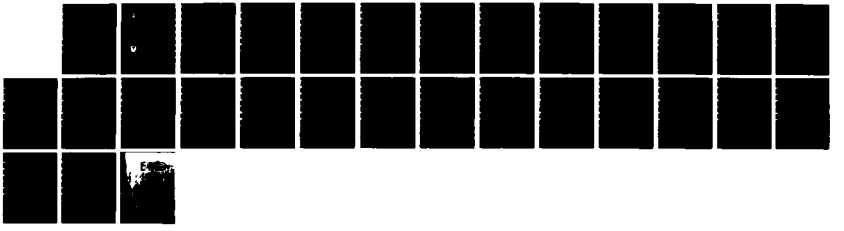
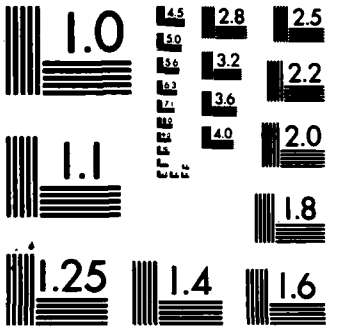
AD-A140 370 THE HAWK MANPOWER MODEL(U) ARMY MISSILE COMMAND 1/1
REDSTONE ARSENAL AL RESEARCH DIRECTORATE
R L MORGAN ET AL. 20 SEP 83 DRSMI/RR-83-3-TR
UNCLASSIFIED SBI-AD-E950 511 F/G 9/2 NL





TECHNICAL REPORT RR-83-3

THE HAWK MANPOWER MODEL

Robert L. Morgan and Peter Franklin
Research Directorate
US Army Missile Laboratory

20 SEPTEMBER 1983

U.S. ARMY MISSILE COMMAND
Redstone Arsenal, Alabama 35809

Approved for public release; distribution unlimited.

DISPOSITION INSTRUCTIONS

DESTROY THIS REPORT WHEN IT IS NO LONGER NEEDED. DO NOT RETURN IT TO THE ORIGINATOR.

DISCLAIMER

THE FINDINGS IN THIS REPORT ARE NOT TO BE CONSTRUED AS AN OFFICIAL DEPARTMENT OF THE ARMY POSITION UNLESS SO DESIGNATED BY OTHER AUTHORIZED DOCUMENTS.

TRADE NAMES

USE OF TRADE NAMES OR MANUFACTURERS IN THIS REPORT DOES NOT CONSTITUTE AN OFFICIAL INDORSEMENT OR APPROVAL OF THE USE OF SUCH COMMERCIAL HARDWARE OR SOFTWARE.

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER RR-83-3	2. GOVT ACCESSION NO. ADA140370	3. RECIPIENT'S CATALOG NUMBER
4. TITLE *(and Subtitle)* THE HAWK MANPOWER MODEL		5. TYPE OF REPORT & PERIOD COVERED 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Robert L. Morgan and Peter Franklin		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS Commander, US Army Missile Command ATTN: DRSMI-RR Redstone Arsenal, AL 35898		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS Commander, US Army Missile Command ATTN: DRSMI-RPT Redstone Arsenal, AL 35898		12. REPORT DATE 20 September 1983 13. NUMBER OF PAGES
14. MONITORING AGENCY NAME & ADDRESS*(if different from Controlling Office)*		15. SECURITY CLASS. *(of this report)* Unclassified 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT *(of this Report)*

Approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT *(of the abstract entered in Block 20, if different from Report)*

18. SUPPLEMENTARY NOTES

19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*

Microcomputer
Software program
HAWK

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

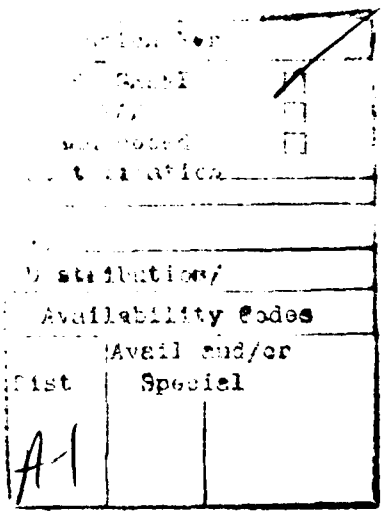
This report presents the EXECUPLANtm software program which allows the implementation of a planning worksheet into a computer's memory. The complete HAWK Evolution Manpower Model is presented along with the complete manpower executive planning and study worksheet as implemented using EXECUPLANtm which was developed by Vector Graphics Corporation.

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

CONTENTS



I. INTRODUCTION

Since the advent of the microcomputer, several executive planning software programs have become available. Most of these programs operate with the CP/M operating system. These software systems allow the implementation of a planning worksheet of extrordinary dimensions into the computer memory and the ability to relate any cell of the planning matrix to any other cell or cells using many arithematic operations including trignometric, log and statistical operations. Such executive software also allows cell values to be varied in a particular matrix and the immediate observation of the effect of such variations on the other matrix elements related to it in the above manner.

EXECUPLANtm, by Vector Graphics Corporation, was used specifically to perform HAWK manpower study to compute the impact on personnel requirements various battalion configurations, maintenance time variations as well as changes in equipment configuration and reliability. The complete HAWK Evolution Manpower Model is presented in Section III of this report along with the complete manpower executive planning and study worksheet as implemented using EXECUPLANtm.

In Section II, a greatly simplified use of the executive planning software is documented for instruction purposes.

II. GENERAL USE OF EXECUPLANtm EXECUTIVE SOFTWARE

There are two different methods for giving a computer commands. One is the language method. In this method, a list of instructions is created and loaded into the computer. The computer then outputs results according to the instructions. This method is a simplified type of computer programming, and is not an acceptable method of getting results when the operator is unfamilier with computer programming. The other method is the interactive method, where the computer is given a command instruction. The computer then follows that command and displays the results. Then another command is given the computer and it performs that command and so on until all commands have been given. The computer interacts with the operator. This is the method used by most microcomputer executive software systems. In other words, a computer programmer has developed a software program, which interacts with the user who supplied the commands, and the computer then is instructed by the software to display the results.

EXECUPLANtm understands some twenty commands. Some commands such as Clear, Enter, Kill, and other related commands are used to manipulate the worksheet matrix array, while other commands such as Print, Format, and List deal with printing out the worksheet matrix and its associated formulae.

Other commands deal with reading from or writing to the disk, file update and file manipulation. A comprehensive listing of EXECUPLANtm commands are available in the EXECUPLANtm Reference Guide supplied with the software.

These commands are used to enter matrix cell values, formulae relating one cell to other cells, outputting the results in a desired format, and updating the planning sheet disk file. The software also has a Help command which will display the aforementioned commands on the CRT screen for quick reference by the user. Appropriate error messages are displayed by the software system when errors are made entering data formulae or text.

EXECUPLANtm software is capable of performing the usual mathematical operations of addition, subtraction, multiplication, division, and exponentiation. Parentheses are used to declare the order of precedence of the various operators. EXECUPLANtm also provides for the defined constants of #PI, #E and #RND. The first two constants are obvious and #RND is a random number in the range of 1 to 2.

Mathematical functions provided by this software are:

A.	Absolute Value	(ABS)
B.	Integer	(INT)
C.	Sine	(SIN)
D.	Cosine	(COS)
E.	Tangent	(TAN)
F.	Arctangent	(ATN)
G.	Natural Log	(LN)
H.	Common Log	(LOG)
I.	Exponent	(EXP)
J.	Square Root	(SQR)
K.	Summation	(SUM)
L.	Minimum	(MIN)
M.	Maximum	(MAX)
N.	Average	(AVG)
O.	Mean	(MEAN)
P.	Variance	(VAR)
Q.	Standard Deviation	(SD)
R.	Counter	(COUNT)
S.	Net Present Value	(NPV)

It is readily seen, that almost any mathematical operation can be performed on any desired array of cell elements. As an example, suppose it is desired to multiply the value of the matrix element located at row 1, column 1 with column 5 and divide the result by the value of the element located at row 2, column 5, and then display the result in the element located at row 3, column 6. To achieve the correct result, the cursor is positioned on the CRT screen to the element located at row 3, column 6, and then enters the formula ([1,1]*[1,5])/[2,5]. Upon computation the result will appear at location 3,6. If the result has been desired at location 3,5, the formula could be simplified as follows; ([1,1]*[1,.])/[2,.]. The character (.) is used to mean the current location in column 5. The use of relative reference to rows and columns is made use of in the HAWK Manpower Model discussed in Section III. An example of relative reference is the statement [.,.-3], which means the current row and the current column minus 3. If the current row was 2 and the current column 5, then [.,.-3] = [2,2]. That is the reference formula at location 2,5 points to the value at location 2,2.

III. HAWK EVOLUTION MANPOWER MODEL

The HAWK MANPOWER MODEL was developed as a tool to assist the engineer by relating HAWK system changes to force structure savings. These engineering changes may be in the form of RAM improvements, equipment changes (i.e., addition, deletions or combinations) and organizational changes. The resulting force structure changes may take the form of total reduction to the force structure in number of vehicles or personnel or more fire units for the same number of personnel and equipment. The primary advantage of the model is its ability to perform these sensitivity analyses quickly and with little programming knowledge.

The basic software used was the Vector Graphics EXECUPLANtm. This software is a CP/M software (i.e., it runs under the control of the CP/M operating system and is similar to VISICALC which runs on the APPLE microcomputer and not under CP/M control). This software is a matrix manipulator type management decision maker by calculation. The HAWK MANPOWER MODEL uses this software to relate the effects of equipment changes on vehicles, system equipment, operators battery maintenance personnel, Direct Support Battery personnel, and the General support slice (to be described later).

In order to measure sensitivities, a baseline was established between the Director of Combat Development (DCD), US Army Air Defense School (USAADS) and the HAWK Evolution Study Group of the US Army Missile Command (USAMICOM), Redstone Arsenal, Alabama. The baseline Table of Organizational Equipment (TOE) for the Improved Assualt Fire Unit (IAFU) Battery was draft TOE 44-287B200, dated 16 March 1982, with corrections. The TOE for the Direct Support Battery was TOE 09-248H800, dated 14 January 1982. The TOE for Headquarters and Headquarters Battery (HHB) was TOE 44-246H220, dated 14 January 1982. To change the Baseline TOE's is a relatively easy matter.

A. IAFU Configuration

The baseline IAFU described by the reference TOE contains some substantial changes to the HAWK SQUARE BATTALION found in todays force

structure. The major changes are described below. All equipment within the IAFU battery are listed in Table 1 and Personnel are listed in Table 2.

1. Battery Headquarters

The Battery headquarters now consists of only the command element, the motor pool and the communications section. The system maintenance personnel are now part of the IAFU platoon, configured as a maintenance section within the Platoon. The structure no longer includes the Improved Pulse Acquisition Radar (IPAR), Range Only Radar (RAR), or the Information and Coordination Central (ICC).

2. IAFU Platoon

In addition to the maintenance Section and associated Prescribed Load List (PLL), the Platoon now carries some maintenance personnel for its vehicles and generators as well as some communications personnel. The Platoon will have 4 Launchers and 2 Loader/Transporters. Although the TOE shows 4 60 KW generators, USAADS has agreed to assume only 3 since this is a more realistic number.

B. Force Structure Configuration

The baseline battalions have 3 batteries with 2 IAFU platoons per battery or a 3 by 2 configuration. Sensitivity was demonstrated by assuming 6 battalions for a total of 36 IAFU's with variations of 48 or 64 IAFU's. The total number of personnel found in HHB and Direct Support Battery are found in Table 3. In reviewing the organization of these batteries, it was determined that the main changes that could be made within the battery are for maintenance personnel within the DSB and TSQ 73 related personnel in the HHB. These relationships are discussed later.

Every piece of maintainable Army equipment has associated with it AMMH's (Annual Maintenance Manhours). These AMMH's are found in each MOS that must maintain the equipment and at each Maintenance level (Organizational, Direct Support, General Support). The AMMH is a function of Mean Time Between Failure (MTBF), Mean Time to Repair (MTR) and other RAM indicators. It is calculated by the commodity command and basically relates the number of hours an equipment repairman will spend on the equipment. It assumes that each repairman has 2500 hours available each year (this number implies that the repairman has available 48 hours a week for repairing equipment, but the 2500 hour figure also includes time spent waiting for parts, contact teams, etc.). The basic formula for calculating the number of maintenance personnel required per piece of equipment is:

Number of Personnel/Piece of Equipment = AMMH/2500

To calculate the total number of personnel for X pieces of equipment:

Number of Personnel = X * Ammh/2500

One must keep in mind that one piece of equipment may have several MOS's associated with it. An example is the High Power Illuminator (HPI). Maintenance personnel associated with it are Organizational, Direct Support and General Support for the maintenance of the trailer. The Direct Support MOS is the 24L and there are maintainers at the general support level outside the actual HAWK force structure. Therefore any changes in AMMH or equipment density will affect personnel strength throughout the entire force structure.

1. General Support Slice

Using AMMH's allows us to also determine savings that can be made outside the actual HAWK force structure. By reducing the number of vehicles in a HAWK IAFU one not only reduces the number of organizational maintenance personnel within the battery but also the number of direct and general support personnel found in motor maintenance companies found the division assets outside the HAWK force structure. The same reasoming applies for general support of the HAWK equipment.

2. IAFU Battery AMMH's

By reviewing Table 4, one can readily see pieces of equipment where changes in RAM can drastically affect the force structure (i.e., IPCP) and other pieces of equipment which do not greatly affect the force structure (i.e., the IFF computer).

One can also see that one MOS may repair several pieces of equipment and therefore a RAM improvement to one piece without associated improvements in other pieces produce only minor reductions in the overall force structure. The calculations for the number of operators within the force structure are basically a function of the numbers and types of equipment within the IAFU platoon. The primary operators that this study is concerned with are the HAWK launcher crewmen (MOS 16D) and the HAWK fire control operators (MOS 16E). The number of 16D's and 16E's within the force structure is the multiple of the number of 16D's and 16E's per battery, number of batteries per battalion and the number of battalions within the force structure. Further explanation of the calculations for 16D's and 16E's per battery follows:

- HAWK Launcher Crewmen (16D). The number of MOS 16D personnel within the battery are a function of the following:

  a. Battery Commander's Driver

  b. Number of IAFU's per Battalion

  c. Platoon Leader's Driver

  d. Platoon Sergeant

  e. Section Chief

  f. Number of Launchers per IAFU

g. Senior Launcher Crewmen (This number takes into account) around the clock operation).

h. Number of launcher crewmen per launcher. (This number of personnel takes into account around the clock operation).

• HAWK Fire Control Operators (16E). The number of MOS 16E personnel within the battery are a function of the following:

a. Number of IAFU's per battery.

b. Fire control supervisory personnel. Includes the personnel in grade E5 and E6 who both assist intactical control of the air battle and the supervision of the lower operators. These numbers take into account around the clock operation.

c. Fire Control Operators. These are functions of the number of personnel required per radar and platoon command post. These numbers also take into account a minimum number of fire control operators to man the system around the clock.

This model also takes into account the number of support personnel (in addition to those described in the maintenance calculations) such as cooks and clerks. An example of this is the number of cooks per battery which is a function of the total number of personnel within the battery.

From the preceeding paragraphs, one can see that any change in the numbers, types or RAM of equipment will affect the force structure in a number of ways. Figure 1 describes these affects by using an example how a multi-function radar would affect the force structure.

From the example, several pieces of HAWK IAFU equipment, as shown in Figure 1, are replaced by one piece of equipment (the multi-function radar). This action effects the number of HAWK operators and HAWK maintenance at all levels. It also affects the number of vehicles required for the equipment and the maintenance personnel associated with the vehicles.

The number and types of generators are affected which again result in changes in the number of maintenance personnel/generator operators. All these changes affect the total number of personnel within the battery which in turn affect the number of cooks. This example shows the complexity of changing pieces of equipment. However, if this methodology were not followed, gross errors in the total force structure could result. One man per IAFU error could result in a 60 personnel error in the total force structure, given a force structure of 60 IAFU's.

Fifteen runs using the model were used to test to the IAFU platoon or organizational structure. Table 5 shows the results of these runs. A few explanations about the computer printouts in Table 5 are necessary. The title part of the run represents the changes for that run with respect to previous runs and the base case.

The term "OUTBNSP (FRM BASELINE) represents the total number of maintenance personnel associated with the IAFU platoon equipment who are located outside the HAWK force structure (these personnel are also referred to as part of the "General Support Slice"). They are also found in the HAWK maintenance General Support as well as the vehicle and generator Direct Support and General Support. The figure of the baseline (130) represents the number from which savings within the "General Support Slice" are made.

IV. CONCLUSION

From the results of section III., it is clear that executive planning software used in conjunction with the appropriate microcomputer hardware system is adequate for almost all planning worksheet studies, and is far superior in time efficiency and currency when compared with the manual method of planning worksheet development. The fact that the worksheet software allows for investigating many different configurations in a very short time, reduces errors in planning since one has the ability to investigate cases that would normally be avoided for lack of time in the manual case. With this in mind, the use of executive planning in the development of manpower models and system management is highly recommended.

TABLE 1. HAWK MANNING STUDY FT. BLISS BASE LINE, BATTERY TOE IS 44-287B200 - 03/16/82 WITH CORRECTIONS, BATTERY EQUIPMENT

LINE	DESCRIPT	HQ'S	COMMO	MTR:PL	NO/IAFU	BAT:TTL
E88188	J BOX				1	2
J35680	60 KW GENERATOR				3	6
J43918	A-1.5KW-60HZ GENERATOR	1			1	3
J43918	B-1.5KW-60HZ GENERATOR			2		2
J44055	1.5KW 28VDC GENERATOR	1				1
J46110	A-3KW 28 VOLT DC GENERATOR				1	2
J46110	B-3KW 28 VOLT DC GENERATOR			1		1
J46252	3KW 60 HZ GENERATOR				1	2
K98250	IFF COMPUTER				2	4
K99094	IFF-TPX46				1	2
L28351	KITCHEN TRAILER	1				1
L45757	LAUNCHER ZERO LENGTH				4	8
L76556	SCOOP LOADER			1		1
L76762	LOADER TRANSPORTER				2	4
N51684	PALLET				8	16
P05898	IPCP				1	2
Q16040	AN/MPC-46 HPI RADAR				1	2
Q16044	ICWAR				1	2
T14109	AN/TSM112				1	2
V19950	TANK AND PUMP UNIT TRAILER			2		2
W95537	3/4 TON TRAILER		1		1	3
W95811	1-1/2 TON TRAILER			5	3	11
W98825	WATER TRAILER	1				1
X40009	2-1/2 TON TRUCK	2		2	2	8
X40831	5 TON LWB 6X6 TRUCK			2	10	22
X41242	5 TON XLWB 6X6 TRUCK				2	4
X62340	2-1/2 TON TRUCK VAN				1	2
X62477	2-1/2 TON TRUCK VAN WITH WINCH			1		1
X63299	5 TON WRECKER			1		1
Z4465	MOTORCYCLE		1			1
Z94	3/4 TON TRUCK	2	2		3	10
B52	BEAM HOISTING GM				1	2
B52	BEAM HOISTING GM				1	2

TABLE 2. HAWK MANNING STUDY FT. BLISS BASE LINE, BATTERY TOE IS 44-287B200 - 03/16/82 WITH CORRECTIONS, BATTERY PERSONNEL

MOS	JOB DESCRIPTION	HQ SECTION	COMMO SECTION	MOTOR POOL	NUMBER PER IAFU	BATTERY TOTAL
14D(CPT)	BATTERY COMMANDER	1				1
14D(1LT)	TACTICAL OFFICER	1			2	5
223B	SYSTEM WARRANT OFFICER				1	2
16Z	FIRST SGT	1				1
16D40	E7-LAUNCHER				1	2
16D30	E6-LAUNCHER				1	2
16D20	E5-LAUNCHER				4	8
16D10	E4&E3-LAUNCHER	2			11	24
16E30	E6-FIRE CONTROL				2	4
16E20	E5-FIRE CONTROL				2	4
16E10	E4&E3-FIRE CONTROL				5	10
16S20	E5-STINGER				1	2
16S10	E4-STINGER				1	2
24R40	E7-SYS MAINT				2	4
24R30	E6-SYS MAINT				2	4
24R2-1	E5 AND BELOW SYS MAINT				6	12
31M20	E5-COMMO				1	2
31M10	E4&E3-COMMO				2	4
31V10	E4&E3-COMMO		1			1
31Z40	E7-COMMO		1			1
36K20	E5-COMMO		1			1
36K10	E4-COMMO		3			3
54E20	NBC NCO	1				1
62E10	SCOOP LOADER OP			1		1
63B40	E7-PWR+MTR MAINT			1		1
63B30	E6-PWR+MTR MAINT			1		1
63B2-1	E5 AND BELOW PWR+MTR MAINT			6	2	10
63Y20	E5-TRACK MECHANIC			1		1
75B20	E5-CLERK	1				1
76C10	PLL CLERK			1	2	5
76W10	PETROL OPERATOR			2		2
76Y30	SUPPLY SGT	1				1
76Y10	ARMORER	1				1
94B	ALL COOKS	6				6

TABLE 3. BATTALION AND DIRECT SUPPORT BATTERY PERSONNEL

	HHB AND DSB PERSONNEL			
RANK	DESCRIPTION	HHB	DSB	TOTAL
OFFICER	HHB=F(TSQ 73) / DSB=CONSTANT	18	2	20
WO	CONSTANT	4	3	7
EM-24SER	HHB=F(TSQ 73) / DSB=CONSTANT	159	80	
24H	DSB 24H		13	
24K	DSB 24K		15	
24L	DSB 24L		21	
EM	ALL EM	159	129	288

TABLE 4. HAWK MANNING STUDY FT. BLISS BASE LINE, BATTERY TOE IS 44-287B200 - 03/16/82 WITH CORRECTIONS, ANNUAL MAINTENANCE MANHOURS (AMMH) FOR EACH PIECE OF EQUIPMENT

	DESCRIPTION	BATTERY MOTOR&GEN AMMH	BATTERY SYSTEM AMMH	NUMBER PER IAFU	NUMBER PER LINE BTRY	DSB 24H AMMH	DSB 24K AMMH	DSB 24L AMMH	GEN SPT MTR&GEN DS AMMH
E88188	J BOX		32	1	2			41	39
J35680	60 KW GENERATOR	475		3	6				228
J43918	A-1.5KW-60HZ GENERATOR	185		1	3				73
J43918	B-1.5KW-60HZ GENERATOR	185			2				73
J44055	1.5KW 28VDC GENERATOR	185			1				73
J46110	A-3KW 28 VOLT DC GENERATOR	312		1	2				176
J46110	B-3KW 28 VOLT DC GENERATOR	312			1				176
J46252	3KW 60HZ GENERATOR	312		1	2				176
K98250	IFF COMPUTER		33	2	4				0
K99094	IFF-TPX46		33	1	2				0
L28351	KITCHEN TRAILER	96			1				32
L23857	KITCHEN SINK			1	2				0
L45757	LAUNCHER ZERO LENGTH	92	408	4	8			1020	261
L76556	SCOOP LOADER	350			1				200
L76762	LOADER TRANSPORTER		1541	2	4			1080	0
N51684	PALLET		C	8	16			4	0
P05898	IPCP	96	4570	1	2	2448			356
Q16040	AN/MPC-46 HPI RADAR	96	3740	1	2		1904	408	740
Q16044	ICWAR	96	1904	1	2		2176	408	774
T14109	AN/TSM112		204	1	2		34		102
V19950	TANK AND PUMP UNIT TRAILER	96			2				32
W95537	3/4 TON TRAILER	96		1	3				26
W95811	1-1/2 TON TRAILER	96		3	11				26
W98825	WATER TRAILER	96			1				32
X40009	2-1/2 TON TRUCK	332		2	8				149
X40831	5 TON LWB 6X6 TRUCK	354		10	22				183
X41242	5 TON XLWB 6X6 TRUCK	354		2	4				183
X62340	2-1/2 TON TRUCK VAN	326		1	2				131
X62477	2-1/2 TON TRUCK VAN WITH WINCH	326			1				131
X63299	5 TON WRECKER	374			1				175
Z44650	MOTORCYCLE	50			1				10
Z94107	3/4 TON TRUCK	235		3	10				125
B52090	BEAM HOISTING GM	0	25	1	2				0
B52464	BEAM HOISTING GM		25	1	2				0
T14102	MOBILE TEAM SHOP AN/TSM 105								567
U59390	TEST ACCY GP: AN/TSM-120					544			13
T14101	SHOP EQUIP: AN/TSM-104					544			54
T14464	SHOP EQUIP: AN/TSM-107						952		

TABLE 5. HAWK MODEL RESULTS

RUN 1 (BASE LINE CASE)
IAFU CHANGES - NONE (4 CONV LNCHRS, NO PHASE 3 PIPS, SYS MAINT IN PLATOON)
ORGANIZATION - 6 BN, 3 BTY/BN. 2 IAFU/BTRY

TOTAL PERSONNEL	OFFICER	WARRANT	ENLISTED	TOTAL
ASSAULT FIRE UNIT	2	1	45	48
BATTERY	6	2	122	130
BATTALION	38	13	654	705
FORCE STRUCTURE	228	78	3924	4230
OUTBNSP (FRM BASELINE)				130
TOTAL NUMBER OF IAFU'S	36			

DIFFERENCE FROM BASELINE CASE (+ = ADDITION IN FORCE, - = REDUCTION IN FORCE)
0

RUN 2
IAFU - 3 CONVENTIONAL LAUNCHERS PER IAFU
ORGANIZATION - NO CHANGE

TOTAL PERSONNEL	OFFICER	WARRANT	ENLISTED	TOTAL
ASSAULT FIRE UNIT	2	1	40	43
BATTERY	6	2	112	120
BATTALION	38	13	619	670
FORCE STRUCTURE	228	78	3714	4020
OUTBNSP (FRM BASELINE)				123
TOTAL NUMBER OF IAFU'S	36			

DIFFERENCE FROM BASELINE CASE (+ = ADDITION IN FORCE, - = REDUCTION IN FORCE)
-217

RUN 3
IAFU - 2 LAUNCHERS PER IAFU
ORGANIZATION - NO CHANGE

TOTAL PERSONNEL	OFFICER	WARRANT	ENLISTED	TOTAL
ASSAULT FIRE UNIT	2	1	37	40
BATTERY	6	2	106	114
BATTALION	38	13	598	649
FORCE STRUCTURE	228	78	3588	3894
OUTBNSP (FRM BASELINE)				117
TOTAL NUMBER OF IAFU's	36			

DIFFERENCE FROM BASELINE BASE (+ = ADDITION IN FORCE, - = REDUCTION IN FORCE)
-349

TABLE 5. Continued

RUN 4
IAFU - 3 LNCHRS/IAFU, PHASE III PIPS*
ORGANIZATION - NO CHANGE
PIPS INCL 2/3 RED IN AMMH FOR PCP,HPI&CWAR AND 1/3 RED IN L/T

TOTAL PERSONNEL	OFFICER	WARRANT	ENLISTED	TOTAL
ASSAULT FIRE UNIT	2	1	37	40
BATTERY	6	2	106	114
BATTALION	38	13	558	639
FORCE STRUCTURE	228	78	3528	3834
OUTBNSP (FRM BASELINE)				105
TOTAL NUMBER OF IAFU'S	36			

DIFFERENCE FROM BASELINE CASE (+ = ADDITION IN FORCE, - = REDUCTION IN FORCE)
-421

RUN 5
IAFU - NO CHANGES FROM RUN 4
ORGANIZATION - 4 BN, 3 BTRY/BN, 3 IAFU/BN - TOTAL IAFU = 36*
ALTHOUGH THIS DOES NOT CHANGE #IAFU IT DOES AFFECT # OF BN OVERHEADS

TOTAL PERSONNEL	OFFICER	WARRANT	ENLISTED	TOTAL
ASSAULT FIRE UNIT	2	1	37	40
BATTERY	8	3	147	158
BATTALION	44	16	719	779
FORCE STRUCTURE	176	64	2876	3116
OUTBNSP (FRM BASELINE)				98
TOTAL NUMBER OF IAFU'S	36			

DIFFERENCE FROM BASELINE CASE (+ = ADDITION IN FORCE, - = REDUCTION IN FORCE)
-1146

RUN 6
IAFU - NO CHANGES FROM PREVIOUS RUN
ORGANIZATION - ADD ONE BN TO RUN 5 = 45 IAFU'S*
ADDS ONE BATTALION TO THE FORCE STRUCTURE

TOTAL PERSONNEL	OFFICER	WARRANT	ENLISTED	TOTAL
ASSAULT FIRE UNIT	2	1	37	40
BATTERY	8	3	147	158
BATTALION	44	16	719	779
FORCE STRUCTURE	220	80	3595	3895
OUTBNSP (FRM BASELINE)				122
TOTAL NUMBER OF IAFU'S	45			

DIFFERENCE FROM BASELINE CASE (+ = ADDITION IN FORCE, - = REDUCTION IN FORCE)
-343

TABLE 5. Continued.

RUN 7
IAFU - NO CHANGES FROM PREVIOUS RUN
ORGANIZATION - CHANGE TO 4 BN, 4 BTRY/BN, 3 IAFU/BTRY FOR 48 IAFU'S

TOTAL PERSONNEL	OFFICER	WARRANT	ENLISTED	TOTAL
ASSAULT FIRE UNIT	2	1	37	40
BATTERY	8	3	147	158
BATTALION	52	19	874	945
FORCE STRUCTURE	208	76	3496	3780
OUTBNSP (FRM BASELINE)				130
TOTAL NUMBER OF IAFU'S	48			

DIFFERENCE FROM BASELINE CASE (+ = ADDITION IN FORCE, - = REDUCTION IN FORCE)
-450

RUN 8
IAFU - USE MOBILE LAUNCHER TRANSPORTER (MLT) IN PLACE OF CONV LNCHR*
ORGANIZATION - 6 BN, 3 BTRY/BN, 3 IAFU/BTRY = 36 IAFU'S**
MLT CREW 1 LESS THAN CONV LNCHR. **FORCE STRUCTURE SAME AS RUN 1

TOTAL PERSONNEL	OFFICER	WARRANT	ENLISTED	TOTAL
ASSAULT FIRE UNIT	2	1	34	37
BATTERY	6	2	100	108
BATTALION	38	13	570	621
FORCE STRUCTURE	228	78	3420	3726
OUTBNSP (FRM BASELINE)				105
TOTAL NUMBER OF IAFU'S	36			

DIFFERENCE FROM BASELINE CASE (+ = ADDITION IN FORCE, - = REDUCTION IN FORCE)
-529

RUN 9
IAFU - USE MLT (SAME AS RUN 8)
ORGANIZATION - CHANGE TO 4 BN, 4 BTRY/BN, 3 IAFU/BTRY = 48 IAFU'S

TOTAL PERSONNEL	OFFICER	WARRANT	ENLISTED	TOTAL
ASSAULT FIRE UNIT	2	1	34	37
BATTERY	8	3	138	149
BATTALION	52	19	838	909
FORCE STRUCTURE	208	76	3352	3636
OUTBNSP (FRM BASELINE)				130
TOTAL NUMBER OF IAFU'S	48			

DIFFERENCE FROM BASELINE CASE (+ = ADDITION IN FORCE, - = REDUCTION IN FORCE)
-594

TABLE 5. Continued.

RUN 10
IAFU - SAME AS PREVIOUS RUN
ORGANIZATION - CHANGE TO 4 BN, 4 BTRY/BN AND 4 IAFU/BTRY = 64 IAFU'S

TOTAL PERSONNEL	OFFICER	WARRANT	ENLISTED	TOTAL
ASSAULT FIRE UNIT	2	1	34	37
BATTERY	10	4	176	190
BATTALION	60	23	1000	1083
FORCE STRUCTURE	240	92	4000	4332
OUTBNSP (FRM BASELINE)				167
TOTAL NUMBER OF IAFU'S	64			

DIFFERENCE FROM BASELINE CASE (+ = ADDITION IN FORCE, - = REDUCTION IN FORCE)
+139

RUN 11
IAFU - SAME AS PREVIOUS RUN
ORGANIZATION - SAME AS PREVIOUS RUN
ADD 1 TSQ 73 PER BATTALION TO HANDLE THE EXTRA IAFU'S

TOTAL PERSONNEL	OFFICER	WARRANT	ENLISTED	TOTAL
ASSAULT FIRE UNIT	2	1	34	37
BATTERY	10	4	176	190
BATTALION	62	23	1016	1101
FORCE STRUCTURE	248	92	4064	4404
OUTBNSP (FRM BASELINE)				167
TOTAL NUMBER OF IAFU'S	64			

DIFFERENCE FROM BASELINE CASE (+ = ADDITION IN FORCE, - = REDUCTION IN FORCE)
+211

RUN 12
IAFU REDUCES AFU MAINTENANCE SUPERVISION, NO DEDICATED STINGER TEAM
ORGANIZATION - SAME AS PREVIOUS RUN (ALSO HAS 2 TSQ 73'S)
ALSO REDUCE PLL CLERKS 1/IAFU PLUS THE MOTOR POOL PLL CLERK

TOTAL PERSONNEL	OFFICER	WARRANT	ENLISTED	TOTAL
ASSAULT FIRE UNIT	2	1	29	32
BATTERY	10	4	156	170
BATTALION	62	23	936	1021
FORCE STRUCTURE	248	92	3744	4084
OUTBNSP (FRM BASELINE)				167
TOTAL NUMBER OF IAFU'S	64			

DIFFERENCE FROM BASELINE CASE (+ = ADDITION IN FORCE, - = REDUCTION IN FORCE)
-109

TABLE 5. Concluded

RUN 13
IAFU - MOVE MAINTENANCE PERSONNEL TO BATTERY
ORGANIZATION - SAME AS PREVIOUS RUN (ALSO HAS 2 TSQ 73'S)
REDUCE PLL CLERKS TO 3 PER BATTERY

TOTAL PERSONNEL	OFFICER	WARRANT	ENLISTED	TOTAL
ASSAULT FIRE UNIT	2	0	24	26
BATTERY	10	2	150	162
BATTALION	62	15	912	989
FORCE STRUCTURE	248	60	3648	3956
OUTBNSP (FRM BASELINE)				167
TOTAL NUMBER OF IAFU'S	64			

DIFFERENCE FROM BASELINE CASE (+ = ADDITION IN FORCE, - = REDUCTION IN FORCE)
-237

RUN 14
IAFU - SAME AS 13 BUT TAKE OUT MLT
ORGANIZATION - SAME AS PREVIOUS RUN (ALSO HAS 2 TSQ 73'S)

TOTAL PERSONNEL	OFFICER	WARRANT	ENLISTED	TOTAL
ASSAULT FIRE UNIT	2	0	27	29
BATTERY	10	2	163	175
BATTALION	62	15	964	1941
FORCE STRUCTURE	248	60	3856	4164
OUTBNSP (FRM BASELINE)				167
TOTAL NUMBER OF IAFU'S	64			

DIFFERENCE FROM BASELINE CASE (+ = ADDITION IN FORCE, - = REDUCTION IN FORCE)
-47

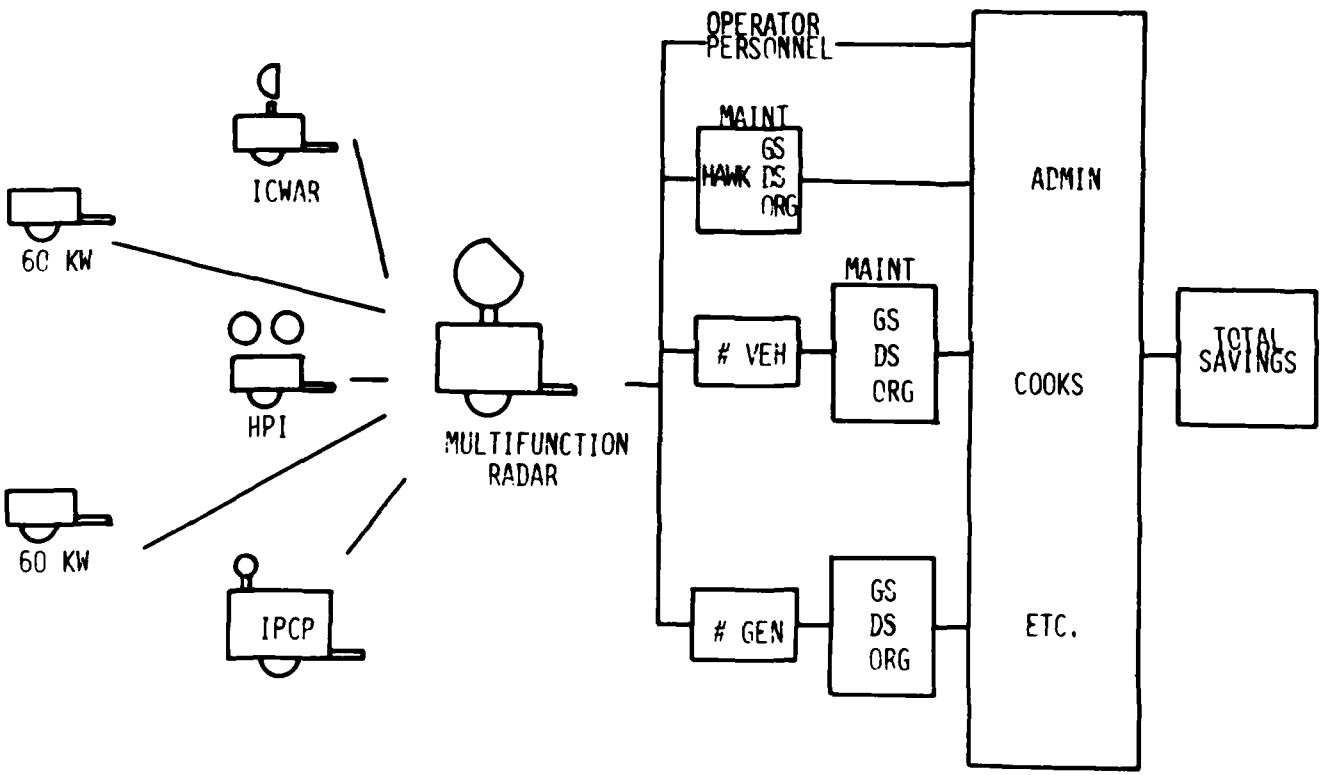


Figure 1. Perturbation example multifunction radar.

APPENDIX

EXECUPLANtm SOFTWARE PROGRAM

```
5,AMMR(M)]          = [128,.]
7,AMMR(M)]          = [131,.]
,BAT:TTL]           = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
,SYS:PROD]          = [.,AMMR(S)]*[.,NO/IAFU]
,M:PROD]            = [.,AMMR(M)]*[.,BAT:TTL]
,24L:PRO]           = [47,AMMR(M)]*[.,AMM(24L)]*[.,BAT:TTL]
,PROD]              = [131,AMMR(M)]*[132,AMMR(M)]*[.,BAT:TTL]*[.,OUT:BNSP]
,BAT:TTL]           = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
,M:PROD]            = [.,AMMR(M)]*[.,BAT:TTL]
,PROD]              = [131,AMMR(M)]*[132,AMMR(M)]*[.,BAT:TTL]*[.,OUT:BNSP]
,BAT:TTL]           = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
,M:PROD]            = [.,AMMR(M)]*[.,BAT:TTL]
,PROD]              = [131,AMMR(M)]*[132,AMMR(M)]*[.,BAT:TTL]*[.,OUT:BNSP]
,BAT:TTL]           = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
,M:PROD]            = [.,AMMR(M)]*[.,BAT:TTL]
,PROD]              = [131,AMMR(M)]*[132,AMMR(M)]*[.,BAT:TTL]*[.,OUT:BNSP]
,BAT:TTL]           = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
,M:PROD]            = [.,AMMR(M)]*[.,BAT:TTL]
,PROD]              = [131,AMMR(M)]*[132,AMMR(M)]*[.,BAT:TTL]*[.,OUT:BNSP]
,BAT:TTL]           = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
,M:PROD]            = [.,AMMR(M)]*[.,BAT:TTL]
,PROD]              = [131,AMMR(M)]*[132,AMMR(M)]*[.,BAT:TTL]*[.,OUT:BNSP]
,BAT:TTL]           = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
,M:PROD]            = [.,AMMR(M)]*[.,BAT:TTL]
.PROD]              = [131,AMMR(M)]*[132,AMMR(M)]*[.,BAT:TTL]*[.,OUT:BNSP]
.BAT:TTL]           = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
.M:PROD]            = [.,AMMR(M)]*[.,BAT:TTL]
PROD]               = [131,AMMR(M)]*[132,AMMR(M)]*[.,BAT:TTL]*[.,OUT:BNSP]
.BAT:TTL]           = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
.SYS:PROD]          = [.,AMMR(S)]*[.,NO/IAFU]
),BAT:TTL]          = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
),SYS:PROD]         = [.,AMMR(S)]*[.,NO/IAFU]
,BAT:TTL]           = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
,M:PROD]            = [.,AMMR(M)]*[.,BAT:TTL]
,PROD]              = [131,AMMR(M)]*[132,AMMR(M)]*[.,BAT:TTL]*[.,OUT:BNSP]
,BAT:TTL]           = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
,BAT:TTL]           = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
,SYS:PROD]          = [.,AMMR(S)]*[.,NO/IAFU]
,M:PROD]            = [.,AMMR(M)]*[.,BAT:TTL]
,24L:PRO]           = [47,AMMR(M)]*[.,AMM(24L)]*[.,BAT:TTL]
,PROD]              = [131,AMMR(M)]*[132,AMMR(M)]*[.,BAT:TTL]*[.,OUT:BNSP]
,BAT:TTL]           = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
,M:PROD]            = [.,AMMR(M)]*[.,BAT:TTL]
,PROD]              = [131,AMMR(M)]*[132,AMMR(M)]*[.,BAT:TTL]*[.,OUT:BNSP]
,NO/IAFU]           = INT([13,.]*.5)
,BAT:TTL]           = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
,SYS:PROD]          = [.,AMMR(S)]*[.,NO/IAFU]
,24L:PRO]           = [47,AMMR(M)]*[.,AMM(24L)]*[.,BAT:TTL]
,NO/IAFU]           = [13,.]*2
,BAT:TTL]           = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
,24L:PRO]           = [47,AMMR(M)]*[.,AMM(24L)]*[.,BAT:TTL]
,BAT:TTL]           = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
,SYS:PROD]          = [.,AMMR(S)]*[.,NO/IAFU]
,M:PROD]            = [.,AMMR(M)]*[.,BAT:TTL]
,24H:PRO]           = [47,AMMR(M)]*[.,AMM(24H)]*[.,BAT:TTL]
,PROD]              = [131,AMMR(M)]*[132,AMMR(M)]*[.,BAT:TTL]*[.,OUT:BNSP]
```

```
,BAT:TTL]         = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
,SYS:PROD]        = [.,AMMR(S)]*[.,NO/IAFU]
,M:PROD]          = [.,AMMR(M)]*[.,BAT:TTL]
,24K:PRO]         = [47,AMMR(M)]*[.,AMM(24K)]*[.,BAT:TTL]
,24L:PRO]         = [47,AMMR(M)]*[.,AMM(24L)]*[.,BAT:TTL]
,PROD]            = [131,AMMR(M)]*[132,AMMR(M)]*[.,BAT:TTL]*[.,OUT:BNSP]
,BAT:TTL]         = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
,SYS:PROD]        = [.,AMMR(S)]*[.,NO/IAFU]
,M:PROD]          = [.,AMMR(M)]*[.,BAT:TTL]
,24K:PRO]         = [47,AMMR(M)]*[.,AMM(24K)]*[.,BAT:TTL]
,24L:PRO]         = [47,AMMR(M)]*[.,AMM(24L)]*[.,BAT:TTL]
,PROD]            = [131,AMMR(M)]*[132,AMMR(M)]*[.,BAT:TTL]*[.,OUT:BNSP]
,BAT:TTL]         = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
,SYS:PROD]        = [.,AMMR(S)]*[.,NO/IAFU]
,24K:PRO]         = [47,AMMR(M)]*[.,AMM(24K)]*[.,BAT:TTL]
,PROD]            = [131,AMMR(M)]*[132,AMMR(M)]*[.,BAT:TTL]*[.,OUT:BNSP]
,MTR:PL]          = [45,AMMR(M)]
,BAT:TTL]         = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
,M:PROD]          = [.,AMMR(M)]*[.,BAT:TTL]
,PROD]            = [131,AMMR(M)]*[132,AMMR(M)]*[.,BAT:TTL]*[.,OUT:BNSP]
,BAT:TTL]         = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
,M:PROD]          = [.,AMMR(M)]*[.,BAT:TTL]
,PROD]            = [131,AMMR(M)]*[132,AMMR(M)]*[.,BAT:TTL]*[.,OUT:BNSP]
,BAT:TTL]         = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
,M:PROD]          = [.,AMMR(M)]*[.,BAT:TTL]
,PROD]            = [131,AMMR(M)]*[132,AMMR(M)]*[.,BAT:TTL]*[.,OUT:BNSP]
,BAT:TTL]         = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
,M:PROD]          = [.,AMMR(M)]*[.,BAT:TTL]
,PROD]            = [131,AMMR(M)]*[132,AMMR(M)]*[.,BAT:TTL]*[.,OUT:BNSP]
,BAT:TTL]         = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
,M:PROD]          = [.,AMMR(M)]*[.,BAT:TTL]
,PROD]            = [131,AMMR(M)]*[132,AMMR(M)]*[.,BAT:TTL]*[.,OUT:BNSP]
,MTR:PL]          = [45,AMMR(M)]
,NO/IAFU]         = [18,.]+[17,.]+[19,.]+[2,.]-[15,.]+[13,.]+[46,AMMR(M)]
,BAT:TTL]         = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
,M:PROD]          = [.,AMMR(M)]*[.,BAT:TTL]
,PROD]            = [131,AMMR(M)]*[132,AMMR(M)]*[.,BAT:TTL]*[.,OUT:BNSP]
,NO/IAFU]         = [15,.]
,BAT:TTL]         = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
,M:PROD]          = [.,AMMR(M)]*[.,BAT:TTL]
,PROD]            = [131,AMMR(M)]*[132,AMMR(M)]*[.,BAT:TTL]*[.,OUT:BNSP]
,BAT:TTL]         = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
,M:PROD]          = [.,AMMR(M)]*[.,BAT:TTL]
,PROD]            = [131,AMMR(M)]*[132,AMMR(M)]*[.,BAT:TTL]*[.,OUT:BNSP]
,BAT:TTL]         = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
,M:PROD]          = [.,AMMR(M)]*[.,BAT:TTL]
,PROD]            = [131,AMMR(M)]*[132,AMMR(M)]*[.,BAT:TTL]*[.,OUT:BNSP]
,BAT:TTL]         = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
,M:PROD]          = [.,AMMR(M)]*[.,BAT:TTL]
,PROD]            = [131,AMMR(M)]*[132,AMMR(M)]*[.,BAT:TTL]*[.,OUT:BNSP]
,BAT:TTL]         = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
,M:PROD]          = [.,AMMR(M)]*[.,BAT:TTL]
,PROD]            = [131,AMMR(M)]*[132,AMMR(M)]*[.,BAT:TTL]*[.,OUT:BNSP]
,BAT:TTL]         = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
,M:PROD]          = [.,AMMR(M)]*[.,BAT:TTL]
,PROD]            = [131,AMMR(M)]*[132,AMMR(M)]*[.,BAT:TTL]*[.,OUT:BNSP]
,BAT:TTL]         = [45,AMMR(M)]*[.,NO/IAFU]
,SYS:PROD]        = [.,AMMR(S)]*[.,NO/IAFU]
,BAT:TTL]         = [45,AMMR(M)]*[.,NO/IAFU]
,SYS:PROD]        = [.,AMMR(S)]*[.,NO/IAFU]
```

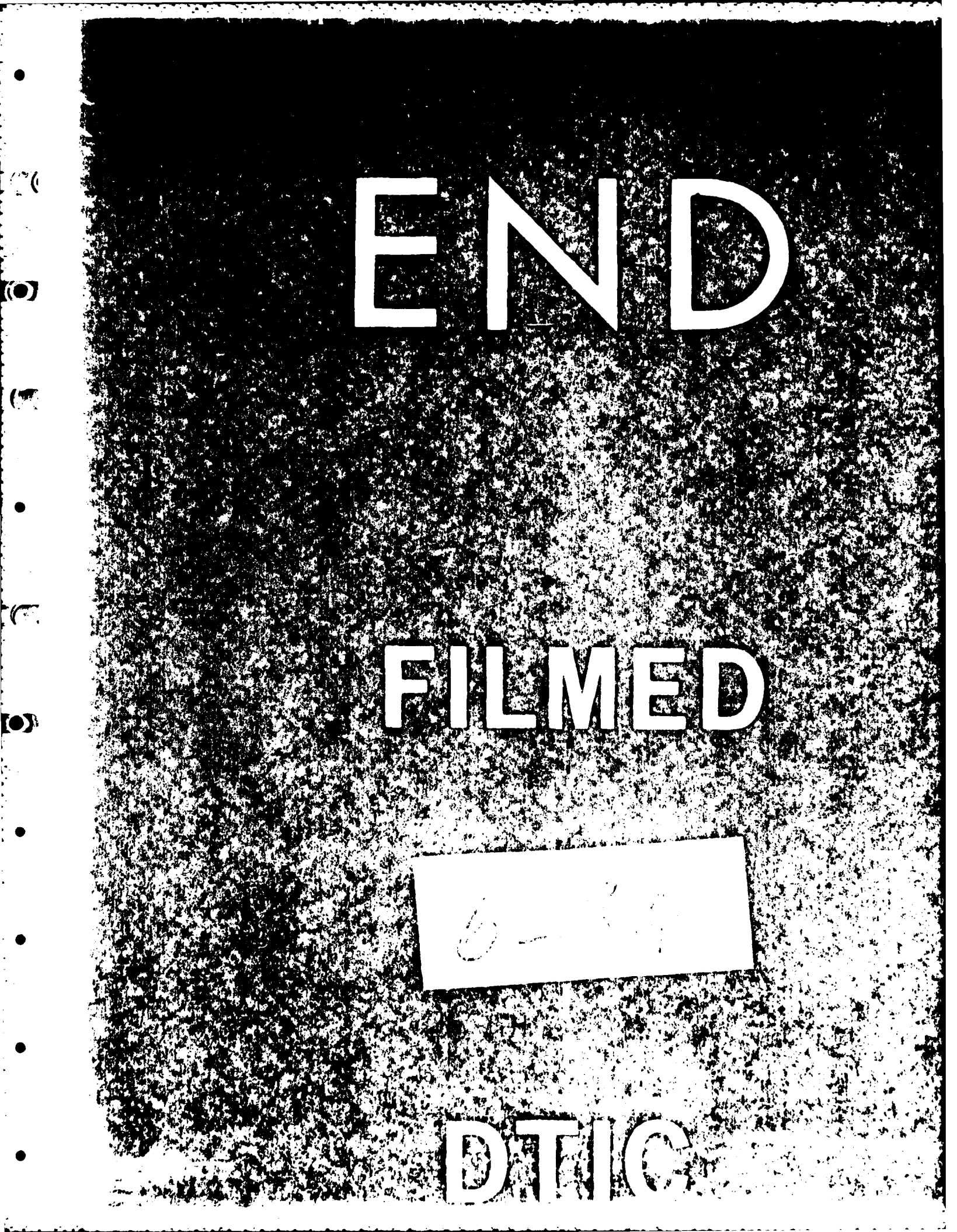
```
5,24H:PRO]      = [47,AMMR(M)]*[.,AMM(24H)]
5,DSBAT]        = [47,AMMR(M)]
5,PROD]         = [.,DSBAT]*[.,OUT:BNSP]*[132,AMMR(M)]
5,24H:PRO]      = INT([47,AMMR(M)]*2/3)*[.,AMM(24H)]
5,DSBAT]        = INT([47,AMMR(M)]*2/3)
5,PROD]         = [.,DSBAT]*[.,OUT:BNSP]*[132,AMMR(M)]
7,24K:PRO]      = [.,AMM(24K)]
7,PROD]         = [.,DSBAT]*[.,OUT:BNSP]*[132,AMMR(M)]
3,24L:PRO]      = [.,AMM(24L)]
3,PROD]         = [.,DSBAT]*[.,OUT:BNSP]*[132,AMMR(M)]
3,AMMR(M)]      = 16+2*[39,###]
3,HQ'S]         = SUM([.,AMMR(M)],[.,AMMR(S)])
1,HQ'S]         = SUM([.,AMMR(M)],[.,AMMR(S)])
5,AMMR(M)]      = 143+16*[39,###]
3,AMMR(S)]      = 7+INT((SUM([1,24H:PRO],[39,24H:PRO]))/2500)
),AMMR(S)]      = 5+INT((SUM([1,24K:PRO],[39,24K:PRO]))/2500)
),AMMR(S)]      = 4+INT((SUM([1,24L:PRO],[39,24L:PRO]))/2500)
5,AMMR(M)]      = [85,AMMR(M)]
5,AMMR(S)]      = SUM([85,.],[80,.])
5,HQ'S]         = SUM([.,AMMR(M)],[.,AMMR(S)])
),BAT:TTL]      = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
.,BAT:TTL]      = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
:,BAT:TTL]      = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
1,BAT:TTL]      = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
1,BAT:TTL]      = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
5,BAT:TTL]      = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
:,NO/IAFU]      = [13,.]
:,BAT:TTL]      = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
',NO/IAFU]      = 1+2*[13,.]+[15,.]
',BAT:TTL]      = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
1,BAT:TTL]      = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
',BAT:TTL]      = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
)0,NO/IAFU]     = 2*([18,.]+[19,.])+[17,.]
)0,BAT:TTL]     = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
)1,BAT:TTL]     = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
'2,BAT:TTL]     = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
3,BAT:TTL]      = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
4,BAT:TTL]      = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
5,NO/IAFU]      = INT((SUM([1,SYS:PROD],[34,SYS:PROD]))/2500)
5,BAT:TTL]      = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
7,BAT:TTL]      = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
8,BAT:TTL]      = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
9,BAT:TTL]      = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
0,BAT:TTL]      = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
1,BAT:TTL]      = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
2,COMMO]        = 1+[45,AMMR(M)]
2,BAT:TTL]      = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
3,BAT:TTL]      = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
4,BAT:TTL]      = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
5,BAT:TTL]      = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
6,BAT:TTL]      = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
7,MTR:PL]       = INT((SUM([1,M:PROD],[34,M:PROD]))/2500)+1-2*[45,AMMR(M)]
7,BAT:TTL]      = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
9,BAT:TTL]      = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
0,BAT:TTL]      = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
1,BAT:TTL]      = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
2,MTR:PL]       = [45,AMMR(M)]
2,BAT:TTL]      = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
3,BAT:TTL]      = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
4,BAT:TTL]      = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
```

```
4,SYS:PROD]        = SUM([90,BAT:TTL],[124,BAT:TTL])+6-62
4,M:PROD]          = SQR([.,SYS:PROD])
4,AMM(24H)]        = [.,SYS:PROD]*[.,M:PROD]
5,HQ'S]            = INT(.1248603133*[124,M:PROD]+.0007010247*[124,AMM(24H)])+5
5,BAT:TTL]         = [45,AMMR(M)]*[.,NO/IAFU]+[.,HQ'S]+[.,COMMO]+[.,MTR:PL]
7,AMMR(M)]         = [128,AMMR(M)]
3,AMMR(M)]         = [131,AMMR(M)]
9,AMMR(M)]         = [132,AMMR(M)]
5,AMMR(M)]         = [91,NO/IAFU]
5,AMMR(S)]         = [92,NO/IAFU]
5,HQ'S]            = SUM([93,NO/IAFU],[125,NO/IAFU])
5,COMMO]           = SUM([.,AMMR(M)],[.,HQ'S])
6,AMMR(M)]         = SUM([90,BAT:TTL],[91,BAT:TTL])
6,AMMR(S)]         = [92,BAT:TTL]
6,HQ'S]            = SUM([93,BAT:TTL],[125,BAT:TTL]
6,COMMO]           = SUM([.,AMMR(M)],[.,HQ'S])
7,AMMR(M)]         = [136,.]*[131,AMMR(M)]+[83,HQ'S]
7,AMMR(S)]         = [136,.]*[131,AMMR(M)]+[84,HQ'S]
7,HQ'S]            = [136,.]*[131,AMMR(M)]+[86,HQ'S]
7,COMMO]           = SUM([.,AMMR(M)],[.,HQ'S])
8,AMMR(M)]         = [137,.]*[132,AMMR(M)]
8,AMMR(S)]         = [137,.]*[132,AMMR(M)]
8,HQ'S]            = [137,.]*[132,AMMR(M)]
8,COMMO]           = [137,.]*[132,AMMR(M)]
0,COMMO]           = INT((SUM([1,PROD],[39,PROD])/2500))
9,AMMR(M)]         = [128,.]*[131,.]*[132,.]
3,DESCRIPT]        = -([142,SYS:PROD]-[138,COMMO]-[140,COMMO])
```

DISTRIBUTION

	No. of Copies
Commander US Army Material Development and Readiness Command ATTN: Dr. James Bender Dr. Gordan Bushey 5001 Eisenhower Avenue Alexandria, VA 22333	 1 1
Headquarters, Department of the Army Office of the DCS for Research, Development & Acquisition ATTN: DAMA-ARZ Room 3A474, The Pentagon Washington, DC 20301	1
OUSDR&E Room 3D1079, The Pentagon Washington, DC 20301	1
Director US Army Night Vision Laboratory Fort Belvoir, VA 22060	1
Commander US Army Picatinny Arsenal Dover, NJ 07801	1
Commander US Army Harry Diamond Laboratories 2800 Powder Mill Road Adelphi, MD 20783	1
Commander US Army Training and Doctrine Command Fort Monroe, VA 22351	1
US Army Materiel Systems Analysis Activity ATTN: DRXSY-MP Aberdeen Proving Ground, MD 21005	1

DRCPM-HA	10
DRSMI-LP, Mr. Voigt	1
RN, Jerry Hagood	1
RE, W. Pittman	1
L, Minor	1
RD	3
RG	1
RG, J. A. McLean	1
O	1
Y	1
RR, Dr. R. L. Hartman	1
Dr. J. S. Bennett	1
Dr. R. L. Morgan	100
Dr. J. G. Duthie	1
DRSMI-RPT (Record Copy)	1
(Reference Copy)	1
RPR	15


END
FILMED
DTIC