

2

TRAC-F-SP-0289
APRIL 1989

AD-A208 585

ACN 73324

**ANALYSIS SUPPORT PLAN
FOR
HEAVY FORCE MODERNIZATION (HFM)
TRADEOFF ANALYSIS (TOA) SUPPORT**

DTIC
ELECTE
JUN 07 1989
D CS D



DISTRIBUTION STATEMENT A
Approved for public release
Distribution Unlimited

FORT LEAVENWORTH

U.S. ARMY
TRADOC ANALYSIS COMMAND - FORT LEAVENWORTH
TRAC - FLVN
FORCE ANALYSIS DIRECTORATE
FORT LEAVENWORTH, KANSAS 66027-5220

89-0382C

89 6 06 127

Analysis Support Plan TRAC-F-SP-0289
April 1989

TRADOC Analysis Command-Fort Leavenworth (TRAC-FLVN)
Force Analysis Directorate
Fort Leavenworth, Kansas 66027-5220

ANALYSIS SUPPORT PLAN
FOR
HEAVY FORCE MODERNIZATION (HFM) TRADEOFF ANALYSIS (TOA) SUPPORT

by

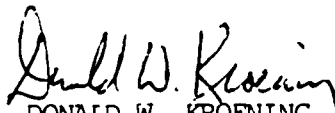
Hugo E. Mayer, Ph.D

ACN 73324

PREPARED BY:


ROBERT D. SPENCER, JR.
LTC, AV
Chief, Analysis Division I

CERTIFIED BY:


DONALD W. KROENING
Director, Force Analysis
Directorate

APPROVED BY:


ROBERT LA ROCQUE
Director, TRAC-FLVN

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1a. REPORT SECURITY CLASSIFICATION Unclassified			1b. RESTRICTIVE MARKINGS None		
2a. SECURITY CLASSIFICATION AUTHORITY			3. DISTRIBUTION / AVAILABILITY OF REPORT Approved for public release; Distribution is unlimited.		
2b. DECLASSIFICATION / DOWNGRADING SCHEDULE None					
4. PERFORMING ORGANIZATION REPORT NUMBER(S) TRAC-F-SP-0289			5. MONITORING ORGANIZATION REPORT NUMBER(S)		
6a. NAME OF PERFORMING ORGANIZATION USA TRADOC Analysis Command- Ft Leavenworth		6b. OFFICE SYMBOL (If applicable) ATRC-FFA		7a. NAME OF MONITORING ORGANIZATION	
6c. ADDRESS (City, State, and ZIP Code) ATTN: ATRC-FFA (Mayer) Fort Leavenworth, KS 66027-5220				7b. ADDRESS (City, State, and ZIP Code)	
8a. NAME OF FUNDING / SPONSORING ORGANIZATION USA TRADOC Analysis Command-Ft Leavenworth		8b. OFFICE SYMBOL (If applicable) ATRC-FFA		9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER	
8c. ADDRESS (City, State, and ZIP Code) ATTN: ATRC-FFA Fort Leavenworth, KS 66027-5220				10. SOURCE OF FUNDING NUMBERS	
				PROGRAM ELEMENT NO.	PROJECT NO.
				TASK NO.	WORK UNIT ACCESSION NO.
11. TITLE (Include Security Classification) (U) Analysis Support Plan for Heavy Force Modernization (HFM) Tradeoff Analysis (TOA) Support					
12. PERSONAL AUTHOR(S) Mayer, Hugo E.					
13a. TYPE OF REPORT		13b. TIME COVERED FROM Feb 89 TO Apr 89		14. DATE OF REPORT (Year, Month, Day) 1989 April	
15. PAGE COUNT 10					
16. SUPPLEMENTARY NOTATION					
17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)		
FIELD	GROUP	SUB-GROUP	Simulation		
19. ABSTRACT (Continue on reverse if necessary and identify by block number)					
The TRADOC Analysis Command-Fort Leavenworth provided support to the Heavy Force Modernization Task Force's tradeoff analysis in the form of the Enhanced Lanchester Plus (ELAN+) and Combined Arms Model-Antiarmor Munitions (CARMO-AM) simulation runs. The plan outlines all of the steps necessary in this effort. The plan also states the support, resource, and administrative requirements.					
20. DISTRIBUTION / AVAILABILITY OF ABSTRACT ☒ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT. ☐ DTIC USERS				21. ABSTRACT SECURITY CLASSIFICATION Unclassified	
22a. NAME OF RESPONSIBLE INDIVIDUAL Dr. Hugo E. Mayer				22b. TELEPHONE (Include Area Code) 913-684-2533/AV552-2533	
				22c. OFFICE SYMBOL ATRC-FFA	

CONTENTS

	Page
TITLE PAGE.	i
DD FORM 1473, Report Documentation Page	ii
TABLE OF CONTENTS	iii
ABSTRACT.	iv
ANALYSIS SUPPORT PLAN	1
Purpose	1
Scope	1
Environment and threat considerations	2
Methodology	2
Criterion-of-choice	3
Resource support requirement.	3
APPENDIX A. RUNS MATRIX.	A-1
APPENDIX B. REFERENCES	B-1
APPENDIX C. DISTRIBUTION LIST.	C-1

ABSTRACT

The TRADOC Analysis Command-Fort Leavenworth provided support to the Heavy Force Modernization Task Force's Tradeoff Analysis in the form of Enhanced Lanchester Plus (ELAN+) and Combined Arms Model-Antiarmor Munition (CARMO-AM) simulation runs. The plan outlines all of the steps necessary in this effort. The plan also states the support, resource, and administrative requirements.



Accession	
DTIC	☒
DDIC	☐
DDIC	☐
By	
Date	
Author	
Title	
Subject	
A-1	

ANALYSIS SUPPORT PLAN
FOR
HEAVY FORCE MODERNIZATION TRADEOFF ANALYSIS

1. Purpose. The purpose of this analysis support plan is to outline the analytical support to the Heavy Force Modernization Task Force (HFM-TF) Tradeoff Analysis (TOA).

2. Scope.

a. Limitations.

(1) The analysis will address only the following armored vehicle alternatives which were provided by the HFM-TF: turret versus turretless tank, heavy versus medium future infantry fighting vehicle (FIFV) chassis, and either advanced antiarmor weapon system-heavy (AAWS-H), advanced antiarmor weapon system-medium (AAWS-M), or no missile on FIFV.

(2) Scenarios. The scenarios are limited to the European (EUR) theater. Three scenarios will be used: High-Resolution Scenario (HRS) 15, mechanized task force (TF) in defense; HRS 13, armored TF in attack; and HRS 12, heavy brigade in attack. These scenarios are vignettes taken from the standard scenario EUR 6.0.

(3) Models. Two models will be used: Enhanced Lanchester Plus (ELAN+) and Combined Arms Model-Antiarmor Munitions (CARMO-AM). ELAN+ will use HRS 15 and HRS 12; CARMO-AM will use HRS 15 and HRS 13.

(4) Doctrine. The analysis will be conducted only within the context of AirLand Battle-Future (Heavy) [ALB-F(H)] concepts. All tactics, techniques, and procedures will be consistent with ALB-F(H) concepts within the capabilities of the models.

b. Assumptions.

(1) System definition will be available in sufficient detail for modeling purposes.

(2) Red doctrine, equipment, and force structure projections out to 2004 are accurate.

(3) Adequate surrogate data will be available to substitute for identified data deficiencies.

3. Environment and threat considerations.

a. Environment.

(1) The battle does not include nuclear, biological, or chemical warfare.

(2) The battle is fought on a day with seven kilometer meteorological visibility in open terrain with an average line of sight of 2,300 meters.

b. Threat.

(1) In HRS 15, the mechanized TF is defending against two tank regiments.

(2) In HRS 13, the armor TF is attacking two lead battalions of a second-echelon tank regiment.

(3) In HRS 12, the heavy brigade is attacking two battalions of a second-echelon tank regiment.

4. Methodology.

a. Essential elements of analysis (EEA).

(1) Does the turreted or the turretless tank make the greater contribution to combat for the Blue force?

(2) Does the heavy or the medium chassis on the FIFV make the greater contribution to combat for the Blue force?

(3) Does the AAWS-H, the AAWS-M, or no missile on the FIFV make the greater contribution to combat for the Blue force?

(4) What combination of the preceding alternatives provides the greatest lethality against the Red force?

(5) What combination of the preceding alternatives provides the greatest survivability for the Blue force?

b. Measures of effectiveness (MOE).

(1) To assess overall performance in the battle, the MOE is the loss exchange ratio (LER). The LER is the ratio of the number of Red systems lost to the number of Blue systems lost $[R(L)/B(L)]$.

(2) To assess issues of lethality, the MOE is the number of Red systems lost $[R(L)]$.

(3) To assess issues of survivability, the MOE is the number of Blue systems lost [B(L)].

c. Alternatives.

(1) The alternatives to be examined are those in paragraphs 4a(1)-(3), above.

(2) The runs matrix that describes the combinations of alternatives to be run is shown in appendix A.

d. Method of analysis.

(1) The output of the 12 runs for each model for each of its two scenarios and for each MOE will be presented graphically with histograms.

(2) The output of the 12 runs for each model for each of its two scenarios and for each MOE will be analyzed with a 2x2x3 factorial analysis of variance (ANOVA) to determine the statistical significance of the differences among the alternatives.

(3) A total of 12 ANOVA will be accomplished. If inconsistent results become evident, additional study will be done to resolve the inconsistencies.

5. Criterion of choice. The preferred alternative will be made evident by using as the criterion of choice the level of statistical significance associated with the MOE as a function of the specific alternative.

6. Resource support requirement. No resources beyond those currently resident in Force Analysis Directorate (FAD), TRADOC Analysis Command-Fort Leavenworth (TRAC-FLVN) are required. FAD, TRAC-FLVN, will:

a. Write the plan.

b. Run the models and perform all analyses.

c. Write the final report.

APPENDIX A
RUNS MATRIX

TANK	FIFV		Run No.
	CHASSIS	MISSILE	
TURRET	HEAVY	AAWS-H	1
		AAWS-M	2
		NONE	3
	MEDIUM	AAWS-H	4
		AAWS-M	5
		NONE	6
NO TURRET	HEAVY	AAWS-H	7
		AAWS-M	8
		NONE	9
	MEDIUM	AAWS-H	10
		AAWS-M	11
		NONE	12

APPENDIX B

REFERENCES

1. CACI, Inc. Federal Resource and Systems Analysis Division. CARMO-AM Users Manual. Arlington, Virginia. January 1988.
2. TRADOC Pamphlet 11-8. Studies and Analysis Handbook. 19 July 1985.
3. DF, TRADOC Analysis Command-Fort Leavenworth, ATRC-FOQ, 27 June 1989, subject: Revised Study Plan and Analysis Plan Preparation Guide.
4. TRADOC Analysis Command-White Sands Missile Range. Combat Model ELAN+: A Users Guide. December 1987.
5. TRADOC message, ATRC-RPR, 221500Z December 1988, subject: Armored Family of Vehicles (AFV) Trade-Off Analysis.

APPENDIX C

DISTRIBUTION LIST

	<u>No. Copies</u>
Defense Technical Information Center ATTN: DTIC-TCA Cameron Station Alexandria, VA 22314	2
US Army Library Army Study Documentation and Information Retrieval System (ASDIRS) ANRAL-RS ATTN: ASDIRS Room 1A518, The Pentagon	1
US Army TRADOC Analysis Command-White Sands Missile Range ATTN: ATRC-WSL (Technical Library) White Sands Missile Range, NM 88002-5502	1
US Army TRADOC Analysis Command-Fort Leavenworth ATTN: ATRC-FOQ (Publications Center) Fort Leavenworth, KS 66027-5200	1
US Army Combined Arms Research Library (CARL) ATTN: ATZL-SWS-L Fort Leavenworth, KS 66027-5000	1
Commander US Army TRADOC Analysis Command ATTN: ATRC Fort Leavenworth, KS 66027-5200	1
Director Armored Family of Vehicles Task Force ATTN: DAMO-AFV Fort Eustis, VA 23604	1
Director, TRAC-Fort Leavenworth ATTN: ATRC-F Fort Leavenworth, KS 66027-5200	1
Director, TRAC-Fort Leavenworth ATTN: ATRC-FS Fort Leavenworth, KS 66027-5220	1
Director, TRAC-Fort Leavenworth ATTN: ATRC-FD Fort Leavenworth, KS 66027-5200	1
Director, TRAC-Fort Leavenworth ATTN: ATRC-FO Fort Leavenworth, KS 66027-5200	1