millimeter wave
MOE	Measures of Effectiveness
MOP	Measures of Performance
MRL	Multiple Rocket Launcher
MSF	Mobile Strike Force
NAI	named area of interest
NBC	Nuclear, Biological, and Chemical
NBCRS	NBC reconnaissance system
NEA	Northeast Asia
NK	North Korea

NKPA	North Korea People's Army
O&O	Operational and Organizational
OEF	Operational Exploitation Force
OPCON	operational control
OPLAN	operations plan
OPFOR	Opposition Forces
OOTW	operations other than war
PGM	Precision Guided Munition
PGMM	Precision Guided Mortar Munition
PLS	palletized load system
PW	PRAIRIE WARRIOR
RAM	reliability, availability, and maintainability
RAS	Regimental Aviation Squadron
RMTU	Reserve Military Training Unit
ROK	Republic of Korea
SAMS	School for Advanced Military Studies, CGSC
SCRAP	Sufficiency Criteria for Realignment Adjustment Process
SME	subject matter expert
SOF	Special Operations Forces
SOI	signal operating instructions
TAA	tactical assembly area
TAI	target area of interest
TDR	Tactical Decision Rule
TRAC	TRADOC Analysis Center
TRAC-Lee	TRAC at Fort Lee
TRAC-OAC	TRAC Operations Analysis Center
TRAC-SAC	TRAC Study and Analysis Center
TRAC-SWC	TRAC Scenario and Wargaming Center
TRADOC	Training and Doctrine Command
TROKA	Third Republic of Korea Army
UAV	Unmanned Aerial Vehicle
UXO	unexploded ordnance
VIC	Vector-in-Commander
WAM	Wide Area Munitions

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APPENDIX C
ADDITIONAL 2010 TECHNOLOGIES

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Appendix C

Additional 2010 Technologies

C-1. Although the MSF portrayed in PW is considered a 2010 organization, some limitations of the constructive models used in the PW exercise precluded the representation of all of the 2010 technologies that were desired to be examined by BLITCD. TRAC has included these technologies that were desired, but not played in PW, in the second run set - the base case. Accordingly, the base case will be the organization against which all subsequent alternatives are compared. A list of these technologies is at table B-1 and their descriptions can be found below.

Table C-1. Additional 2010 Technologies.

Combat Function	Technology
Maneuver	Future Land Warrior
	Command Guided 2.75" Rocket
Fire Support	Guided MLRS
Mobility and Survivability	Improved FOX
	Chem/BIO Standoff Detection
	Biological Integrated Detection System
	Multispectral Smoke
	Intelligent Minefield/WAM
	Deep Attack WAM
	ASTAMIDS / GSTAMIDS
Logistics	APADS
Intelligence	Common Ground Station
	IEW Common Sensor

C-2. Technology Descriptions.

a. *Future Land Warrior (FLW)*. FLW is a highly integrated, modular fighting ensemble for the dismounted soldier with payoffs in lethality, survivability, C2, mobility and sustainability. The system provides the individual soldier enhanced capability to detect and identify targets, rapidly engage threats with an aided, point and shoot fire control, an advanced C2 capability including voice, digital and graphic communications. Survivability is enhanced by improved ballistic, NBC, Directed Energy Weapons (DEW), and incendiary protection.

b. *Command Guided 2.75" Rocket*. The Command Guided 2.75" Rocket is a low cost, precision guided weapon providing a stand off surgical strike capability against specified non-tank

point targets. This guided rocket would reduce collateral damage and cost per kill. Potential Army platforms include Apache and Comanche helicopters.

c. *Guided MLRS.* Inertial and GPS capabilities are being explored to improve delivery accuracy of munitions and significantly reduce the number of rockets required to defeat the target. This increase in lethality and accuracy will reduce collateral damage, mission duration and logistics burdens. The Guided MLRS will have its most significant effects at extended ranges.

d. *Improved FOX.* The FOX NBC Reconnaissance System is a system of NBC detection, warning, and sampling equipment integrated into a high speed, high mobility armored carrier capable of performing NBC reconnaissance throughout the battlefield. The Improved FOX will introduce organic maintenance and will reduce the crew size from four to three soldiers. (The interim FOX was fielded as a Non-developmental Item, using contractor maintenance support.) The Improved FOX systems will also incorporate improved chemical and biological detectors.

e. *Chem/BIO Standoff Detection.* This capability will be provided through the Improved NBC reconnaissance system (NBCRS) (Improved FOX) and the Laser Standoff Chemical Detector (LSCD). The NBCRS will detect and identify nuclear, biological, and chemical contamination. It will warn units of NBC contamination, report and mark contaminated areas, locate and mark clean bypass routes and collect and transport samples of NBC material for later analysis. This armored vehicle can operate at speeds up to 45 kmph. The LSCD will use infrared (IR) laser to remotely detect chemical agents by their IR absorption. The detector scans horizontally 60 degrees at line of sight and can detect chemical agent vapor up to 5 km distance within 3 minutes. It can be employed to observe critical terrain or scan upwind of high priority units to provide early chemical agent warning.

f. *Biological Integrated Detection System.* The HMMWV mounted shelter dedicated to biological detection forms a large-area network with other systems to detect biological warfare contaminants. It identifies and characterizes the agent to the extent possible, forwards the detection information to corps for analysis, and preserves a sample for further analysis.

g. *Multispectral Smoke.* The Multispectral Smoke System generates large area mobile and stationary visual, IR, and millimeter wave (MMW) defeating smoke clouds to enhance survivability by reducing the enemy's ability to acquire targets. The system can be mounted on either track or wheeled vehicles, and can provide 90 minutes of visual and 30 minutes of IR or MMW obscuration without refueling.

h. *Intelligent Minefield/WAM.* The WAM minefield becomes an Intelligent Minefield (IMF) with the substitution of a Gateway or control device for one of the mines and the addition of advanced acoustic sensor data. The Gateway receives and combines sensor data from multiple mines and advanced acoustic sensors to reduce error and improve individual mine engagements. Through a Gateway-Controller interface, the commander can override the Gateway to turn minefields on and off, as well as implement other minefield tactics. The IMF contributes to situational awareness by feeding Inter-Vehicular Identification System (IVIS) users minefield

location and status. The IMF will increase WAM effectiveness by 50%, providing a more efficient, lethal, autonomous barrier. Operating range is 10-20 kilometers from the controller.

i. *Deep Attack WAM.* Deep attack WAM is a capability to deliver or employ a WAM minefield by the MLRS or ATACMS at extended ranges. (Other WAM variants are the basic hand emplaced (HE WAM) and Volcano (V WAM) helicopter delivered versions.) The WAM has a standoff detection and engagement capability common to all variants. It attacks targets from the top at a distance of up to 100 meters and will provide a mobility kill (Mk) to a predesignated target array. Pre-planned product improvements will allow the mine to communicate with its employing unit for remote on/off, recyclable self-destruct and intelligence gathering. (See Intelligent Minefield, above.)

j. *ASTAMIDS/GSTAMIDS.* ASTAMIDS is an airborne standoff mine/minefield detection and survey system that will be employed in all levels of conflict. Using the Short Range UAV as host, ASTAMIDS will conduct wide area intelligence gathering missions and will verify and precisely locate minefields. Information will be relayed to ground stations where it is screened, processed and transmitted to maneuver commanders. The system will provide real-time mine/minefield information for development of battle plans, modification of existing plans, and forward security during operations. Ground STAMIDS (GSTAMIDS) is a metallic/nonmetallic mine and unexploded ordnance (UXO) detector. The detector will locate mines/UXOs outside their lethality distance. Processed mine/UXO data can be disseminated through intelligence information channels.

k. *Advanced Precision Airborne Delivery System (APADS).* APADS allows for autonomous precision delivery of equipment, munitions, and sensors, reducing delivery aircraft vulnerability to hostile air defense weapons. It provides an inter-operable guidance system for various advanced serial and airdrop platforms from high altitude and offset. Remote deployment of mines, other submunitions, or stand-alone sensors will increase our capability on the future battlefield. APADS' ability to provide early entry and humanitarian forces precision delivery of combat equipment and sustainment items, without the need for personnel to manually guide the delivery platform to its target area, enhances survivability of both aircraft and airdrop cargo against adverse terrain and manportable, surface-to-air weapons.

l. *Common Ground Station.* The Common Ground Station will receive, process, and display multi-sensor intelligence information and disseminate intelligence products. Open architecture hardware and software modules, conformal antenna technologies, and other advanced concepts will be integrated to provide commanders with intelligence "on-the-move" and on demand. The Common Ground Station is the product of a P3I of the JSTARS Light Ground Station Module.

m. *Intelligence electronic warfare (IEW) Common Sensor.* IEW Common Sensor is composed of the Advanced Quickfix and Ground-Based Common Sensor systems, optimally used in a network configuration. System modularity allows for tailored mission tasking for communications and non-communications intelligence collection, precision location and electronic attack (smart jamming). Precision targeting relies on the use of both an aerial platform (Quickfix) and either the light or heavy Ground-Based Common Sensor (GBCS). An internal data link and

special algorithms in the GBCS preprocessor allow for the sharing of target location information and for the calculation of quality, near-real-time targeting data in support of advanced indirect fire systems. The GBCS is all-weather, all-terrain, self-contained and can operate on the move. Quickfix uses angle and time difference of arrival technology to permit rapid mid-range emitter mapping of the battlefield. Command and Control nodes within the division battlespace can be targeted; fixed frequency and low probability of intercept (LPI) communications can be detected, located, collected, analyzed and exploited through the use of networked assets.

APPENDIX D
UNIT COMPOSITION

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Appendix D Unit Composition

Table D-1 contains a listing of the units analyzed in SCRAP and the major weapon systems included in each.

Mech Inf HHC	2 M2A3, 6 M3A3, 6 120mm Mortars, 5 Javelin
Mech Inf Co	17 M2A3
Lt Inf HHC	
Lt Inf Co	3 Javelin, 2 60mm Mortars
Lt Inf Wpns Co	6 120mm Mortars, 12 HMMWV TOW
LOSAT Co	12 LOSAT
M1 HHC	2 M1A2, 6 M3A3, 6 120mm Mortars, 3 Javelin
M1 Co	11 M1A2
AGS HHC	2 AGS, 6 120mm Mortars, 3 Javelin
AGS Co	11 AGS
Cav Trp (Grnd)	32 FSVs
Avenger Btry	24 Avengers
BSFV-E Btry	8 BSFV-E
Corps Avenger Btry	18 Avengers
ER-FOG-M Btry (AD)	8 ER-FOG-M
ER-FOG-M Btry (AT)	12 ER-FOG-M
Corps SAM Btry	8 Corps SAM
Crusader Btry	8 Crusaders
Ltwt 155 (T) Btry	8 Howitzer ATCAS 155mm
HIMARS Btry	9 HIMARS
Paladin Btry	8 Paladin
ATACMS Btry	9 MLRS Launchers
Air Recon Trp	12 RAH-66
Attack Trp	3 RAH-66, 5 AH-64D
Assault Trp	15 UH-60L
Medium Lift Co	16 CH-47D
GS Lift Co	16 CH-47D
Avn Spt Co	8 UH-60L

Table D-1. Composition of units used in SCRAP.

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APPENDIX E

MSF COUNTERATTACK OPLAN

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Appendix E

MSF Counterattack OPLAN

The following plan is a collaboration of several different SMEs. Planning began in December of 1994. COA analysis was conducted by SWC and SAC with assistance from the MSF Commander Brigadier General Miller, and Retired Brigadier General Wass de Czege. SMEs were then asked to review a tentative plan. The plan was reviewed and revised several times until a Division OPLAN was produced. SMEs from combat support and service support centers were asked to write their annex to the Division Plan. SMEs from combat arms centers were asked to develop their own subordinate OPLANs. The Armor, Aviation and Infantry Center each provided a brigade OPLAN. The Chemical School, Air Defense School, Air Combat Command Joint Project Office (ACCJPO), and Combined Arms Support Command (CASCOM) each provided an annex. This plan was executed in accordance with their detailed planning.

MSF COUNTERATTACK PLAN

References: CFC Campaign Plan for the Defense of Korea Map, Korea, 1:100,000

E-1. Task Organization:

<u>1/52 AR BDE</u>	<u>4/52 AVN</u>	<u>1/51 IN</u>	<u>52 DIVARTY</u>
1-5 AGS	1-88 IN	2-507 AVN	2-13 FA
B/1-524 (LOSAT)	2-47 FA (DS)	5-22 EN	A/2-252 AT
1-40 FA DS	C/1/52 CAV	A/1-842 ADA	1-1FA (MLRS)
5-21 EN BN	A/1/8 FA	B/1-52 CAV	2-.37 FA (MLRS)
A/B/1-441 ADA	1-41 FA	2-6 FA (Paladin)	
A/1-52 CAV			

<u>52 EN BDE</u>	<u>MSF TROOPS</u>	<u>111 AVN</u>
14 EN (C) (W)	33 AIR CAV SQDN	
19 EN (C) (W)	52 EN BDE	
652 CSE	52 MI BN	
5022 BRIDGE CO	52 SIG CO	
610 TERRAIN DET	52 CHEM CO	
	22 PSYOP DTCH	
	52 MP CO	
	A/3-4 (CORPS SAM)	
	A/6-58 (CORPS AV)	

E-2. Situation:

a. Friendly

(1) CFC Mission: On order, CFC responds to North Korean preparations for an attack on the Republic of Korea (ROK) by undertaking military preparations to prevent that attack. If North Korea (NK) attacks, CFC defends the ROK, retains Seoul and minimizes loss of territory, defeats NK armed forces, ends hostilities on terms favorable to the ROK, US, and their allies; and supports subsequent peace implementation plans.

(2) CFC Commander's Intent. The purpose of this phase is to defeat the NK armed forces and prevent the NK government from directing actions and activities of its remaining

military units and populace. The method is to conduct counteroffensive operations to isolate the NK capital, separate the government from its armed forces and people, and compel the North Korea People's Army (NKPA) to fight in at least two directions at the same time and commit its remaining operational reserves. At the end of the phase CFC forces will have prevented the NK political and military leaders from exercising strategic direction and operational control of their armed forces and people; destroyed the NKPA forward and operational exploitation corps; established a defense in-depth south of the Sinanju-Tokchon-Hamhung line; and neutralized weapons of mass destruction.

b. Enemy

(1) Twelfth Mechanized Corps is a nine brigade Operational Exploitation Force (OEF). It will move to reinforce bridgehead north east of Seoul on __ March 2010. The OEF moves only at night. In the day they laager in pre-established hide sites. Their rate of march is 12 kilometers an hour given a night time unopposed move. They possess the M1983, the T62, the 240 MRL and 152 and 122 self propelled artillery. There are six mechanized brigades composed of five battalions of mechanized infantry and one battalion of armor. There is one armor brigade composed of four armor battalions. Finally there are two artillery brigades, one 240 MRL, and one 152/122 self propelled brigade. The nine brigades will move along three avenues of approach, north, central and south from their original hide spots. They will move with two mechanized brigades and one tank brigade along the northern avenue of approach, one mechanized brigade and two artillery brigades along the center avenue of approach (to provide mutual support) and three mechanized brigades along the southern avenue of approach.

(2) A brigades length in column is 35 kilometers. A mechanized brigade possess 288 tanks, APCs and artillery pieces. A tank brigade possesses 244 combat systems. An artillery brigade possesses 72 systems. The OEF is expected to reach the Chorwon with reconnaissance troops at or about H+26.

(3) Two operational contingencies exist for the OEF. The first is the Wonson-Kokson highway; an eight lane highway which moves from the Kokson all the way to the Chorwon. All nine brigades could move in a single column along their route. The second operational contingency is to move south into the Seoul pocket. The most likely COA is to move on the three center avenues of approach where the OEF receives the force protection benefits of dispersion without losing the ability to provide mutual support.

E-3. Mission: On order the MSF attacks as the Joint Forces Land Component Commander (JFLCC) operational reserve to destroy 12th Mechanized Corps (OEF) in the vicinity of the Koksan/Chorwon valleys to deny the 2 AG reinforcement.

E-4. Execution:

a. Commanders Intent - The purpose of the operation is to destroy the OEF, thus denying the 2 AG reinforcement. I expect to incorporate the full range of MSF and CFC air, naval, and

SOF capabilities to execute a simultaneous, in-depth attack. I expect the end state to leave the MSF at 85% or better, vicinity of the DMZ, ready for follow-on missions.

b. Concept of the Operation - (See annex A) The MSF will conduct the Corps counterattack to destroy the OEF in late March of 2010. The attack will be conducted in five phases. These phases are: reconnaissance, positioning attack assets, simultaneous ambush, exploitation, reconstitution and repositioning. Decisive combat will occur during phase III, the Ambush. During this phase the decisive point will be when at least two of the OEF's three lead brigades enter EAs Wildcat, Tomcat, or Bobcat. At that point the ambush will begin and all other combat systems can adjust utilizing a refined situational awareness available to the MSF. The light infantry brigade possesses the least mobility and will therefore be the anvil of the attack. The light infantry brigade will be the MSF's main effort and will receive priority of fires during phase III.

c. The phases of the attack overlap and are broken down by H-hour. H-hour is defined as the time when the lead elements of the first OEF brigades begin to move from their hide sites. Each phase is described separately below.

(1) Phase 1. Reconnaissance. During phase 1, the MSF commander will conduct precision reconnaissance throughout the depth of the battlefield.

(a) Prior to H hour, SOF teams will be placed at NAIs 1, 2, & 6. Their purpose is to trigger TAIs 1, 2, & 3 at H+25, or when the lead battalions from the trail brigades cross their respective NAIs. They will also maintain continuous surveillance of the NAIs to update the situational template.

1. NAI 1 @ 4204

2. NAI 2 @ 4465

3. NAI 6 @ 5481

(b) At H+00:30, the 33 Air Cav squadron conducts a route reconnaissance from the Chorwon to the Kokson along the three main avenues of advance with one troop (three Comanches along each avenue of advance). Upon reaching the Kokson bowl, it will conduct an area reconnaissance of the bowl with a second troop. They will continue route reconnaissance along the three avenues of advance with a third troop, until reaching the three brigades of the OEF. They will conduct a screen, maintaining visual contact with the three lead brigades, and withdraw as necessary to ensure survivability of the air troops. Observation posts, UAVs, or FERRETS will be placed on NAIs 3, 4, 5, 7, 8, 9, & 10. They will update a situational template of all nine OEF brigades, giving the MSF commander a complete picture of the OEF. The Air Cav will coordinate close air support (CAS) as available to continuously harass and disrupt the OEF. This will enable the MSF commander to affect the velocity of the OEF's closure to the decisive point of contact.

(c) At H+3, JSTARS will monitor NAIs 3, 4, & 5. UAVs will monitor these NAIs as necessary, as blank spots occur or as more specificity is required. The aviation brigade will control them, and they will be cued to JSTARS. Their primary purpose is to trigger WAM minefields in engagement areas Lion, Tiger, and Bear after the lead battalion of combat vehicles from the second echelon brigades cross their respective NAIs. They will also maintain continuous surveillance of the NAIs to update the situational template.

1. NAI 3 @ 6699
2. NAI 4 @ 7683
3. NAI 5 @ 5956

(d) At H+10 LRSD sections will be inserted vicinity NAI 7, 8, 9, & 10. These LRSD will be OPCON to the light infantry brigade. Their primary purpose is to trigger the WAM and FASCAM minefields in engagement areas Tomcat, Wildcat and Bobcat when the lead battalion of the lead brigades cross NAIs 7, 8, and 10. They will also maintain continuous surveillance of their NAIs to update the situational template.

1. NAI 7 @ 2682
2. NAI 8 @ 9978
3. NAI 9 @ 1068
4. NAI 10 @ 9153

(2) Phase 2. Positioning attack assets. During phase 2, the MSF brigades will position the deep strike assets with aviation lift battalions.

(a) At H+ 28 two UH-60s will place pathfinders on two LZs in a six kilometer arc around EA Wildcat. These pathfinders will prepare the LZs for the future placement of an infantry battalion assets. At H+29, 12 UH-60s will place one light infantry company and the battalion's light weight 120 mm mortar platoon in one of the two LZs around EA Wildcat. One light company (-) will be air assaulted into observation positions overwatching Wildcat. The first company will establish and secure a firebase for the battalion mortars, and ER EFOG-M. They will prepare to conduct a synchronized attack with FASCAM, AFAS, ER EFOG-M, and mortars to defeat the lead brigade in EA Wildcat at H+30.

1. LZ 1 @ 023343
2. LZ 2 @ 290780

(b) At H+28, two UH-60s will place pathfinders on two LZs in a six kilometer arc around EA Tomcat. These pathfinders will prepare the LZs for the future placement of infantry

battalion assets. At H+29, 12 UH-60s will place one light infantry company and the battalion's light weight 120 mm mortar platoon in one of the two LZs around EA Tomcat. One light infantry company (-) will air assault with six UH-60s to observation positions overwatching Tomcat. The first company will establish and secure a fire base for the battalion mortars, and ER EFOG-M. They will prepare to conduct a synchronized attack with FASCAM, AFAS, ER EFOG-M, and mortars to defeat the lead brigade in EA Tomcat at H+30.

1. LZ 1 @ 304665
2. LZ 2 @ 210690

(c) At H+28, two UH-60s will place pathfinders on two LZs in a six kilometer arc around EA Bobcat. These pathfinders will prepare the LZs for the future placement of infantry battalion assets. At H+29, 12 UH-60s will place one light infantry company and the battalion's light weight 120 mm mortar platoon in one of the two LZs around EA Bobcat. One light infantry company (-) will air assault with six UH-60s to observation positions overwatching Wildcat. The first company will establish and secure a firebase for the battalion mortars, and ER EFOG-M. They will prepare to conduct a synchronized attack with FASCAM, AFAS, ER EFOG-M, and mortars to defeat the lead brigade in EA Bobcat at H+26.

1. LZ 1 @ 023343
2. LZ 2 @ 034472

(d) At H+28, eight UH-60s will place four platoons of light infantry in four LZs to support an insertion of two batteries of lightweight 155 towed artillery. These infantry platoons will secure the LZs for the batteries insertion at H+29. The primary purpose of these platoons is to determine the best (safest) LZ to place the batteries. Once the batteries are on the ground, these platoons will consolidate to provide security for the batteries.

1. LZ 1 @ 0688
2. LZ 2 @ 1487
3. LZ 3 @ 0385
4. LZ 4 @ 1381

(e) At H+28, two batteries of lightweight 155, with basic load and crew, will be emplaced with 16 CH-47Ds with two Comanches and two AH-64Ds in escort into two of the previous LZs. The first battery will provide WAM at H+30 when triggered by the UAV on NAI 3, 4, & 5 on EAs Lion, Tiger, and Bear. The second battery will fire SADARM against targets in EA Lion and EA Tiger.

(f) At H+8, four platoons of light infantry will be placed in four LZs to support an insertion of one battery of HIMARS. These infantry platoons will secure the LZs for the battery's insertion at H+28. The primary purpose of these platoons is to determine the best (safest) LZ to place the battery. Once the battery is on the ground these platoons will consolidate to provide security for the battery.

1. LZ 1 @ 9762

2. LZ 2 @ 0462

3. LZ 3 @ 0959

4. LZ 4 @ 0657

(g) At H+28, a battery of HIMARS, their basic load, and crew will be emplaced with nine CH-47Ds with two Comanches and two AH-64Ds in escort. It will provide SADARM at H+30 in EA Bear, when triggered by the UAV overwatching NAI 5.

(h) At H+23, the Armor Brigade's attached FSV Cav Troop will begin to move from TAA Badger to the Chorwon. They will conduct a mobile screen for the maneuver force while moving along Axis Cheetah. Upon completion of the move (when the maneuver units enter battle positions around EA Fox) the FSV Cav Troop will move to screen the west side of the Chorwon. The purpose of this screen is two fold. First, provide security for the maneuver force's flank. Second, trigger the MSF ambush as the OEF's lead brigades reconnaissance companies enter the Chorwon.

(i) At H+23:30 the Armor brigade will begin to move along Axis Cheetah. They will move with AFAS, Paladin, and MLRS. They will establish battle positions around EA Fox. Their primary purpose is to escort the artillery forward to positions from which they can range to support the Infantry Brigade's fight in EAs Tomcat, Wildcat, and Bobcat.

(3) Phase 3. Ambush. O/O, the MSF will conduct a simultaneous ambush to destroy the NKPA's 12th Mechanized Corps to deny the NKPA's reinforcement. The ambush will initiate at H+30, destroying the 12th Mech Corps throughout the MSF AO using the entire spectrum of infantry, aviation and armored maneuver, and precision munitions firing systems (mortars through MLRS). Additionally, CFC will provide fixed wing aircraft in a supporting role. As the ambush conditions are established at H+30, all organizations and systems will simultaneously assault the entire 12th Mech Corps. The infantry brigade will air assault in LZs and occupy BPs surrounding EAs Bobcat, Tomcat and Wildcat, synchronizing a coordinated attack consisting of FASCAM, AFAS, ER EFOG-M, and mortars, rapidly destroying an enemy brigade in each EA. The Aviation brigade destroys an enemy brigade in each of the following EAs, Tiger, Lion, and Bear with their attack assets. The armored brigade attacks along axis Cheetah to position artillery assets to destroy enemy brigades in EAs Wildcat, Bobcat, and Tomcat. The armor brigade occupies a hasty defense and destroys lead enemy units in EA Fox. On order the armor brigade

destroys a mechanized brigade in the Chorwon Bowl. The MSF will complete operations with 85% strength and postures to complete any follow-on-missions.

(a) At H+30, Air Interdiction (AI), 20 ATACMS, and 120 mine WAM minefield, will strike simultaneously in TAIs 1, 2, & 3.

<u>TAI 1</u>	<u>TARGET</u>	
AI TARGET	4903 TO 5203	Armor Brigade
LINEAR TARGET	5305 TO 5604	
WAM MF	5703 TO 6003	

<u>TAI 2</u>		
AI TARGET	4860 TO 5261	Mech Brigade
LINEAR TARGET	5260 TO 5660	
WAM MF	5760 TO 6161	

<u>TAI 3</u>		
AI TARGET	6486 TO 6984	MRL Brigade
LINEAR TARGET	6987 TO 7187	
WAM MF	7286 TO 7483	

(b) At H+29:30 elements of the attack aviation brigade will move along three air corridors to battle positions overwatching EAs Lion, Tiger and Bear. They will move as companies with three Comanches in the lead. Upon conducting a forward passage through the Regimental Aviation Squadron (RAS) screen, the lead Comanches will launch Ferrets. These Ferrets will provide security for the force forward of the Comanches and will kill any and all enemy air defense assets along the air corridor. At H+30 the attack aviation battalions in EAs Lion, Bear and an attack aviation company in EA Tiger will ambush the three center brigades. The ambush will include: an attack aviation battalion firing a basic load of HELLFIRE missiles, a lightweight 155 battery or HIMARS battery firing 140 rounds and 50 missiles of SADARM respectively, and a 120 mine WAM minefield fired by a HIMARS battery.

<u>EA LION</u>	<u>TARGET</u>	
AI TARGET	8607 TO 9005	Mech Brigade
LINEAR TARGET	9107 TO 9405	
WAM MF	9505 TO 9803	

EA TIGER

AI TARGET	8481 TO 8978	SP Arty Brigade
LINEAR TARGET	8978 TO 9277	
WAM MF	9377 TO 9676	

EA BEAR

TARGET

AI TARGET	6858 TO 7258	Mech Brigade
LINEAR TARGET	7246 TO 7647	
WAM MF	7748 TO 8050	

(c) At H+30, the three lead brigades will be ambushed in EAs Tomcat, Wildcat and Bobcat. The ambush will be synchronized by the light infantry brigade. Each ambush will include: AFAS/Paladin-delivered 84 FASCAM, 50 rounds of AFAS/Paladin delivered SADARM, 24 ER EFOG-M, and 400 precision guided mortar rounds.

EA TOMCAT

TARGET

FASCAM TARGET	2164 TO 2464	Mech Brigade
LINEAR TARGET	1762 TO 2164	
ER EFOGM	1462 TO 1762	
MORTARS	1462 TO 1762	

EA WILDCAT

FASCAM TARGET	3878 TO 3873	Mech Brigade
LINEAR TARGET	3780 TO 3873	
ER EFOGM	3582 TO 3780	
MORTARS	3582 TO 3780	

EA BOBCAT

FASCAM TARGET	2164 TO 2464	Mech Brigade
LINEAR TARGET	1762 TO 2063	
ER EFOGM	3582 TO 3640	
MORTARS	1462 TO 3640	

(d) At H+ 30, a Joint Air Attack Team (JAAT) will be launched in EA Wolverine by a Troop from the 33rd Air CAV SQDN. The attack will include a Volcano minefield emplaced at H+24 by three UH-60s, 8 CAS sorties and a Comanche troop equipped with HELLFIRE missiles. The primary purpose of this JAAT is to defeat the lead companies of the two northern lead

brigades. The maneuver brigade will destroy the recon troop and or remnants from the lead southern brigade with direct fire in EA Fox. On order, the maneuver brigade will destroy one of the OEF's lead brigades. If these brigades are not acquired by the light infantry brigade in one of its three engagement areas, the armor brigade will destroy that brigade as it enters the Chorwon in either EA Fox or EA Wolverine.

<u>EA WOLVERINE</u>	<u>TARGET</u>	
JAAT	4455 TO 4855	Recon Troops
VOLCANO MF	4454 TO 4954	

<u>EA FOX</u>		
4 MAN BNS	CM 4546	Remnants

(4) Phase 4. Exploitation. At H+31, AI will be committed in the DIVARTY zone to destroy battalion sized remnants. The three attack aviation elements that struck Lion, Tiger and Bear will return to forward area refuel points (FARPs) in TAA Badger to rearm, and refuel. After the Brigade commander has received an updated paint of the enemy situation, he will commit a single attack battalion back into zone to destroy battalion sized remnants. The light infantry brigade commander will commit his attack aviation battalion during this phase against a remnant battalion if all three engagement areas in his zone were successful. If one or more engagement areas were not successful in defeating an OEF brigade, the infantry brigade commander will commit his attack aviation battalion to destroy that brigade (with assistance from MLRS, AFAS, and Paladin. Remaining CAS and AI sorties will be committed as needed to complete the destruction of remnant OEF forces in the MSF's area of operations. The Armor Brigade will destroy all remnant forces which enter the Chorwon bowl during this phase.

(5) Phase 5. Reconstitution/Repositioning. All assets emplaced during phase 2 will begin withdrawal during phase 5. Priority for extraction of deep assets is as follows: Lightweight 155, HIMARS, LRSD, Air assault companies. Assets will begin extraction after the ambush is complete. The maneuver brigade will withdraw back to TAA Badger to prepare for future missions.

d. Fire Support. The two Lightweight 155 and HIMARS batteries are direct support (DS) to the Aviation Brigade because they are airmobile and can be emplaced to support the MSF in depth. The remaining Lightweight 155 battalion will be DS to the Light Brigade but will move forward under the protection of the Armor Brigade (on the ground). The MLRS battalion, AFAS battalion, and Paladin battalion will provide fires (general support reinforcing) to the light brigade. These three battalions will move forward (on the ground) from TAA Badger to Fire Bases around EA Fox under the protection of the Armor Brigade. The RAS receives priority of fires during phases one and two. The Light Infantry Brigade receives priority of fires during phase three. The Armor Brigade will receive priority of fire within the MSF during phase four.

e. Tasks to Maneuver Units.

(1) 1/52 AR BDE: At H+23:30 will move along Axis Cheetah with AFAS, Paladin, and MLRS. Establish battle positions around EA Fox. Escort AFAS, Paladin and MLRS battalions forward to positions from which they can range EAs Tomcat, Wildcat, and Bobcat. Destroy the recon troop and or remnants from the lead southern brigade with direct fire in EA Fox.

(2) 4/52 AVN: At H+28, place four platoons of light infantry in four LZs to support an insertion of two batteries of lightweight 155 towed artillery. At H+29, emplace two batteries of lightweight 155, with basic load and crew into two of the previous LZs. At H+24, place four platoons of light infantry in four LZs to support an insertion of one battery of HIMARS. At H+29, emplace a battery of HIMARS, their basic load, and crew into one of the LZs.

(3) Use the following three air corridors for all ingress/egress to EAs Lion, Tiger, and Bear:

<u>Air Corridor</u>	<u>Air Corridor Points</u>	<u>EAs</u>
Vampire	2583, 1684, 0797, 0216, 9035, 8442	Bear
Blue Bird	3687, 3610, 3630, 3044, 2350, 1053, 0164	Tiger
Hawk	3687, 3610, 3630, 4053, 2476, 1593, 0097	Lion

(4) Upload for the attack company in EA Tiger will be 16 Hellfire missiles. Upload for the two other battalions will be as depicted in the Aviation annex.

(5) 1/51 IN: At H+28 place pathfinders on two LZs in a six kilometer arc around EA Wildcat. At H+29, place one light infantry companies in one of the two LZs around EA Wildcat. One light infantry company (-) will air assault to observation positions overwatching Wildcat. Prepare to conduct a synchronized attack with FASCAM, AFAS, ER EFOG-M, and mortars to defeat the lead brigade in EA Wildcat at H+30.

(6) At H+28, place pathfinders on two LZs in a six kilometer arc around EA Tomcat. At H+29, place one light infantry company in one of the two LZs around EA Tomcat. Air assault one light infantry company to observation positions overwatching Tomcat. Prepare to conduct a synchronized attack with FASCAM, AFAS, ER EFOG-M, and mortars to defeat the lead brigade in EA Tomcat at H+30.

(7) At H+28, place pathfinders on two LZs in a six kilometer arc around EA Bobcat. At H+29, place one light infantry company in one of the two LZs around EA Bobcat. One light infantry company (-) will air assault into observation positions overwatching Wildcat. Prepare to conduct a synchronized attack with FASCAM, AFAS, ER EFOG-M, and mortars to defeat the lead brigade in EA Bobcat at H+25.

(8) At H+30, ambush the three lead brigades in EAs Tomcat, Wildcat and Bobcat.

(9) 52 DIVARTY: At H+30, strike TAIs 1, 2, & 3 simultaneously with 20 sorties of AI, 20 ATACMS, and 120 WAM.

(10) 33 AIR CAV: At H+00:30, conducts a route reconnaissance from the Chorwon to the Kokson along the three main avenues of advance with one troop (three Comanches along each avenue of advance). Upon reaching the Kokson bowl, conduct an area reconnaissance of the bowl with a second troop. Continue route reconnaissance along the three avenues of advance with a third troop, until reaching the three brigades of the OEF. Conduct a screen, maintaining visual contact with the three lead brigades, and withdraw as necessary to ensure survivability of Comanches. Place observation posts, UAVs or FERRETS on NAIs 3, 4, 5, 7, 8, 9, & 10. Maintain a continuous template of all nine OEF brigades. Coordinate CAS as available to continuously harass and disrupt the OEF.

(11) At H+30, conduct a JAAT in EA Wolverine. Include a Volcano minefield emplaced at H+28 by three UH-60s, 8 CAS sorties and a Comanche troop.

f. Coordinating Instructions.

(1) Starting positions for the OEF: 5710, 5077, 5203, 4074, 4686, 4174, 5287, & 5060.

(2) Starting positions for the MSF: TAA Badger, center of Mass 3576 (North of Seoul) vicinity Yong Am Ri.

(3) Commanders will position assets forward with just enough (soldiers, bullets, equipment), just in time.

(4) Mechanized forces must complete the move along Axis Cheetah in six hours. (Average 8 kph.)

(5) Air defense weapons control status will be Yellow Tight.

(6) MOPP 0 will be in effect until H+24. At H+24 all MSF will assume MOPP 2.

E-5. Service support:

a. General

(1) During Phase I of the operation the priority of CSS effort will go to the air assault brigade in support of the air assaults of the LRSD and SOF into specified AOs.

(2) In Phase II, priority of CSS effort will go to the Infantry Bde during its four company air assault into specified LZs. Secondary effort for support will go towards the initial movements of the MECH Bde toward EA Fox.

(3) In Phase III priority of CSS support will go towards the MSF element most closely engaged. MSF CSS assets during this phase will remain flexible to respond to all contingencies that might occur during the simultaneous ambush. During this phase, CSS assets will begin to surge support forward in expectation of Phase V, Reconstitution and Resupply.

(4) During Phase IV, CSS priority of support will go to the AVN lift assets as they extract the infantry and artillery companies from their respective EAs.

(5) During Phase V, priority of CSS effort will go to replenishing and restocking the brigades in order: the aviation brigade, DIVARTY, the infantry brigade, and the heavy brigade.

b. Specific.

(1) Maintenance

(a) General. (Concept of Support). Combat logistics companies (CLCs) will maintain habitual relationships with supported maneuver battalions and supporting maintenance companies. When task organization for the counterattack operation goes into effect, CLCs will become attached to the forward logistics battalion (FLB) supporting the brigade to which the CLC's maneuver battalion is attached. Maintenance will be conducted as far forward as possible.

(b) Priority of maintenance is by Phase and to committed units.

(c) Maintenance activities will pass back all maintenance requirements which cause their backlog to exceed an eight hour limit.

(d) Maximum use of controlled substitution is authorized to sustain the availability of material.

(e) Authority is granted to commanders to employ battle damage assessment and repair (BDAR) procedures.

(f) Artillery contact teams from their supporting FLBs will Air Assault into appropriate LZs.

(2) Transportation

(a) Priority is to committed units.

(b) Palletized Load System (PLS) units are uploaded during Phase I with Class III (bulk) and class V in the assembly areas to move forward on order for the reconstitution during Phase V, or for emergency resupply.

(c) Aviation assets are available for emergency resupply and normal resupply except during Phase V to relocate and reconstitute units.

E-6. Command and signal:

- a. Succession of command by SOP. DTOC will remain with the maneuver brigade. DTAC will air assault to the infantry battalion located in EA Tomcat at H+28.
- b. Current signal operating instructions (SOI) in effect. Day 10. Frequencies will change at 1200 local and 2400 Greenwich Mean Time.

E-7. Annexes:

- a. I: OPLAN Diagrams
- b. II: IN BDE Plan
- c. III: AR BDE Plan
- d. IV: AVN BDE Plan
- e. V: ADA
- f. VI: CAS & AI
- g. VII: CSS
- h. VIII: Chemical

E-8. Brief explanation of Task Organization:

- a. The 33 Air Cavalry squadron was placed among division troops to provide centralized control of the MSFs Cavalry to the MSF commander. This enables the MSF commander to maintain continuous and complete picture of the division's area of operations. It also gives the brigade commander's a complete picture which they can compare with their own sensors.
- b. The AGS battalion and LOSAT company are attached to the Armor Brigade because in this COA it will not be feasible to insert them with the light infantry companies. Insertion would require fixed wing assets. The dense mountainous terrain prohibits a practical insertion and reduces the value added by the system once on the ground. The only way to measure the effectiveness of these systems/get them in to the fight (in this COA) is to attach them to the Armor Brigade.

APPENDIX F

VECTOR-IN-COMMANDER (VIC)
MODEL DESCRIPTION

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Appendix F

Vector-in-Commander (VIC)

Model Description

F-1. The VIC model is an automated combined arms force-on-force simulation representing land and air forces at the U.S. Army corps and division levels. VIC is deterministic, event-sequenced, and Lanchester-equation based. It is written in SIMSCRIPT II.5 and executes on SUN and Hewlett-Packard computer systems. The level of unit resolution is variable depending upon the unit modeled. The normal level of resolution is battalions for maneuver units, batteries for artillery and air defense units, troops for cavalry units, and companies for helicopter units. The model portrays ground maneuver units, whose movement through a predefined network of unit paths is controlled by a set of tactical decision rules (TDRs). The TDRs determine the actions (advance, attack, call for fire, defend, withdraw, etc.) of a unit based on its perception of a number of dynamic parameters (local force ratio, unit strength, loss rate, etc.). Additionally, there are decision rules for units above the maneuver battalion level (brigade, division, army, corps, front) to control reserves, combat support, and combat service support.

F-2. Functional area representation. VIC is modular and allows the user to control the level of representation of various functional areas. These functional areas are: direct fire combat, artillery fire support, C2, communications, engineer operations, tactical air operations, maintenance/return-to-duty, intelligence/electronic warfare, helicopter operations, electronic warfare, air defense, target acquisition, logistics, chemical and nuclear warfare.

F-3. All functional areas were included in the VIC simulations for the MSF O&O analysis. For an explanation of the scenario that was implemented in VIC for this analysis see Appendix E.

F-4. In order to provide detailed logistics data, VIC was ran with the CSS functional area set at the high level resolution. This detailed CSS data was provided to TRAC-Lee for their analysis in assessing the effectiveness of the 2010 CSS doctrine, equipment, and organization.

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APPENDIX G
FORCE TAILORING TOOLS

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Appendix G
Mobile Strike Force 95 O&O Analysis
Force Tailoring Tools

G-1. Background. The FORT-T were initially constructed to assist in the Early Entry Force Analysis Study and consist of three stand-alone tools: Sufficiency Criteria for Realignment Adjustment Processor (SCRAP), Force Package Logic Utility System (Force-PLUS), and Early Entry Force Tailoring Tool (EFFORT). Although the study plan included the use of EFFORT, it was not a part of the analysis and will not be discussed as a part of this document. Warfighting characteristics, force sufficiency criteria (FSC), and FSC goals provide the framework for the output from SCRAP and Force-PLUS. These tools were used to determine which types of units to delete and add to the force package to maximize force performance in the warfighting characteristics. Included in this appendix is an explanation of the warfighting characteristics, FSC, and the FSC goals; detailed information on the two models; and a thorough explanation of the process used in the models for each of the adjustments.

G-2. Warfighting characteristics, force sufficiency criteria, and FSC goals.

a. Warfighting characteristics, FSC, and FSC goals are determined for each study depending on the scenario; mission, enemy, terrain, troops, and time available (METT-T); and the issues of the study. The question to be answered in this study was whether any units in the MSF could be deleted or added to produce a more lethal, more survivable force package with better tempo.

b. The warfighting characteristics are the broad attributes of a force which are factors in its success or failure in a battle. In this study the warfighting characteristics of interest were lethality, survivability, and tempo. Other warfighting characteristics include, but are not limited to, sustainability and deployability. The tempo warfighting characteristic was further subdivided into tactical mobility, situational awareness, and maneuver of fires and effects.

c. FSC are the standards used to determine a force's degree of success in a particular warfighting characteristic. For use in SCRAP and Force-PLUS the FSC should be measurable from whatever simulation is used to produce the data at the total force level and at the company, battery, or troop level. Two of the FSC in this study were not used in the analysis: Destroy OEF helicopters and percent of MSF units doing BDA on attacked OEF units. This was because there were no helicopters in the OEF and the ability of units to perform BDA was not measurable in VIC.

d. FSC goals establish the level of achievement required to assert success has been attained in a particular warfighting characteristic. The warfighting characteristics, their associated FSC, and the FSC goals are shown in Table G-1.

Table G-1. Warfighting characteristics, FSC, and FSC goals.

Warfighting Characteristic	Force Sufficiency Criterion	FSC Goal
Lethality	Destroy OEF anti-tank (mounted/wheeled), tanks, and armored fighting vehicles	Destroy 60%
	Destroy OEF C3I systems	Destroy 70%
	Destroy OEF 240 MRL	Destroy 70%
	Destroy OEF helicopters	Destroy 60%
	Destroy OEF artillery and mortars (120 mm and higher)	Destroy 60%
	Destroy OEF mounted ADA systems	Destroy 70%
	Destroy OEF reconnaissance vehicles and systems	Destroy 60%
	Destroy OEF dismounted infantry/MANPADS	Destroy 40%
Survivability	MSF units surviving at more than 85% combat power	100% of units
Tempo <i>Tactical Mobility</i>	MSF units at correct location at the time desired	75% of units
	Lift assets available to the MSF when required	90% of assets
<i>Situational Awareness</i>	MSF units doing BDA on attacked OEF units	85% of units
	MSF units detecting OEF units	85% of units
<i>Maneuver of Fires and Effects</i>	MSF units committed	85% of units

G-3. Sufficiency Criteria for Realignment Adjustment Processor (SCRAP).

a. SCRAP is a spread-sheet package which calculates each unit type's contribution to the force's goal achievement. For each tailoring process the warfighting characteristic of interest was weighted three times as much as each of the other characteristics which were weighted equally. In the case of the tempo FSC the weighting was distributed evenly across all four of the tempo FSC. In lethality the weighting was distributed evenly across the FSC applicable for each particular type of unit. In other words, the attack helicopter troop was expected to assist the force in accomplishing five of the lethality FSC, so each of those five FSC was weighted one-fifth of the total lethality weight. Figures G-1 and G-2 illustrate the calculations made by SCRAP to determine a unit type's contribution to a lethality FSC goal.

b. Figure G-1 shows the calculations for a lethality FSC when the unit type made a positive contribution, that is, it killed enemy systems. In this example, the goal for the FSC is 70 percent of enemy systems destroyed, and the force performance from the VIC run was 52 percent destroyed. The deviation from the goal is, therefore, 18 percent, and the percent deviation from the goal is 25.7 percent.

c. If a unit type killed 9 percent of the enemy systems, then we must calculate how the force would perform without that unit type. This comes to 43 percent of enemy systems destroyed. The

force's deviation from the goal without this unit type is then 27 percent and the percent deviation from goal is 38.6 percent. By deleting the unit type from the force, the lethality of the force as measured for this FSC is reduced by 12.9 percent. Given that the weight associated with this FSC is .025, the benefit gained by deleting the unit type from the force is -.00323.

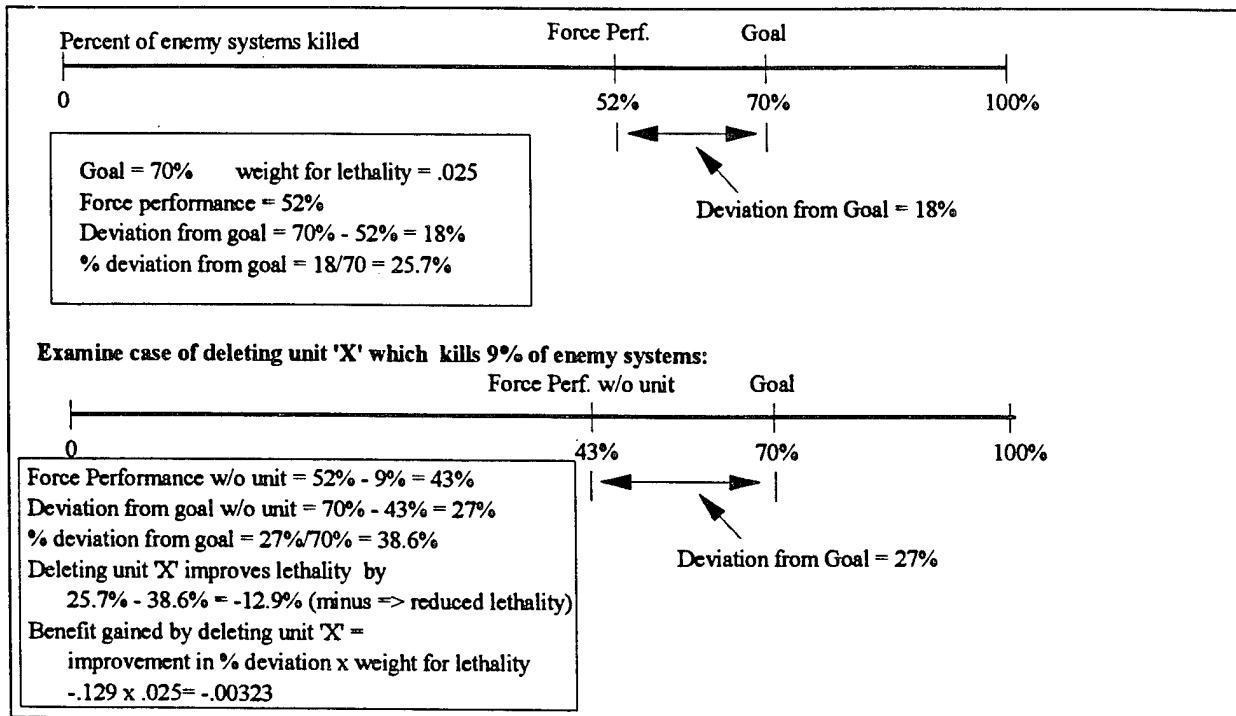


Figure G-1. Lethality calculations for units making a positive contribution.

d. Figure G-2 shows the calculations for unit types that do not kill any enemy systems during the battle. In this case, a penalty was assessed to the unit type for not destroying any systems it should have destroyed. Only FSC that clearly apply to the unit type can have a associated penalty for that unit type. For example, Avengers would be expected to kill enemy helicopters, so if an Avenger unit did not destroy any enemy helicopters, it would be assessed a penalty. In contrast, Avengers would not be expected to destroy enemy tanks, so no penalty would be assessed to an Avenger unit because it did not destroy any tanks.

e. The amount of the penalty assessed was 10 percent of the total deviation associated with the force. This amount was selected as a reasonable amount of improvement that could be expected if the unit type were making a valid contribution to the force effectiveness.

f. In the example in Figure G-2, a unit type has not killed any systems of a type it is expected to kill. Once again the goal for this FSC is 70 percent and the force actually achieved 52 percent kills. The penalty assessed to the noncontributing unit is thus 1.8 percent calculated as 10 percent of the 18 percent deviation from goal. Therefore, deleting the unit type from the force would improve the force's performance for this FSC by an estimated 2.57 percent. When multiplied by the weighting factor for this lethality FSC, .025, the benefit gained by deleting this unit type is +.00064.

Examine case of deleting unit 'X' which kills 0% of enemy systems:

Assess a penalty (10% of total deviation) for units that do not kill systems, but should

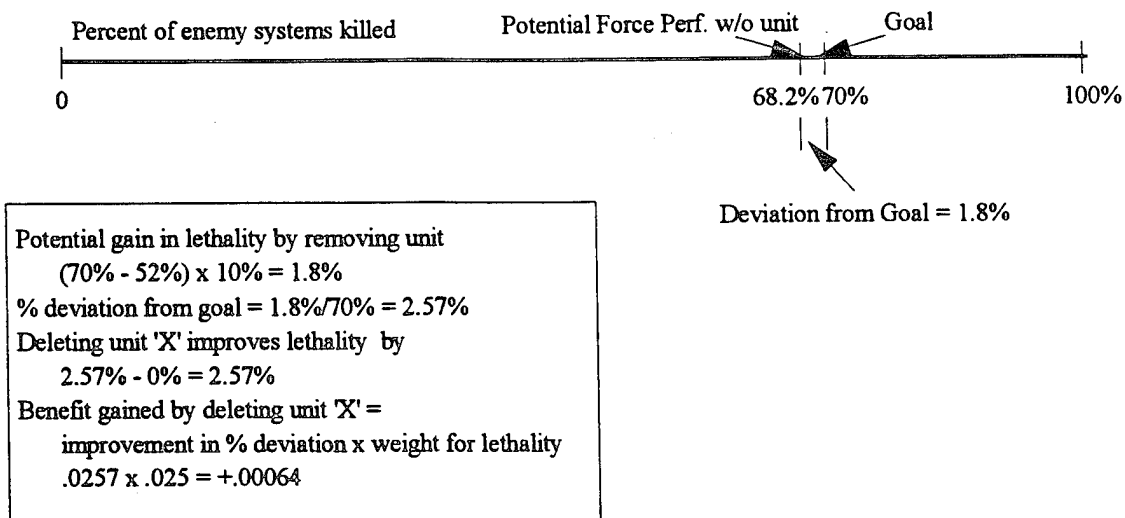


Figure G-2. Lethality calculations for units making no contribution.

g. The calculations for the survivability and tempo FSC were similar. After all the calculations were made to compute the benefit gained by deleting a unit type for each FSC, these were summed to determine the total benefit gained by deleting the unit type. The unit types were then rank ordered from high contribution to the force (low total benefit gained by deleting) to low contribution to the force (high total benefit gained by deleting). The unit types at the bottom of the list were candidates for deletion. Military judgment determined which of these candidates to delete and the number of units of each type.

G-4. Force Package Logic Utility System (Force-PLUS).

a. Force-PLUS is an expert system written in the C Language Integrated Production System (CLIPS)¹ designed to assist decision makers in determining which types of units should be added or deleted from a force package. Instead of relying on the military judgment of people who may not know all of the capabilities of different units, Force-PLUS captures this expertise and allows users to search for units with specific characteristics. The expert data base was established from a conference hosted by the TRADOC Analysis Center, Studies and Analysis Center at Fort Leavenworth, Kansas in which Battle Labs and Combat Development Directorates were invited.

b. Units were assessed in the warfighting characteristics of lethality, survivability, and tempo. The FSC captured specific capabilities of units.

¹ CLIPS is an expert system developed by the Software Technology Branch, NASA/Lyndon B. Johnson Space Center. CLIPS is designed to facilitate the development of software to model human knowledge or expertise.

c. Force-PLUS is presently a class two expert system. This implies it gives good performance but has not gained wide acceptance by the average user. Force-PLUS gives satisfactory output, but lacks an in-depth analysis explanation to satisfy the average user. Class one status can be attained with further modification and further input from the expert community.

d. Assessing the units was done using an ordinal scale. Quantitatively assessing the units would be too difficult and would lack accuracy, so qualitative assessments were used. Each of the units were assessed in their ability to improve the overall force's performance for each of the areas using the following terms (significance levels):

- (1) Level 1-significant improvement
- (2) Level 2-moderate improvement
- (3) Level 3-little improvement
- (4) Level 4-some improvement
- (5) Level 5-possible improvement

e. The user then searches for units with the desired characteristics. The user can search for units that improve each of the areas where the force performed poorly. If no unit is given from Force-PLUS, then the user must relax the significance levels. Conversely, if multiple units are given from Force-PLUS, then the user can tighten the significance levels. An example best illustrates these principles. If there are three areas where the force requires better performance, the user searches for units which give significant improvement to all these areas. If no unit is returned, the user relaxes the significance level to moderate improvement and searches for units. This process is continued until a unit is returned. If multiple units are returned, the user can tighten the significance levels of certain areas if desired.

f. The purpose of Force-PLUS was to help eliminate biases and/or parochialism in selecting units to add to the force. With an expert system data base built, the user can then search for units which can help force performance in selected areas.

G-5. Mobile Strike Force Tailoring.

a. Introduction. The MSF base case was to be tailored in each of the warfighting characteristics. It was thought the output from SCRAP and Force-PLUS would be different in turn when each warfighting characteristic was weighted higher than the others. This turned out to not be the case, at least not within the lists of unit types to delete or add. So, the discussion here will look at each of the force packages rather than the individual tailoring processes. In all cases the output for SCRAP came from data from VIC.

b. Although the SCRAP output may appear counterintuitive in certain tailoring applications, it should be remembered that the purpose of the analysis was to review the performance of the organization as a whole and not to critically evaluate specific systems. Furthermore, as task organization affected the operational employment location of critical units, it also affected their ability to impact on the battle.

c. The base case.

(1) The performances in each of the warfighting characteristics by the base case are shown in Figure G-3. The first three bars show the average percent of the FSC goals achieved in each of the warfighting characteristics. The last three bars show a weighted average of the overall accomplishment of the goals first with lethality weighted the most, then survivability weighted the most, and finally with tempo weighted the most. Since the goals were not achieved in any of the warfighting characteristics, the force package had room for improvement.

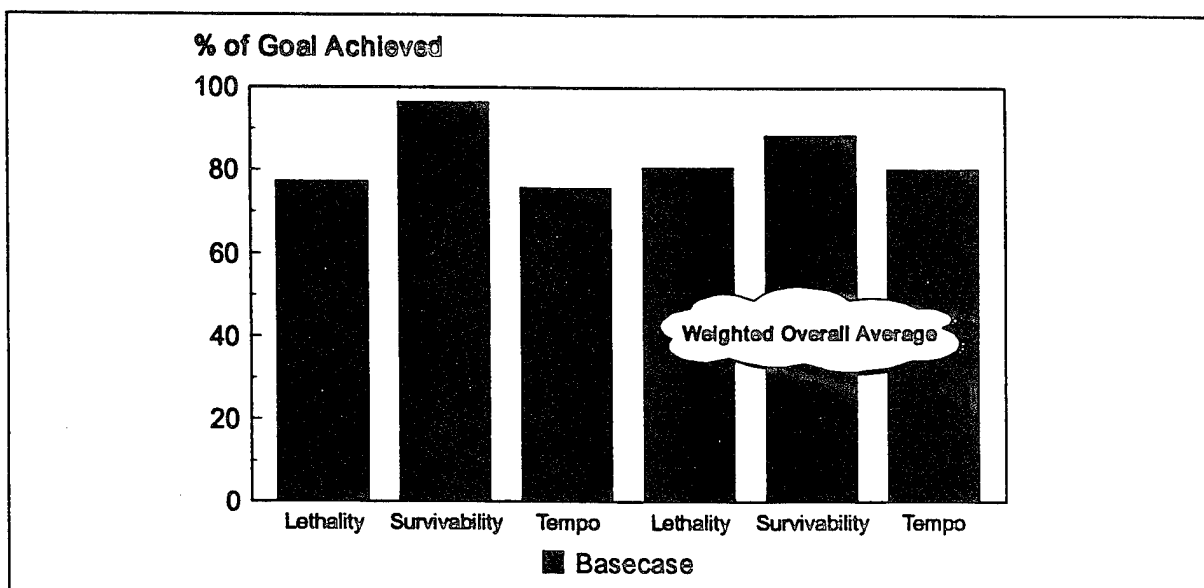


Figure G-3. Performance of the base case.

(2) The output for the base case from SCRAP is shown in Table G-2. The warfighting characteristic with the highest priority for tailoring is shown at the top of each list. Within each tailoring list the unit types are shown from high contribution to low contribution. Even though the warfighting characteristics were weighted differently each time to reflect the characteristic of interest, the lowest contributors were the same across the board. The final decision was to remove one light infantry battalion, one AGS company, two M1 companies, and two mechanized infantry companies. The AGS, M1, and mechanized infantry battalions were left with three companies in each. These particular unit types did not do well in the SCRAP analysis because their role was to protect and they moved unopposed to the conflict area. In a different scenario, which includes a significant direct fire fight, these unit types probably would show a higher contribution and would not be deleted.

Table G-2. SCRAP output for the base case.

Base Case					
Lethality Tailoring		Survivability Tailoring		Tempo Tailoring	
High Contribution	Low Contribution	High Contribution	Low Contribution	High Contribution	Low Contribution
Ground Cav Trp	AGS HHC	Attack Helo Trp	ATCAS Btry	Attack Helo Trp	AGS Co
Attack Helo Trp	Crusader Btry	ATACMS Btry	MLRS Btry	ATACMS Btry	Lt Inf HHC
ATACMS Btry	Air Recon Trp	Lt Inf Wpns Co	Ground Cav Trp	CH-47 Co	M1 Co
Lt Inf Wpns Co	ATCAS Btry	UH-60 Co	M1 HHC	Lt Inf Wpns Co	Mech Inf Co
ER-EFOG-M Btry	MLRS Btry	CH-47 Co	Mech Inf HHC	UH-60 Co	Lt Inf Co
CH-47 Co	Mech Inf HHC	Paladin Btry	LOSAT Btry	Paladin Btry	
Paladin Btry	M1 HHC	BSFV-E Btry	AGS Co	BSFV-E Btry	
UH-60 Co	LOSAT Btry	Corps Avenger Btry	M1 Co	ER-EFOG-M Btry	
BSFV-E Btry	AGS Co	ER-EFOG-M Btry	Lt Inf HHC	HIMARS Btry	
Corps Avenger Btry	M1 Co	Avenger Btry	Mech Inf Co	Corps Avenger Btry	
Avenger Btry	Lt Inf HHC	HIMARS Btry	Lt Inf Co	Crusader Btry	
HIMARS Btry	Mech Inf Co	Crusader Btry		Avenger Btry	
	Lt Inf Co	AGS HHC		Air Recon Trp	
		Air Recon Trp		AGS HHC	
				MLRS Btry	
				ATCAS Btry	
				M1 HHC	
				Mech Inf HHC	
				Ground Cav Trp	
				LOSAT Btry	

(3) The Crusader battalion was the direct support battalion for the heavy brigade in their movement to contact (MTC) from the TAA to the DMZ. This task organization took into account the rapid capability of the Crusader to stop and shoot in a MTC. The Paladin battalion was in direct support to the infantry brigade because the infantry lacked the mobility of the heavy brigade and did not require the enhanced mobility capability. Consequently, real time situation awareness enabled the heavy brigade to avoid a decisive battle in their MTC to the DMZ. On the other hand, the light brigade was directly involved in the ambush of the OEF, so the Paladin battalion had the greater opportunity for target destruction.

(4) ATCAS was one of the major contributors. It provided a 155 anti-tank capability which could be rapidly emplaced to be fired into large targets of opportunity. In the base case runs, only three of the six batteries were committed. This resulted in a low contributor rating. As the force was tailored in later adjustments, five of the six batteries were committed which resulted in a higher contribution during the later tailoring runs.

(5) In assigning air cavalry reconnaissance troops missions, the G-3 considered operational risk. The air cavalry conducted route reconnaissance forward until making contact with lead elements of the OEF. They then withdrew to conduct a screen within the Chorwon Bowl (the MSF's no penetration line). Fortunately, no combat effective OEF units entered the Chorwon Bowl. Thus, deceptively, the air cavalry reconnaissance troop received a low contribution rating.

(6) These examples point out the necessity of analyzing the output of the force tailoring models to evaluate the underlying operational rationale behind the contribution calculation. Military judgment can then be applied to the results to determine what force structure changes should be applied to the scenario.

(7) The base case force package did not meet the goals associated with the FSC listed in Figure G-4. Although the unmet goals were the same for each of the tailoring, the FSC were prioritized in Force-PLUS according to the warfighting characteristic of interest. In each case the list from Force-PLUS of unit types to add contained only attack helicopter troop. Military judgment indicated the addition of one attack helicopter battalion would be appropriate. This additional battalion was used in the infantry zone with much success.

d. Adjustment 1.

(1) Adjustment 1 was the result of the additions and deletions to the base case described above. The two M1 battalions, two mechanized infantry battalions, and one AGS battalion in adjustment 1 each contained three companies. Adjustment 1 has three light infantry battalions and an additional attack helicopter battalion.

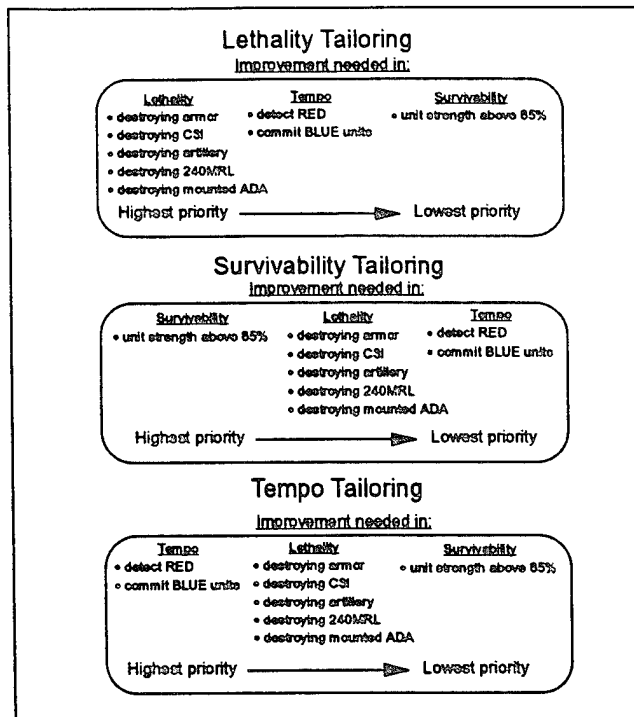


Figure G-4. Base case priorities of FSC in Force-PLUS.

(2) A comparison of the base case force package performance with adjustment 1's performance is shown in Figure G-5. Adjustment 1 improved the attainment of the goals in all cases. In particular, the force package achieved 99 percent of the survivability FSC goal of 100

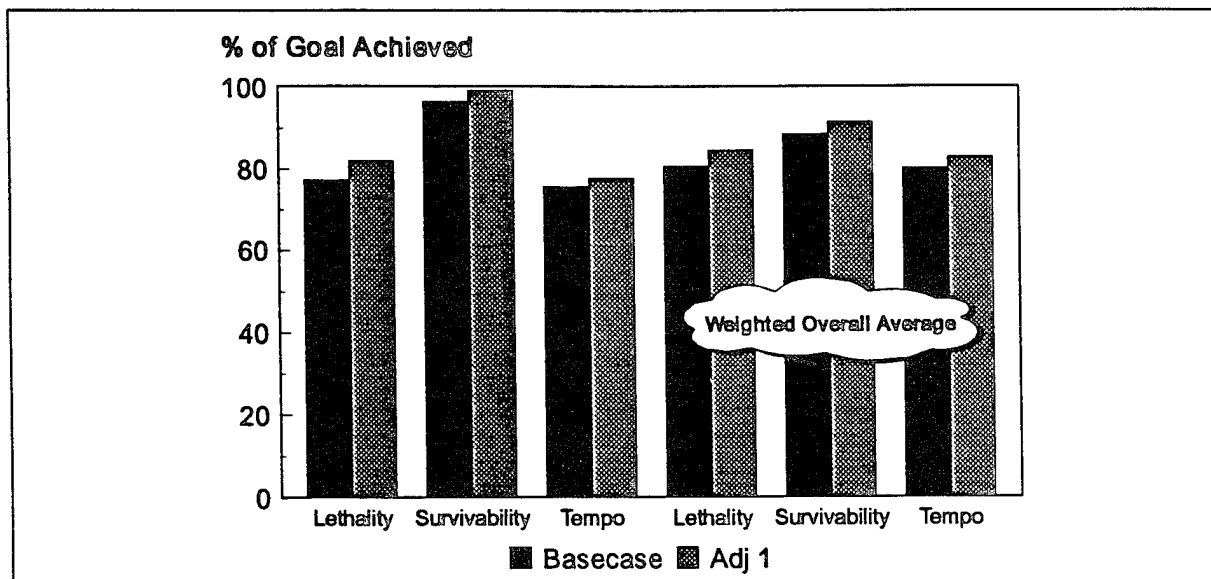


Figure G-5. Comparison of the performances of the base case and adjustment 1.

percent of the units surviving at more than 85 percent combat power. Improvement was sought primarily in lethality and tempo, but it was thought the goal might be reached in survivability.

(3) The lists from SCRAP of high contributors and low contributors in the tailoring for each of the warfighting characteristics is shown in Table G-3. The top three contributors and the last four contributors were the same in all three tailorings. One M1 company, one mechanized infantry company, and one light infantry company were removed from the force package.

Table G-3. Adjustment 1 output from SCRAP.

Adjustment 1					
Lethality Tailoring		Survivability Tailoring		Tempo Tailoring	
High Contribution	Low Contribution	High Contribution	Low Contribution	High Contribution	Low Contribution
Attack Helo Trp	Lt Inf Wpns Co	Attack Helo Trp	ATCAS Btry	Attack Helo Trp	Lt Inf HHC
Ground Cav Trp	HIMARS Btry	Ground Cav Trp	MLRS Btry	Ground Cav Trp	M1 Co
ATACMS Btry	Crusader Btry	ATACMS Btry	Air Recon Trp	ATACMS Btry	Mech Inf Co
ER-EFOG-M Btry	AGS HHC	UH-60 Co	M1 HHC	CH-47 Co	Lt Inf Co
CH-47 Co	ATCAS Btry	CH-47 Co	Mech Inf HHC	UH-60 Co	
Paladin Btry	MLRS Btry	ER-EFOG-M Btry	LOSAT Btry	Paladin Btry	
UH-60 Co	Air Recon Trp	Paladin Btry	AGS Co	BSFV-E Btry	
BSFV-E Btry	M1 HHC	BSFV-E Btry	M1 Co	ER-EFOG-M Btry	
Corps Avenger Btry	Mech Inf HHC	Corps Avenger Btry	Lt Inf HHC	Corps Avenger Btry	
Avenger Btry	LOSAT Btry	Avenger Btry	Mech Inf Co	Crusader Btry	
	AGS Co	Lt Inf Wpns Co	Lt Inf Co	Lt Inf Wpns Co	
	M1 Co	Crusader Btry		Avenger Btry	
	Lt Inf HHC	AGS HHC		AGS HHC	
	Mech Inf Co	HIMARS Btry		MLRS Btry	
	Lt Inf Co			Air Recon Trp	
				HIMARS Btry	
				M1 HHC	
				Mech Inf HHC	
				ATCAS Btry	
				LOSAT Btry	
				AGS Co	

(4) The FSC requiring improvement in the adjustment 1 force package are shown in Figure G-6. The list of unit types to add included several artillery unit types and the attack helicopter troop. Attack helicopters saturated the battlespace, so attention was directed to the artillery. The MSF had three ATCAS batteries which had not been committed. The decision was to add two CH-47 companies to forward position two of the ATCAS batteries, one to the infantry zone and one to the aviation zone. This resulted in two ATCAS batteries in the infantry zone and three ATCAS batteries in the aviation zone.

e. Adjustment 2.

(1) The outcome of the additions and deletions to adjustment 1 was adjustment 2. This force package had five M1 companies and five mechanized infantry companies which were organized into one pure M1 battalion with three companies, one pure mechanized infantry battalion with three companies, and one balanced task force with two M1 companies and two mechanized infantry companies. One light infantry battalion had two light infantry companies, a light infantry HHC, and a light infantry weapons company. Figure G-7 shows a comparison of the percentages of the goals attained by the base case, adjustment 1, and adjustment 2. Adjustment 1 was better than adjustment 2 in survivability and the overall attainment of the goals in the

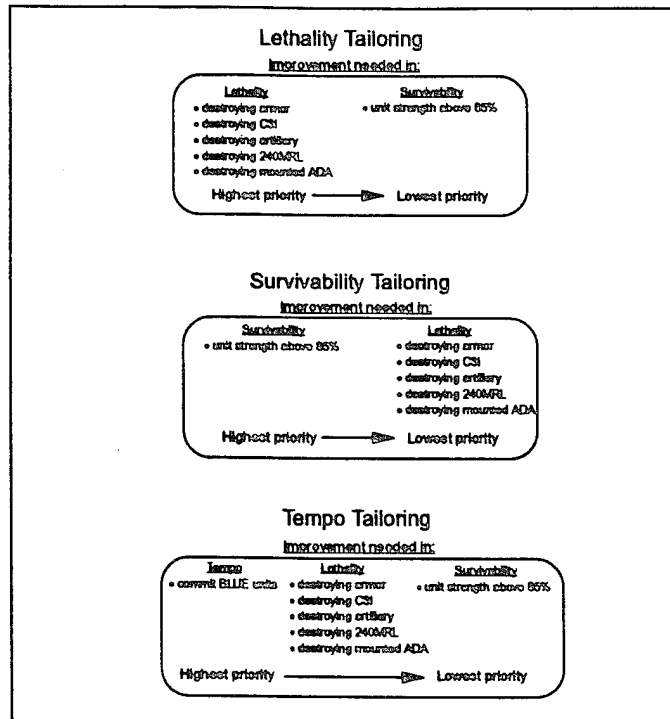


Figure G-6. Adjustment 1 priorities of FSC in Force-PLUS.

survivability tailoring process only improved slightly from adjustment 1. For these reasons, adjustment 1 became the survivability force package alternative.

(2) Table G-4 displays the list of high and low contributors in adjustment 2 for lethality tailoring and tempo tailoring. The lowest contributors to the attainment of the FSC goals were the same as in the previous force packages, but no units were removed from the force. To have

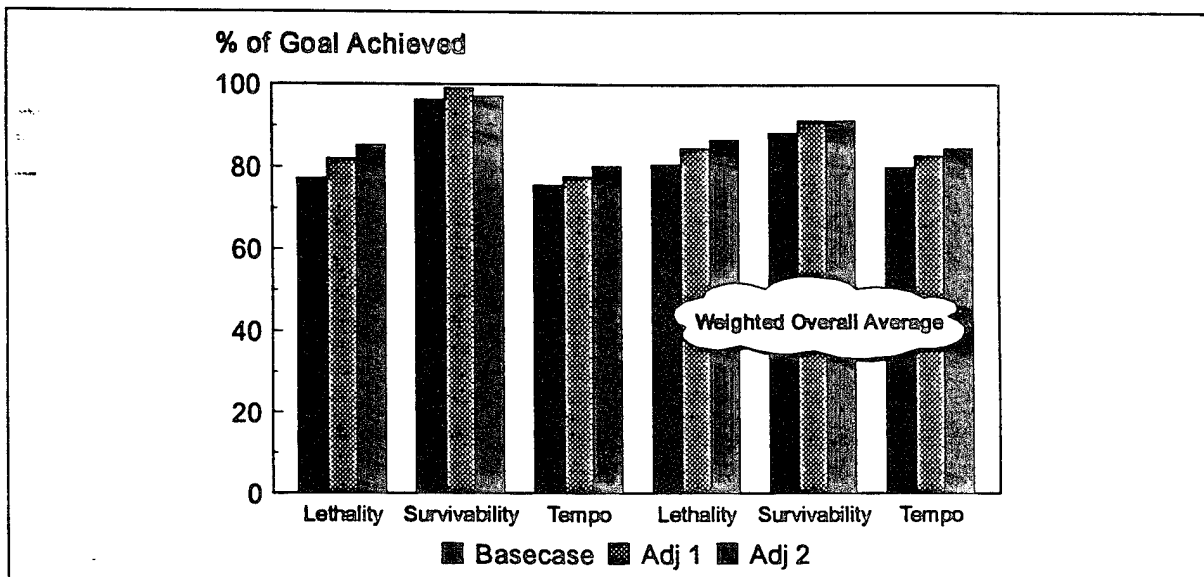


Figure G-7. Comparison of the performances of the base case, adjustment 1, and adjustment 2.

removed any of those unit types at the bottom of the list would have been detrimental to the force and the accomplishment of its mission.

Table G-4. Adjustment 2 SCRAP output.

Adjustment 2			
Lethality Tailoring		Tempo Tailoring	
High Contribution	Low Contribution	High Contribution	Low Contribution
Ground Cav Tnp	HIMARS Btry	Attack Helo Tnp	M1 Co
Attack Helo Tnp	Lt Inf Wpns Co	CH-47 Co	Lt Inf HHC
ATACMS Btry	AGS HHC	ATACMS Btry	Mech Inf Co
ER-EFOG-M Btry	Air Recon Tnp	UH-60 Co	Lt Inf Co
CH-47 Co	Crusader Btry	ER-EFOG-M Btry	
UH-60 Co	MLRS Btry	Paladin Btry	
BSFV-E Btry	ATCAS Btry	BSFV-E Btry	
Paladin Btry	M1 HHC	HIMARS Btry	
Corps Avenger Btry	Mech Inf HHC	Corps Avenger Btry	
Avenger Btry	LOSAT Btry	Avenger Btry	
	AGS Co	Crusader Btry	
	M1 Co	Lt Inf Wpns Co	
	Lt Inf HHC	AGS HHC	
	Mech Inf Co	MLRS Btry	
	Lt Inf Co	ATCAS Btry	
		Ground Cav Tnp	
		Air Recon Tnp	
		M1 HHC	
		Mech Inf HHC	
		LOSAT Btry	
		AGS Co	

(3) Shown in Figure G-8 are the FSC which needed improvement in the lethality tailoring and the tempo tailoring. Force-PLUS listed the same unit types as in the previous run. It was felt no additional artillery or helicopter units were necessary. To increase the precision targeting of the artillery units already in the force, three ground control stations (GCSs) were added to allow three additional UAVs to fly. These were employed in the DIVARTY zone.

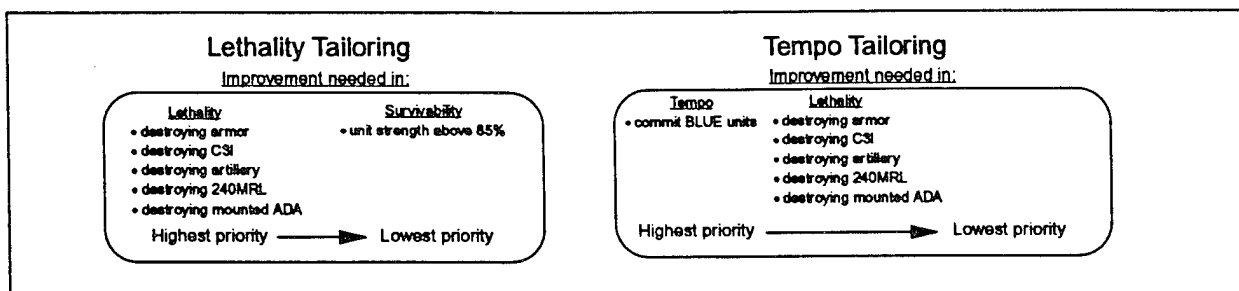


Figure G-8. Adjustment 2 priorities of FSC in Force-PLUS.

f. Adjustment 3.

(1) Adjustment 3 had the same force package as adjustment 2 except for an additional three GCSs deployed in the DIVARTY zone. A comparison of the goal accomplishment is shown in Figure G-9. The force package improved in all the warfighting characteristics, in the weighted overall lethality, and in the weighted overall tempo. The addition of UAVs changed the target configuration as it entered engagement areas in both the aviation and infantry zones. This change was large enough to increase ATCAS kills by 100 systems.

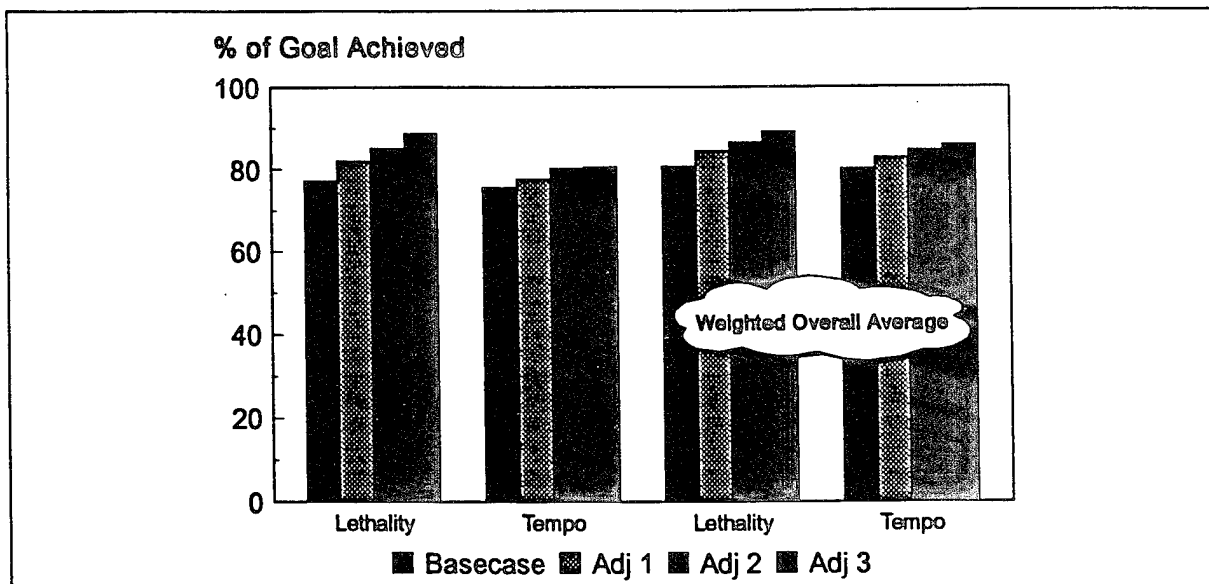


Figure G-9. Comparison of the performances of the base case, adjustment 1, adjustment 2, and adjustment 3.

(2) The lists from SCRAP and Force-PLUS were the same as the previous lists. Military judgment indicated there were no possible additions or deletions included on the lists. Because of this, adjustment 3 became the lethality force package and the tempo force package.

APPENDIX H
REFERENCE CASE RESULTS

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Appendix H

Reference Case Results

H-1. Battle Flow.

a. Mission. On order the MSF attacks as the JFLCC operational reserve to destroy 12th Mechanized Corps (OEF) in the vicinity of the Koksan/Chorwon valleys to deny the 2 AG reinforcement.

b. Commanders Intent. The purpose of the operation was to destroy the OEF, and deny the 2 AG reinforcement. The full range of MSF and CFC air, naval, and SOF capabilities executed a simultaneous, in-depth attack. The goal, was to destroy the OEF and to leave the MSF at 85% or better, vicinity of the DMZ, ready for follow-on missions.

c. Concept of the Operation. The MSF conducted the Corps counterattack destroying the OEF. The attack was conducted in five phases. These phases were: reconnaissance, positioning attack assets, simultaneous ambush, exploitation, reconstitution and repositioning. Decisive combat occurred during phase 3, the ambush. During this phase the trigger point was two of the OEF's three lead brigades entered EAs Wildcat, Tomcat, or Bobcat. At that point the ambush began and all other combat systems did adjust utilizing a refined situational awareness available to the MSF. Each of the brigade task forces were assigned zones of responsibility and these will be referred to by the task force name, see Figure H-1. Since the light infantry task force was the least mobile it was the anvil of the attack. The light infantry task force was the MSF's main effort and received priority of fires during phase 3. The phases of the attack overlap and are broken down by H-hour. H-hour was defined as the time when the lead elements of the OEF brigades began to move from their hide sites during the hours of darkness. Each phase is described separately below.

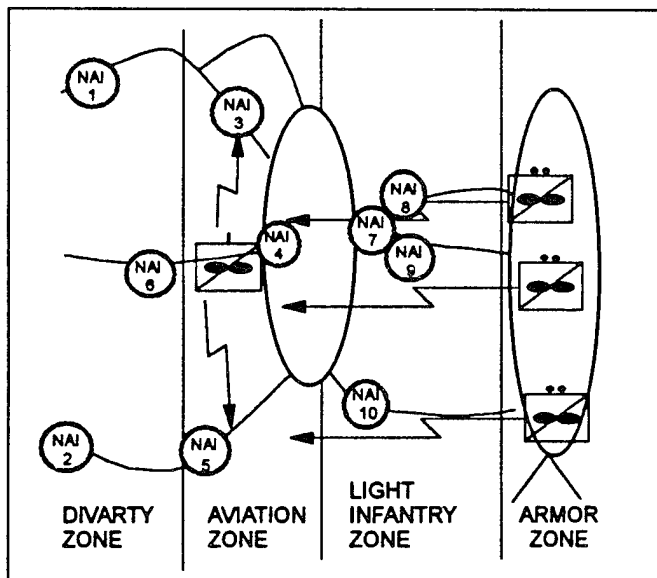


Figure H-1, Reconnaissance phase, H-H+6

d. Phase 1. Reconnaissance. During phase 1, the MSF commander conducted thorough reconnaissance throughout the depth of the battlefield as shown in Figure H-1.

(1) Prior to H hour, SOF teams were placed at NAIs 1, 2, & 6. Their purpose was to trigger TAIs 1, 2, & 3 at H+25, or when the lead battalions from the trail brigades crossed their respective NAIs. They also maintained continuous surveillance of the NAIs to update the situational template.

(2) At H+00:30, the 33rd Air Cav squadron conducted a route reconnaissance from the Chorwon bowl to the Kokson bowl along the three main avenues of advance with one troop (three Comanches along each avenue of advance). Upon reaching the Kokson bowl, it conducted an area reconnaissance of the bowl with a second troop. They continued route reconnaissance along the three avenues of advance with a third troop, until making contact with the three brigades of the OEF. They conducted a screen, maintaining visual contact with the three lead brigades, and withdrew as necessary to ensure survivability of the air troops. Observation posts, UAVs and or Ferrets were placed on NAIs 3, 4, 5, 7, 8, 9, & 10. They provided information to update a situational template of all nine OEF brigades and, gave the MSF commander a complete picture of the OEF. The Air Cav coordinated CAS to continuously harass and disrupt the OEF. This enabled the MSF commander to affect OEF's rate of the closure to the decisive point of contact.

(3) At H+3, JSTARS monitored NAIs 3, 4, & 5. UAVs monitored these NAIs as necessary, as blank spots occur, or as more detail was required. The aviation brigade task force controlled the UAVs, and they were cued by JSTARS. Their primary purpose was to trigger WAM minefields in EAs Lion, Tiger, and Bear after the lead battalion of combat vehicles from the second echelon brigades crossed their respective NAIs. They also maintained continuous surveillance of the NAIs to update the situational template.

(4) At H+10 LRSD sections were inserted vicinity NAI 7, 8, 9, & 10. These LRSD were OPCON to the light infantry brigade task force. Their primary purpose was to trigger the WAM and FASCAM

minefields in EAs Tomcat, Wildcat and Bobcat when the lead battalion of the lead brigades crossed NAIs 7, 8, and 10. They also maintained continuous surveillance of their NAIs to update the situational template.

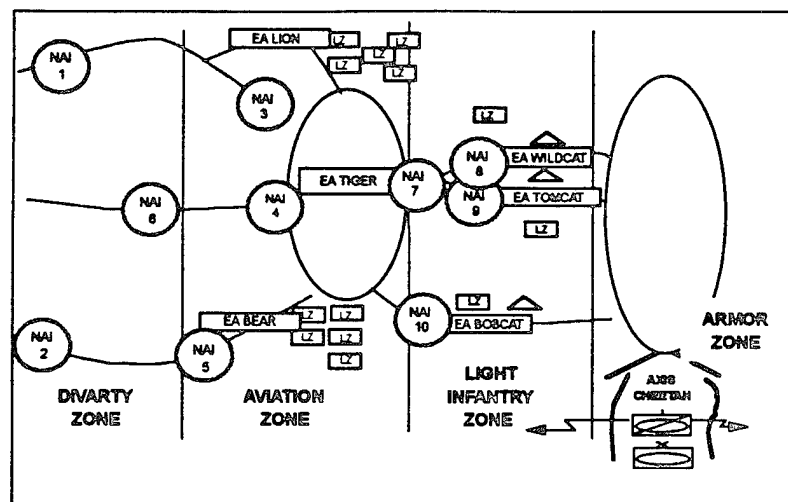


Figure H-2. Phase 2, Positioning attack assets.

expected to occur. An early deployment would have put the assets at risk for too long a time.

(1) At H+23, the armor brigade task force's attached FSV Cav Troop began moving from TAA Badger to the Chorwon. They conducted a mobile screen for the maneuver force while moving along Axis Cheetah. When the FSV Cav Troop completed the move (when the maneuver units entered battle positions around EA Fox) it provided a screen on the west side of

e. Phase 2. Positioning attack assets. During phase 2, the MSF brigades positioned the deep strike assets with aviation lift battalions. This phase had to wait until just before the ambush was

the Chorwon. The purpose of this screen was two fold. First, it provided security for the maneuver force's flank. Second, it triggered the MSF ambush as the OEF's lead brigade's reconnaissance companies entered the Chorwon.

(2) At H+23:30 the armor brigade task force began moving along Axis Cheetah. They moved with AFAS, Paladin, and MLRS. They established battle positions around EA Fox. Their primary purpose was to escort the artillery forward to positions from which they can range the infantry brigade task force's fight in EAs Tomcat, Wildcat, and Bobcat. See figure H-3 below.

(3) At H+28 two UH-60s placed pathfinders on two LZs in a six kilometer arc around EA Wildcat. These pathfinders prepared the LZs for the future placement of an infantry battalion assets. At H+29, 12 UH-60s placed one light infantry company and the battalion's light weight 120 mm mortar platoon in one of the two LZs around EA Wildcat. One light company (-) was air assaulted into observation positions overwatching Wildcat. The first company established and secured a firebase for the battalion mortars, and ER EFOG-M. They conducted a synchronized attack with FASCAM, AFAS, ER EFOG-M, and mortars defeating the lead brigade in EA Wildcat at H+30.

(4) At H+28, two UH-60s placed pathfinders on two LZs in a six kilometer arc around EA Tomcat. These pathfinders prepared the LZs for the future placement of infantry battalion assets. At H+29, 12 UH-60s placed one light infantry company and the battalion's light weight 120 mm mortar platoon in one of the two LZs around EA Tomcat. One light infantry company (-) was air assaulted with six UH-60s to observation positions overwatching Tomcat. The first company established and secured a fire base for the battalion mortars, and ER EFOG-M. They conducted a synchronized attack with FASCAM, AFAS, ER EFOG-M, and mortars defeating the lead brigade in EA Tomcat at H+30.

(5) At H+28, two UH-60s placed pathfinders on two LZs in a six kilometer arc around EA Bobcat. These pathfinders prepared the LZs for the future placement of infantry battalion assets. At H+29, 12 UH-60s placed one light infantry company and the battalion's light weight 120 mm mortar platoon in one of the two LZs around EA Bobcat. One light infantry company (-) was air assaulted with six UH-60s to observation positions overwatching Wildcat. The first company established and secured a firebase for the battalion mortars and ER EFOG-M. They conducted a synchronized attack with FASCAM, AFAS, ER EFOG-M, and mortars to defeat the lead brigade in EA Bobcat at H+26.

(6) At H+28, eight UH-60s placed four platoons of light infantry in four LZs in support of the insertion of two batteries of lightweight 155 towed artillery. These infantry platoons secured the LZs for the batteries insertion at H+29. The primary purpose of these platoons was to determine the best (safest) LZ to place the batteries. Once the batteries were on the ground, these platoons provided security for the batteries.

(7) At H+28, two batteries of lightweight 155, with basic load and crew, were emplaced with 16 CH-47Ds with two Comanches and two AH-64Ds in escort into two of the previous LZs. The first battery provided WAM at H+30 when triggered by the UAV on NAI 3,

4, & 5 on EAs Lion, Tiger, and Bear. The second battery fired SADARM against targets in EA Lion and EA Tiger.

(8) At H+28, four platoons of light infantry were placed in four LZs to support the insertion of one battery of HIMARS. These infantry platoons secured the LZs for the battery's insertion at H+28. The primary purpose of these platoons was to determine the best (safest) LZ to place the battery. Once the battery was on the ground these platoons provided security for the battery.

(9) At H+28, a battery of HIMARS, their basic load, and crew was emplaced with nine CH-47Ds with two Comanches and two AH-64Ds in escort. The HIMARS provided SADARM at H+30 in EA Bear, when triggered by the UAV overwatching NAI 5.

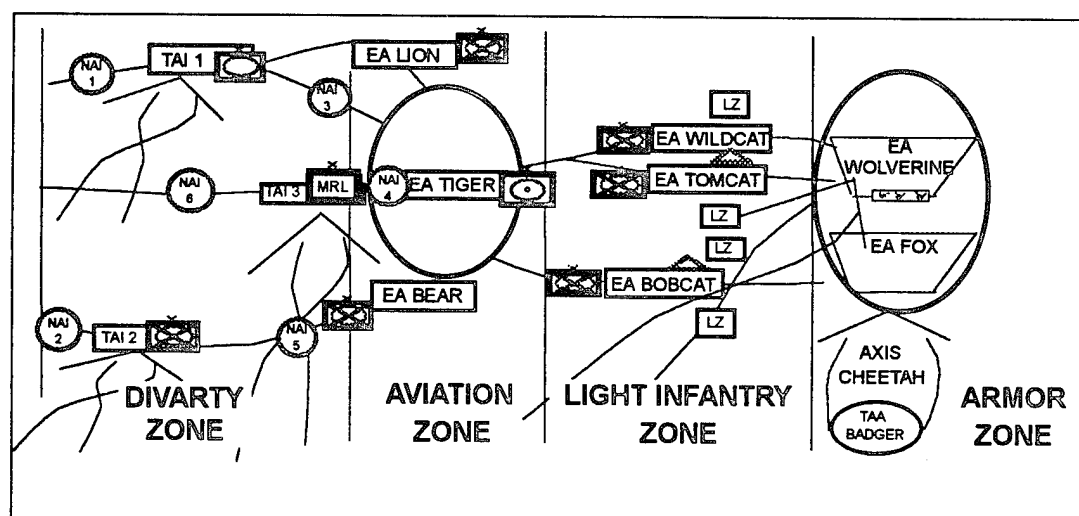


Figure H-3. H+30, The ambush.

f. Phase 3. Ambush. The MSF conducted a simultaneous ambush and destroyed the NKPA's 12th Mechanized Corps denying the NKPA's reinforcement. The ambush, shown in figure H-3, started at H+30 and destroyed the 12th Mech Corps throughout the MSF AO by using the entire spectrum of infantry, aviation and armored maneuver, and precision munitions firing systems (mortars through MLRS). Additionally, CFC provided fixed wing aircraft in a supporting role. As the ambush conditions were established at H+ 30, all organizations and systems simultaneously struck the entire 12th Mech Corps. The infantry brigade air assaulted platoons into LZs and occupied BPs surrounding EAs Bobcat, Tomcat and Wildcat, synchronizing a coordinated attack consisting of FASCAM, AFAS, ER EFOG-M, and mortars, and rapidly destroyed an enemy brigade in each EA. The Aviation brigade task force destroyed an enemy brigade in each of the following EAs, Tiger, Lion, and Bear with their attack assets. The armored brigade task force attacked along axis Cheetah to position artillery assets and conduct a hasty defense.

g. Phase 4. Exploitation. The three attack aviation elements that struck EAs Lion, Tiger and Bear returned to FARPs in TAA Badger to rearm, and refuel. After the aviation brigade task force commander received an updated enemy situation, he committed a single attack battalion

back into zone and destroyed the remaining battalion-sized elements. The remaining CAS and AI sorties were committed to complete the destruction of remnant OEF forces in the MSF's area of operations. The armor brigade task force's artillery support destroyed the OEF's lead mechanized brigade in the south as it entered the Chorwon bowl during this phase.

h. Phase 5. Reconstitution/Repositioning. All assets emplaced during phase 2 were withdrawn at the completion of the ambush. Priority for extraction of deep assets was: ATCAS batteries, HIMARS battery, LRSD, air assaulted light infantry companies. The armor brigade task force withdrew back to TAA Badger to prepare for future missions.

H-2. Analysis of MSF O&O reference case results. The reference case was not used as input for the force tailoring process. The comparison with the base case results was included in the scripted briefing.

a. The reference case was the first case developed by the MSF O&O analysis team. The MSF used in the reference case was the same force, in terms of structure and equipment, as that used in the PW 95 student exercise. While the dynamic scenario for the constructive simulation in VIC was derived from the PW 95 campaign plan and the MSF operational concept the PW 95 students executed a very different battle plan. Although the reference case was done at the request of the study sponsor to provide a link to PW 95 student exercise and may provide some comparisons to the results of the PW 95 exercise, such a comparison is beyond the scope of this analysis. The base case which was the reference case with the major equipment brought up to 2010 will be the basis of comparison and provide the parameters for the force tailoring process. The reference case results are reported for information only.

b. The study issues are supported by the EEA. The following EEA have been grouped under the study issue they address below. Some EEA apply to multiple study issues.

c. Study issue 1d: Does the mix of combat, combat support, and CSS capabilities provide a balanced Mobile Strike Force design which meets pre-defined sufficiency criteria in each area? The reference case MSF was a balanced force and was successful as the EEA results show, however it was not as successful as it could have been.

(1) EEA 1. Does the MSF alternative satisfy the force sufficiency criteria for tempo? We examined the duration of the ambush, the units in the right location at the right time, and the whether or not lift was available to execute the mission. The units were at the right place at the right time and there was lift helicopters available to execute the mission. The duration of the ambush was longer than we thought it should be based on the length of time the weapons systems capability to fire the planned missions. While it took from 1.6 to over 4 times as long to fire the missions as the planned, the MSF was successful in reducing the OEF to 52% strength.

(2) EEA 2. Does the MSF alternative satisfy the force sufficiency criteria for lethality? We can see by the results in Figure H-4 that the MSF is not quite enough lethal. The FSC goal for lethality was to reduce the OEF to 40% strength. The OEF was at 52% strength at the end of the reference case.

(3) EEA 3. Does the MSF alternative satisfy the force sufficiency criteria for survivability? While the MSF survived at 94% strength, it still did not meet the FSC of having 100% of the company-level units survive at 85% or more strength.

d. Study issue 1e: What Mobile Strike Force 2010 technological capabilities contribute most to its effectiveness?

(1) EEA 4. What technological capabilities contribute most to the lethality of each MSF alternative? In the reference case the attack helicopters were the most lethal systems in the MSF. As shown in Figure H-5, helicopters killed 37% of the total OEF systems killed.

(2) EEA 5. What technological capabilities contribute most to the survivability of each MSF alternative? Losses to the MSF were minuscule. In the aviation zone, losses were highest among UH-60s (2.61). Losses in the infantry zone were highest for the ER EFOG-M battery which lost 4 launchers or 50%. Within the armor zone, losses are highest among the SFVs which lost 0.98 systems. When the MSF loses only ten systems it is difficult to determine which of the 94% of the systems remaining are most responsible for the survivability of the force. The MSF's high survivability is very close to the FSC goal.

(3) EEA 6. What technological capabilities contribute most to maintaining and controlling the tempo within each MSF alternative? The capabilities which seem to impact the most on tempo were the intelligence sensors, the sensor to shooter link, and the capability of the shooters to place steel on the targets. The limiting technology seemed to be the sensor capability to locate targets for the attacking systems so that the MSF could be more effective in the destruction of the OEF.

(4) EEA 7. Are there combination of units, when employed together, that are consistently the primary contributors to the effectiveness of the MSF? In the aviation zone employing the FASCAM and WAM to fix the enemy permitted the attack helicopters to reap a large number of kills. The combination of systems including the Ferret, cannon artillery, MLRS, PGMM, WAM and helicopters in the aviation zone was very lethal and resulted in 48% of all kills in that zone.

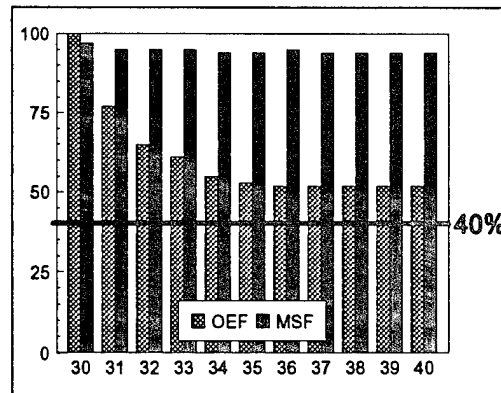


Figure H-4. MSF and OEF percent strength by hour.

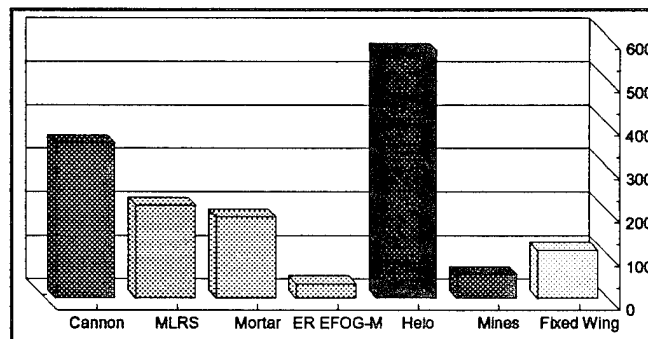


Figure H-5. MSF total kills by system.

e. Study issue 2a: Does the Mobile Strike Force have the assets necessary to conduct operations which result in domination of its battle space as defined by the Mobile Strike Force operational concept?

(a) EEA 8. Does the MSF dominate the battlespace over time? The results in the reference case clearly show that the MSF does dominate its battlespace over time. The MSF reduced the OEF to 52% while maintaining its combat strength at 94% in about 6 hours of

battle shows a decisive victory and coupled with the MSF ability to move assets at will across the 100 by 160 km box does indicate a domination of the battlespace.

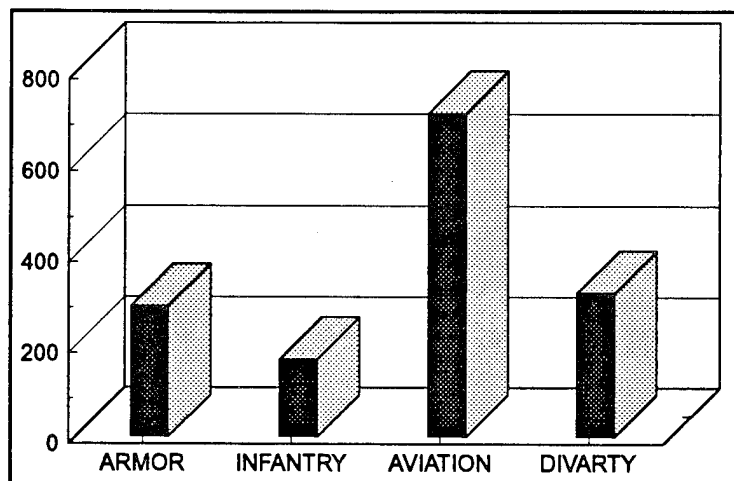


Figure H-5. Total kills by zone.

(b) EEA 9. To what extent does each alternative achieve a decisive victory? The results show that with 94% remaining combat strength and having reduced the OEF to 52% the reference case MSF does achieve a decisive victory.

(1) Study issue 2b: What organizational adjustments, if any, are required to the Mobile Strike Force to allow it to better execute the operational concept? This case was not tailored therefore this issue and its associated EEAs were not analyzed.

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APPENDIX I
BASE CASE RESULTS

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Appendix I

Base Case Results

I-1. Battle Flow

a. The MSF was modernized in the base case, with the addition of the tank 1080, the future infantry fighting vehicle (FIFV), the command guided (CG) 2.75 rocket, the enhanced future land warrior (FLW), and the low cost competent munitions (LCCM). Base case battle flow remained virtually the same as that of the reference case. In the aviation zone, however, the AH-64L engaged OEF AFVs with CG 2.75 rockets as well as with Hellfire missiles. The battle flow in both the artillery and infantry zones remained the same.

b. The MSF was more lethal in the base case. The armor brigade task force's artillery was unable to range all the targets in the infantry zone. To improve the lethality of direct support artillery by putting a battery within range of the OEF targets, it was decided to forward position an additional ATCAS battery. This battery was air assaulted into the infantry zone to support the two northern engagement areas in the infantry zone. This would cover the targets which were not within range of the MSF's self-propelled artillery.

c. Forward movement of all air assault assets was done during the seven hours of darkness preceding the ambush. This enabled aircraft to ingress along air corridors unmolested by air defense units capable of daylight only operations. Given the time window necessary to move all the attack assets forward, the reference case aviation force structure could not move the additional ATCAS battery. Therefore, a CH-47 company was added to the reference case aviation structure for the base case. System emplacement and timing in the other zones did not change from those of the reference case.

I-2. EEA Analysis

a. EEA 1 Does the alternative satisfy the force sufficiency criteria for tempo?

(1) The FSC's for tempo include tactical mobility, situational awareness, and maneuver of fires and effects. The MSF possesses the mobility required to execute the counterattack plan in NEA. In the base case one hundred percent of the force was at the correct location and time when desired. All lift assets were available when required. Fifty-three percent of the force was committed, which is substantially lower than the FSC goal of 85%. Possibilities for improvement in tempo include an increase in the quantity of reconnaissance assets available, an R&S plan which further incorporates aviation as a sensor, forward positioning of ATCAS, and the use of an additional attack aviation battalion.

(2) The MSF has adequate sensors, analysis and processing systems to provide the picture of the OEF. All of the named areas of interests designated in the intelligence collection plan were monitored. Additionally, the MSF was able to use available sensors for BDA and targeting within the engagement areas. However, in order to reduce the duration of the ambush

from 4 hours and twenty minutes in the base case more sensors will be required. The base case MSF has only four UAV ground control stations which limits the number of mobile sensors available to precision attack assets. This limited number of sensors requires additional time to identify all targets in the mountainous and restrictive terrain.

(3) The MSF does not use all available assets to fight the OEF. A major criteria in the evaluation of tempo is the maneuver of fires and effects. We ask the question, "Was the commander able to maneuver all his killing systems into a position and time to mass them on the enemy?" The answer in the base case is no. The MSF O&O concept, on which the Counterattack plan was based, calls for a placement of just enough assets, just in time. This concept was incompatible with a FSC tempo goal of a 85% commitment of all MSF assets to the fight. It is possible to add more units to the ambush as we will see in the next alternate. These added units will increase the lethality of the force in their particular zone and decrease the time required to defeat the OEF. Additionally, as we tailor the force by deleting some companies reducing the total number of units will produce a higher percentage of committed forces.

b. EEA 2 Does the base case satisfy the force sufficiency criteria for lethality? It was the goal of the MSF to reduce the OEF to 40% combat strength in as short a period of time as possible. This goal for reducing total combat strength of the OEF was not met in terms of strength or time, however the MSF did reduce the OEF to 50% strength in five hours, as depicted in Figure I-1. Even though the OEF is combat ineffective at 50%, it retains enough combat power to possibly reorganize and continue the mission. A review reveals that not all FSC lethality goals were met, e.g., OEF C3I vehicles were reduced to 28%, not 70%, and tanks were reduced by 50% not 60%. Although the MSF was extremely lethal, reducing the OEF down to 50%, it did not accomplish its goal.

(1) In the armor zone, the armor brigade task force acted as a "catcher's mit" for the

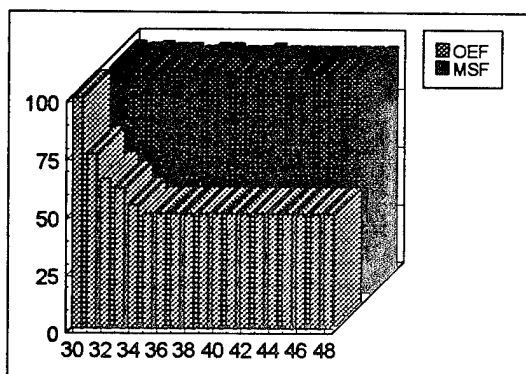


Figure I-1. Percent remaining combat strength.

ambush. Its primary purpose was to catch and defeat any and all forces which escaped the ambush and continued east into the Chorwon bowl. This zone, surprisingly, witnessed no direct fire battle, despite the fact that the MSF fought a full strength mechanized OEF brigade in that zone. The indirect fires provided by the Paladin and Crusader battalions, coupled with a

FASCAM minefield, succeeded in defeating this OEF brigade. The most significant kills in this zone came from smart, precision munitions fired from cannon artillery.

(2) In the infantry zone, the precision guided mortars killed the most systems, 124. We also got a significant number of kills (62) from the ATCAS battery, that was air assaulted to a fire base in support of the two northern most engagement areas in this zone. The light infantry brigade task force reserve (the attack aviation AH-64L battalion) was not committed in the infantry zone because the two remaining OEF brigades in the infantry zone were defeated and the criteria for its commitment was not met. Therefore, the reserve attack aviation battalion killed no OEF systems the infantry brigade task force's zone.

(3) In the aviation zone, the greatest killers were attack helicopters, and cannon artillery. The attack aviation proved highly lethal and was responsible for the greatest number of kills (723). Attack helicopters engaged targets in two major surges during the ambush and in the exploitation phase.

(4) The DIVARTY zone fired the initial 25 missions in hour 31 and the remaining 2 missions in hour 33. The total of 54 ATACMs struck the OEF within the three TAIs resulting in (238) OEF system losses. The delay in firing the last 2 mission was in acquiring the targets for those missions.

c. EEA 3 Does the base case satisfy the force sufficiency criteria for survivability? Losses occurred for two different reasons: combat losses, reliability, availability and maintainability (RAM) failures. This survivability analysis considered both types of losses and found greater losses to RAM than survivability. The MSF was highly survivable in the base case, losing less than 10 systems overall. However, it was not able to meet the survivability FSC which required one hundred percent of each of its companies to retain 85% combat power, as is shown in Figure I-2. The highest percentage losses were in the ER EFOG-M battery which lost half of its systems or a total of just under four systems. A ER EFOG-M section and light infantry company was air assaulted into deep strike positions. The losses occurred when the ER EFOG-M section fire base and the light infantry company defending it was overrun.

d. EEA 4 What technological capabilities contribute most to the lethality of the base case?

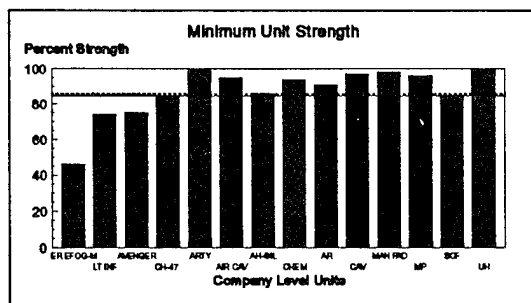


Figure I-2. Minimum unit strengths.

(1) The most lethal system in the MSF was the attack helicopter accounting for 42% of all MSF kills. It killed a large quantity of systems with direct fire precision munitions and has a range and mobility unequalled by all systems except ATACMS and fixed wing. The attack helicopter contribution was double that of cannons, the next most lethal systems.

(2) Cannons account for 20% of all MSF kills. This includes ATCAS forward positioned in the aviation zone and SP cannons in the armor brigade task force zone. By placing ATCAS in deep fire bases, the MSF vastly increased the capability of ATCAS to reach the deep targets. SADARM was the primary cannon artillery munition fired against tanks, AFVs, and artillery pieces. Forward observers equipped with lasers, advanced optics and hand held computers (Future Land Warrior) further increased the accuracy and lethality of ATCAS.

(3) ATACMS produced 13% of all MSF kills, which is quite large especially when considering that only 54 block II rounds were fired. These engagements combined the lethal effects of IWAM, CAS and AI to produce high results in a very short time frame. It is arguable that an increase in the number of ATACMS rounds would increase the lethality of the force; however the analysis was limited to 54 ATACMS BL II rounds allocated to the MSF by Corps.

e. EEA 5 What technological capabilities contribute the most to maintaining the survivability of the MSF?

(1) Losses to the MSF were minuscule. In the aviation zone, losses were highest among UH-60s (2.61). Losses in the infantry zone were highest among the ER EFOG-M battery which lost 4 launchers. Within the armor zone, losses are highest among the SFVs which lost 0.98 systems. When the MSF loses only ten systems it is difficult to determine which of the 95% of the systems remaining are most responsible for the survivability of the force. The MSF's high survivability is very close to the FSC goal.

(2) Attack helicopters were committed in large numbers over a short period of time. Despite intense use, there were no losses due to combat. This can be attributed to the limited air defense capabilities attributed to the OEF, HDF, and RMTU by the World Class OPFOR as well as to the fact that all operations were conducted during periods of limited visibility. Attack helicopters did experience a severe drop in operational readiness as a result of RAM failures due to intense use over the five hour ambush.

f. EEA 7. Are there combination of units, when employed together, that are consistently the primary contributors to effectiveness of the MSF? The aviation brigade task force produced the greatest combined arms effect of any task force. ATCAS, HIMARS and attack aviation fired FASCAM and WAM into engagement areas. Targeting for the ATCAS and HIMARS batteries was done by UAVs. These UAVs also provided the aviation brigade task force the trigger to launch their attack companies. The synergistic effects of these systems enabled the aviation brigade task force to kill 800 OEF systems which is greater than any other task force.

g. EEA 6. What technological capabilities contribute most to maintaining and controlling the tempo within the base case?

(1) The most lethal system in the MSF was the attack helicopter, as is depicted in Figure I-3. It killed a large quantity of systems with direct fire precision and has a range and mobility unequaled by all systems except ATACMS and fixed wing. Attack aviation was able to kill the threat quickly and in larger numbers.

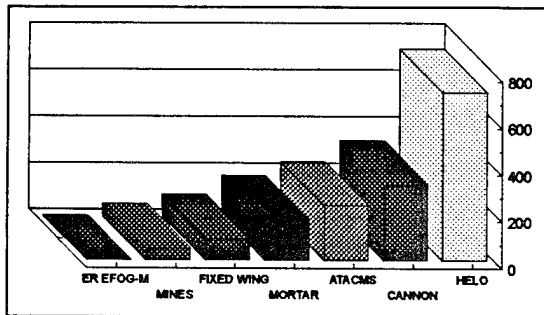


Figure. I-3. MSF system kills.

(2) Cannon fired precision munitions and being able to air assault the ATCAS make a very lethal combination, as is shown in Figure I-3. By establishing deep fire bases with the ATCAS, the MSF vastly increased the capability and mobility of cannons. SADARM was the primary munitions for MSF cannons fired against tanks, AFVs, and artillery pieces. Additionally, forward observers were equipped with lasers or the Enhanced Land Warrior which increased the accuracy and lethality

of observed fires.

(3) The DIVARTY zone's ATACMS strike produced the highest kills in the shortest time. Only 54 block II rounds were fired. These engagements were combined with the lethal effects of IWAM to produce high results in a very short time frame. Limited quantities of ATACMS precluded further strikes.

(4) Our measures of tempo included the availability of lift helicopters. The CH-47s and UH-60s were key systems for tempo. These technologies enabled the MSF to place combat systems within range of the threat to defeat and in some cases destroy him.

(5) Given a very restrictive terrain and limited line of sight, HUMINT was severely limited in terms of the quantity of targets visible to the observer at any one time. The MSF had three DS GCS and one GS GCS. This enabled them to fly only four UAVs at once despite having 28 UAVs. The ambush dynamic requires an accurate, precise, and timely intelligence systems. Precision attack assets can fire adequate numbers of munitions per hour, but a timegap exists in the target acquisition/mission assignment process. E.G., the MSF can fire the combat load of PGMM in 118 minutes (based on a sustained rate of fire); it took the force an additional 76 minutes for the target acquisition/mission assignment process.

h. EEA 8. Does the Mobile Strike Force dominate the battlespace over time?

(1) The MSF dominates the battle space during a six hour attack, attacking the OEF simultaneously and with violent results. The steep decline of OEF combat power between hours 30 and 31 represents a tremendous shock effect upon the command and control of the OEF. To properly assess this effect, one should remember that at hour 31 the OEF is extended over 100 kilometers from hide sites just south of Pyongyang all the way to the Chorwon bowl. The OEF commander lacked the capability to respond by committing a reserve or firing counter battery. His only course of action was to attempt the reorganization of his remaining force and continuance of the mission.

(2) Even in the infantry and armor zones, which as Figure I-4 shows, demonstrated the MSF's lowest lethality, the OEF was reduced below 70% strength in five hours. The MSF could improve its capability to dominate the battle space in these zones. Improvements should come from those assets proven most lethal in these and other zones. These assets include attack aviation and cannon artillery. The steep decline of combat power for the OEF from hour 30 to 31 represents a tremendous shock effect upon the threat. A force which loses so much so quickly would be unable to respond.

i. EEA 9. To what extent does the base case achieve a decisive victory?

(1) The MSF succeeded in reducing the OEF by 50 percent in four hours and twenty four minutes. It did this while retaining 95 percent of its own forces. It returned to TAA Badger and stands ready to conduct future missions. This unquestionable superiority defines decisive victory.

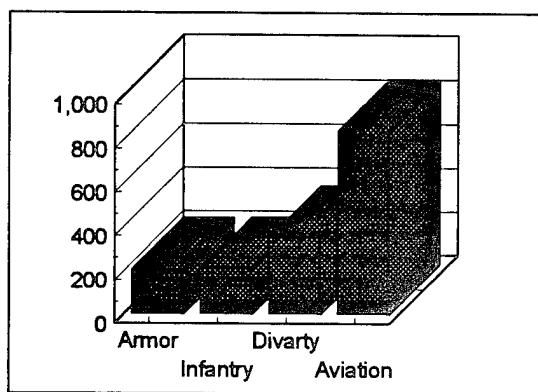


Figure I-4. Brigade task force lethality.

APPENDIX J

SURVIVABILITY TAILORED RESULTS

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Appendix J

Survivability Tailored Results

J-1. FORT-T adjustments for survivability. One adjustment was made to the base case for the survivability force package. The tailoring process using SCRAP and Force-PLUS is discussed in the main section of this document. One light infantry battalion, one AGS company, two M1 companies, and two mechanized infantry companies were removed from the base case force package. One attack helicopter (AH) battalion was added to the base case force package and employed in the infantry zone. Three light infantry battalions remained in the survivability force package; the AGS battalion, two M1 battalions, and two mechanized infantry battalions each contained three companies instead of four.

J-2. Battle Flow

a. An attack helicopter battalion was added to the MSF in Adjustment I. Although the infantry brigade already had an attack helicopter battalion OPCON to it, that battalion was held in reserve and not employed because the preconditions for commitment were not present. The potential was still there in future runs for commitment of the aviation reserve in zone. Therefore, the MSF received the additional attack battalion to support the infantry zone while still maintaining their reserve. The additional battalion engaged two OEF mechanized brigades moving into EAs Tomcat and Wildcat. Two companies of the AH battalion focused on EA Wildcat, the northernmost of the two EAs, while the remaining company oriented on EA Tomcat. The ATCAS battery introduced in the Base Case serviced EA Wildcat. The addition of the attack helicopter battalion increased OEF losses in the infantry zone.

J-3. EEA Analysis

a. EEA 1, Does the survivability adjustment satisfy the force sufficiency criteria for tempo? The FSC used to evaluate tempo were 75% of MSF units at the correct location and time when required, 90% of MSF lift assets available when required, 85% of OEF units detected, and 85% of the MSF committed. The MSF accomplished an average of 75.6% of its tempo FSC.

b. EEA 2 Does the survivability adjustment satisfy the force sufficiency criteria for lethality?

(1) The force sufficiency criteria (FSC) used to evaluate lethality were the capability of the force to destroy 60% of the OEF anti-tank (mounted/wheeled), tanks, and armored fighting vehicles, 70% of OEF C3I systems, 70% of OEF 240 MRL systems, 60% of OEF artillery and mortars (120 mm and higher), 70% of OEF mounted/wheeled ADA systems, and 60% of OEF reconnaissance vehicles and systems.

(2) Cannon artillery and attack aviation were the most lethal systems in the MSF. Adding an attack aviation battalion to the MSF optimized survivability by destroying OEF mounted ADA. The MSF accomplished an average of 77.1% of its lethality goals.

c. EEA 3 Does the survivability adjustment satisfy the force sufficiency criteria for survivability?

(1) In adjustment 1, the MSF placed an attack aviation battalion into the infantry zone. Additional attack aviation improved the survivability of the CH-47 to 86% by destroying mounted air defense within the infantry and aviation zones.

(2) The FSC goal for survivability was for the MSF to have 100% of its units survive with 85% or more of their combat power. For the survivability force package, the MSF accomplished 99% of its survivability force sufficiency criteria goal. As is shown in Figure J-1 only two units lost more than 15%. MSF finished at 95% of its combat strength.

An ER EFOG-M battery lost half of its systems when a forward positioned section of it was over run along with the light infantry company defending it. The light infantry company lost 16% of its combat strength.

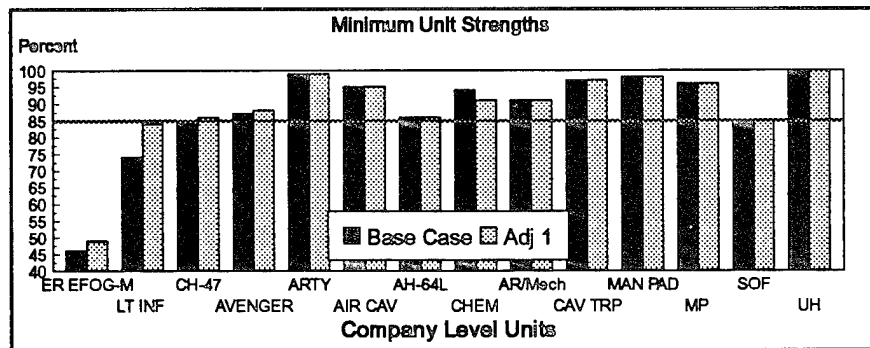


Figure J-1. FSC goals

(3) All together the MSF lost less than 18 combat systems. MSF combat losses occurred primarily in units air assaulted into forward positions in the aviation and infantry zones. The MSF force package shown in Figure J-2 was the result of force tailoring for survivability. The MSF accomplished 99% (2.7% improvement) of the survivability FSC. Despite the high level of survivability achieved by the MSF in the base case, even higher levels of survivability were attained by tailoring the force.

(4) The survivability force package (adjustment 1) produced a force at high readiness. Two different types of losses were faced by the MSF. The first type was combat losses, and the second type was RAM. In the DIVARTY and aviation zones, battles were fought primarily with deep strike assets (ATACMS, AFAS and Paladin). These zones experienced almost no combat losses. While in the infantry and aviation zones, those assets, HIMARS, ATCAS, PGM, and ADA systems, that were air assaulted forward to attack the OEF suffered some combat losses.

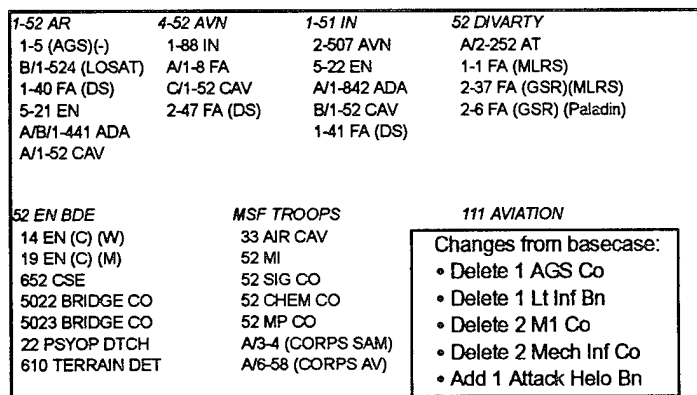


Figure J-2 Survivability force package.

(5) Each zone experienced some maintenance failures, however only the armor zone experienced extensive losses in terms of numbers of systems. Seven tanks in the armor zone were destroyed by indirect fire. The infantry zone experienced losses of the aforementioned ER EFOG-M section and a light infantry company. The aviation zone showed a distinct improvement over the base case by losing no UH-60s.

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APPENDIX K

TEMPO AND LETHALITY TAILORED RESULTS

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Appendix K

Tempo and Lethality Tailored Results

K-1. FORT-T adjustments for tempo.

a. The tempo force package, Adjustment 3, was reached after three adjustments which are discussed in Appendix G. Using the output from SCRAP, one light infantry battalion, one light infantry company, one AGS company, three M1 companies, and three mechanized infantry companies were removed from the force package. Two complete light infantry battalions and one light infantry battalion comprised of one light infantry HHC, two light infantry companies, and one light infantry weapons company remained in the tempo force package. The AGS battalion contained three companies. One pure M1 battalion with three companies, one pure mechanized infantry battalion with three companies, and one balanced task force with two M1 companies and two mechanized infantry companies were organized from the five M1 companies and five mechanized infantry companies which remained in the tempo force package.

b. An attack helicopter battalion was added and employed in the infantry zone. Two ATCAS batteries, which were already part of the base case force package but not previously employed, were forward positioned by two CH-47 companies which were added to the force. This provided two ATCAS batteries forward in the infantry zone and three ATCAS batteries forward in the aviation zone. The use of seven UAVs in the entire battlespace at one time became possible by increasing the number of GCSs by three. The three GCSs were added to Divarty to use three more UAVs in that zone.

K-2. FORT-T adjustments for lethality.

a. The tailoring process for the lethality force package using SCRAP and Force-PLUS required the same three adjustments to the base case force package as for tempo and is discussed in detail in Appendix G and in paragraph K-1 above. Therefore, the lethality force package was also Adjustment 3. The lethality and tempo force package is shown in figure K-1.

K-3. Battle Flow

a. The tempo tailored force, Adjustment 3, was the final adjustment for both tempo and lethality. The systems added to the base case increased both lethality and tempo. The MSF airmobiled two additional ATCAS batteries, with light infantry as security, from TAA Badger to support EA Bear in the aviation zone and EA Tomcat in the infantry zone. The ATCAS

1-52 AR 1-5 (AGS) B/1-524 (LOSAT) 1-40 FA (DS) 5-21 EN A/B/1-441 ADA A/1-52 CAV	4-52 AVN 1-88 IN A/1-8 FA C/1-52 CAV 2-47 FA (DS)	1-51 IN 2-507 AVN 5-22 EN A/1-842 ADA B/1-52 CAV 1-41 FA (DS)	52 DIVARTY A/2-252 AT 1-1 FA (MLRS) 2-37 FA (GSR)(MLRS) 2-6 FA (GSR) (Paladin)												
52 EN BDE 14 EN (C) (W) 19 EN (C) (M) 652 CSE 5022 BRIDGE CO 5023 BRIDGE CO 22 PSYOP DTCH 610 TERRAIN DET	MSF TROOPS 33 AIR CAV 52 MI 52 SIG CO 52 CHEM CO 52 MP CO A/3-4 (CORPS SAM) A/6-58 (CORPS AV)	111 AVIATION	Changes from the Base Case <table><tr><th>Deletions</th><th>Additions</th></tr><tr><td>• 1 AGS Co</td><td>• 1 Attack Helo Bn</td></tr><tr><td>• 1 Lt Inf Co</td><td>• 2 CH-47 Co</td></tr><tr><td>• 1 Lt Inf Bn</td><td>• 3 Grd Control Stations</td></tr><tr><td>• 3 M1 Co</td><td></td></tr><tr><td>• 3 Mech Inf Co</td><td></td></tr></table>	Deletions	Additions	• 1 AGS Co	• 1 Attack Helo Bn	• 1 Lt Inf Co	• 2 CH-47 Co	• 1 Lt Inf Bn	• 3 Grd Control Stations	• 3 M1 Co		• 3 Mech Inf Co	
Deletions	Additions														
• 1 AGS Co	• 1 Attack Helo Bn														
• 1 Lt Inf Co	• 2 CH-47 Co														
• 1 Lt Inf Bn	• 3 Grd Control Stations														
• 3 M1 Co															
• 3 Mech Inf Co															

Figure K-1, Lethality and Tempo Force Package.

batteries improved the MSF's capabilities to simultaneously ambush a larger portion of the OEF systems in each of those zones. The ATCAS in EA Bear augmented HIMARS fires which, although effective in the placement of WAM, did not contribute much to the destruction of OEF combat systems. The fires in EA Tomcat were provided by direct support cannon fire for the infantry brigade. The impact of repositioning the ATCAS served to substantially increase the overall lethality of the MSF.

b. The MSF augmented the Divarty zone with three UAVs in an attempt to provide a more refined target for the ATACMS firing into the three western TAIs. The UAVs monitored these three TAIs after SOF teams reported OEF trail brigades passing through the Divarty zone NAIs. The UAVs served to reallocate fires within the three TAIs, thereby increasing the lethality of the MSF.

K-4. EEA Analysis: Tempo. The duration of the ambush and the exploitation was shortened in the tempo force package. In nearly every zone kills during the first two hours of the ambush increased from the base case alternative. In fact, kills doubled in the aviation zone during hour 31.

a. EEA 1 Does the Tempo force package satisfy the force sufficiency criteria for tempo?

(1) The FSC used to evaluate tempo were: are 75% of MSF units at the correct location and time when required, were 90% of MSF lift assets available when required, were 85% of OEF units detected, and was 85% of the MSF committed. The MSF accomplished an average of 75.6% of its tempo FSC. The OPLAN ordained that the goal to commit 85% of the MSF would not be met. The plan called for just enough assets to be committed just in time. The MSF met the timelines and committed 100% of the forces planned to be committed, but did not commit 85% of the total force.

(2) Time required for the ambush went down in the Tempo Force Package. By increasing the volume of kills in hours 31 and 32. The Tempo Force Package reduced the time required for an ambush.

b. EEA 2 Does the tempo force package satisfy the force sufficiency criteria for lethality?

(1) The force sufficiency criteria (FSC) used to evaluate lethality were the capability of the force to destroy 60% of the OEF anti-tank (mounted/wheeled), tanks, and armored fighting vehicles, 70% of OEF C3I systems, 70% of OEF 240 MRL systems, 60% of OEF artillery and mortars (120 mm and higher), 70% of OEF mounted/wheeled ADA systems, and 60% of OEF reconnaissance vehicles and systems. The MSF accomplished an average of 77.1% of its lethality goals. The MSF destroyed 41% of the OEF's combat strength.

(2) The MSF can fire 28,000 munitions/hour, but can not acquire targets with current assets in time. The ambush dynamic requires an accurate, precise, and timely targeting system. Precision attack assets can fire adequate numbers of munitions per hour; but a time gap exists in the target acquisition/mission assignment process.

(3) Time required for the exploitation went down in the tempo force package. The tempo force package increased kills during hours 31 and 32 in the DIVARTY, aviation, and armor zones. This occurred because the capability to use three more UAVs was added to the force package. The additional coverage provided by these UAVs reduced the queue or the time spent searching for targets by available MSF sensors. These sensors could now directly and quickly link targets to shooters. This high volume ambush nearly achieved the commander's intent of a sixty percent reduction of the OEF. It did this by striking with unprecedented violence in the two initial hours of the attack.

c. EEA 3 Does the tempo force package satisfy the force sufficiency criteria for survivability?

(1) The FSC used to evaluate survivability was the capability of the MSF to have 100% of its units maintain 85% or more of its combat systems. The MSF accomplished 99% of its survivability force sufficiency criteria goal. Only two units lost more than 15%.

(2) MSF combat losses occurred exclusively in units air assaulted into the aviation and infantry zones. These included an ER EFOG-M battery and a light infantry company. MSF lost less than 10 combat systems. The MSF force package was used in the constructive simulation VIC to tailor the force for survivability. The MSF accomplished 96.3% of its sole survivability FSC. The MSF accomplished 99% (2.7% improvement) of its sole survivability FSC. MSF survived at 95% combat strength.

d. EEA 4. What technological capabilities contribute most to the lethality of the tempo force package? Many precision attack assets are effective in the MSF. In order to get these assets into the fight in NEA in a timely manner, the MSF must possess attack assets which can be air assaulted. In NEA, the CH-47 and UH-60 are necessary to emplace all attack systems, except the armor brigade assets.

K-5. EEA analysis: Lethality

a. EEA 2 Does the lethality force package satisfy the force sufficiency criteria for lethality?

(1) The MSF achieved a decisive victory as is shown in Figure K-2. The OEF was crippled by a rapid and violent ambush, losing 59 percent of its force. The MSF retained 95 percent of its combat power, returned to TAA Badger and stood ready to continue the mission. The MSF demonstrated a nine percent improvement from the base case (50 percent) reducing the OEF to 41 percent strength.

(2) Lethality improved across a broad spectrum of weapons systems including attack helicopters, ATCAS, Paladin, and AFAS cannons, as well as ER EFOG-M. An attack aviation battalion was added to the infantry zone as well as an additional ATCAS battery. The most

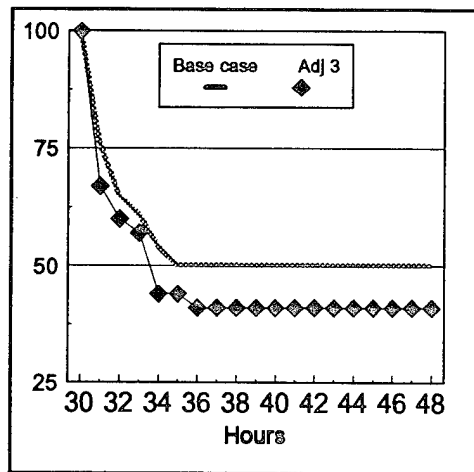


Figure K-2. Percent remaining combat strength.

significant killer in the infantry zone was the attack aviation battalion which fired into EAs Tomcat and Wildcat.

(a) The results were outstanding. Aviation kills in the infantry zones increased from zero to 278. Kills from cannons increased from 58 to 105. The lethality force package also included three additional UAV ground control stations (GCSs). These GCSs positioned more precision sensors in the MSF's battle space resulting in more kills for the total force.

(b) Interestingly, as the total force killed more OEF systems, fewer targets were available in the aviation zone. The armor zone kills demonstrated a slightly higher lethality initially and then no significant change in the following hours.

b. EEA 4 What technological capabilities contribute most to the lethality of the lethality force package?

(1) The most significant killer in the infantry zone was the attack aviation battalion which fired into EAs Tomcat and Wildcat. Increasing the triple threat of ATCAS, Longbow equipped attack helicopters, and UAVs optimized lethality for the MSF. Infantry zone lethality doubled by adding two cannon batteries and one attack battalion. Success was largely due to lethality of 2010 aviation and artillery forces.

(2) The most lethal technologies of the lethality force package were cannons and helicopters. Kills from these two systems increased dramatically across the board in this force package. Kills in three other systems also increased: ER EFOG-M, mines, and fixed wing. Because of target competition from fixed wing and mines, ATACMS kills decreased. Due to target competition from ATCAS, kills by mortars also went down.

c. EEA 7. Are there combination of units, when employed together, that are consistently the primary contributors to effectiveness of the MSF?

(1) The simultaneous ambush concept appears feasible when combined arms brigades attack in separate zones with lethal attack assets including aviation, cannons, UAVs and WAM minefields.

(2) The lethality force package demonstrated that aviation and cannons, when combined with UAVs and minefields, form a deadly team. These systems combined, not only in the aviation zone as in the base case, but also with great effect in the infantry zone. The infantry zone doubled its kills from the base case by adding an additional attack aviation battalion and an ATCAS battery to the systems striking its engagement areas. Like the base case these systems were highly effective in the aviation zone. Combining them in other areas produced a similar effect.

(3) The balance of systems in the aviation and infantry zones should be considered here. In the infantry zone one attack aviation battalion, two ATCAS batteries, one ER EFOG-M platoon and two PGM platoons combined for nearly 450 kills. In the aviation zone three attack aviation battalions, three ATCAS batteries, one HIMARS battery, and one ER EFOG-M platoon produced nearly 800 kills. This difference of nearly 350 kills can be accounted for by two reasons. First, there were three OEF brigades in the aviation zone and only two OEF brigades in the infantry zone. Second the AH accounted for most of the killing in the MSF, and the aviation zone committed three times as many AH as the infantry zone did.

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