1.0 ∥∥∥ 2.8 2.5

3.2 2.2

3.6

4.0 2.0

1.1

1.8

1.25 1.4 1.6

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963 A

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

FORTRAN	Ammunition	Logistics
SIMSCRIPT II.5	Equivalent Stylized Day	Expenditures
Concepts Evaluation Model	Report Generator	Weapon Type
COSAGE	Ammunition Buffer	Equipment Losses
WARRAMP	Combat Analysis	Tonnage

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

This manual provides information on the use and ___ ation of the three computer programs that comprise the Ammunition Postp____ essor (APP) of the Wartime Requirements for Ammunition, Materiel and Personnel (WARRAMP) Methodology. This manual provides a general overview of the Methodology system followed by a user-level discussion of each program. The discussion includes a general description, data base, input and output file samples and sample program runstreams for the applications on the UNIVAC 1100/82 operating system installed at the US Army Concepts Analysis Agency.

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WARTIME REQUIREMENTS FOR
AMMUNITION, MATERIEL, AND PERSONNEL
(WARRAMP)

VOLUME III

AMMUNITION POST PROCESSOR
USER'S MANUAL

(APP-UM)

December 1981

PREPARED
FOR:

U.S. ARMY CONCEPTS ANALYSIS AGENCY
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AMMUNITION POSTPROCESSOR
USER'S MANUAL

(APP-UM)

CONTENTS

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Table of Contents, Cont'd.

FIGURES

SECTION I

GENERAL

1. **PURPOSE:** The purpose of the Ammunition Post Processor (APP) is to compute ammunition requirements predicated on the results of modeling a theater level conflict. It is further the purpose of this APP User's Manual to provide the combat analyst sufficient information about the background, structure and organization of the APP to effectively run it and incorporate its results into the study reports to support the decision process.

   The APP is one of 3 postprocessors in the Wartime Requirements for Ammunition, Materiel and Personnel (WARRAMP) analytical system (methodology). (Figure I.1.1) The APP uses data produced by the Concepts Evaluation Model (CEM) and the Combat Sample Generator (COSAGE), in addition to data and control information provided by the combat analyst. The APP componets are high lighted in the figure.

   This user documentation includes all component programs of the APP with general descriptions of structure, data base, UNIVAC 1100 runstream, sample input data and output data. Throughout the document specific examples of runstreams and files are used. It should be emphasized that the user has great flexibility in the naming conventions through modification of the runstreams and the file maintenance capabilities of EXEC-8 data files used in the APP. However, it is recommended that the convention established already in the APP be followed. This convention uses the basic name of the file as its core and around it is added additional data which distinquish it from other versions of the file which still may exist (for example, the file **RPERCK used in the ESD program). The core of the name is "RPERCK"; the preceeding asterisks are to be replaced by the user's computer identification number. Further, if the user has more than one version of the **RPERCK file he can distinquish the version by appending the date of creation to each element; for example, **PRERCK/18Jul80. These procedures assist the user in maintaining a data audit trail for verification and study reports.

   This document has been prepared under the assumption that users of the APP have a working understanding of the UNIVAC EXEC 8 operating system, it's functions, and the system Editor capabilities.

2. **APPLICATION:** The Ammunition Post Processor is designed to support the analysis of ammunition requirements as a part of WARRAMP methodology. Other applications may be developed based upon a user's study of the component programs and determining applicability.

3. **SECURITY** and **PRIVACY:** The individual software components (programs) are cataloged as indicated under the detailed descriptions for each program. In each case, they are cataloged in the public mode for user access. User's are asked not to modify or edit (write) in the program files. In the event alteration is required for a specific purpose, a potential user

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should copy the program to a file under his/her user identification, and then edit the file as desired. In event of error detection during use, the user is requested to note the error by program line and forward the proposed correction to the program custodian, so that the record program may be updated. Test (sample) data, either input or output, and the programs contained herein are unclassified. User's must apply the appropriate security classifications to their data files and are responsible for the safeguard of printed matter accordingly in accordance with USACAA policy.

4. CONFIGURATION: Figure I.1.1 depicts the overall WARRAMP system and methodology. The portion of the system which this document covers is contained in the heavy lined boxes. The details of the APP configuration is discussed in the following section.

5. REFERENCES: Project references can be found in Appendix A. This documentation effort was achieved through contractor support to USACAA, by CACI, Inc., under contract MDA903-80-D-0668. The Contracting Officers Technical Representative (COTR) was Mr. Hugh Jones, Models Group, Methodology and computer Support Directorate, USACAA. This manual is one of a series to document the WARRAMP Methodology's computer software. Volume IV of the series contains the Program Maintenance portion of the instructions on this software.

6. TERMS and ABBREVIATIONS: Terms and abbreviations are used throughout to facilitate communications of sets of words (acronyms) and analytical expressions common to the methodology and military operations research. A complete listing may be found in Appendix B of this manual. In addition, to the full statement of the expression followed by the acronym or term in closed parenthesis is used throughout the manual on the first occurence of its use.

WARRAMP OVERVIEW

Figure I.4.1

3
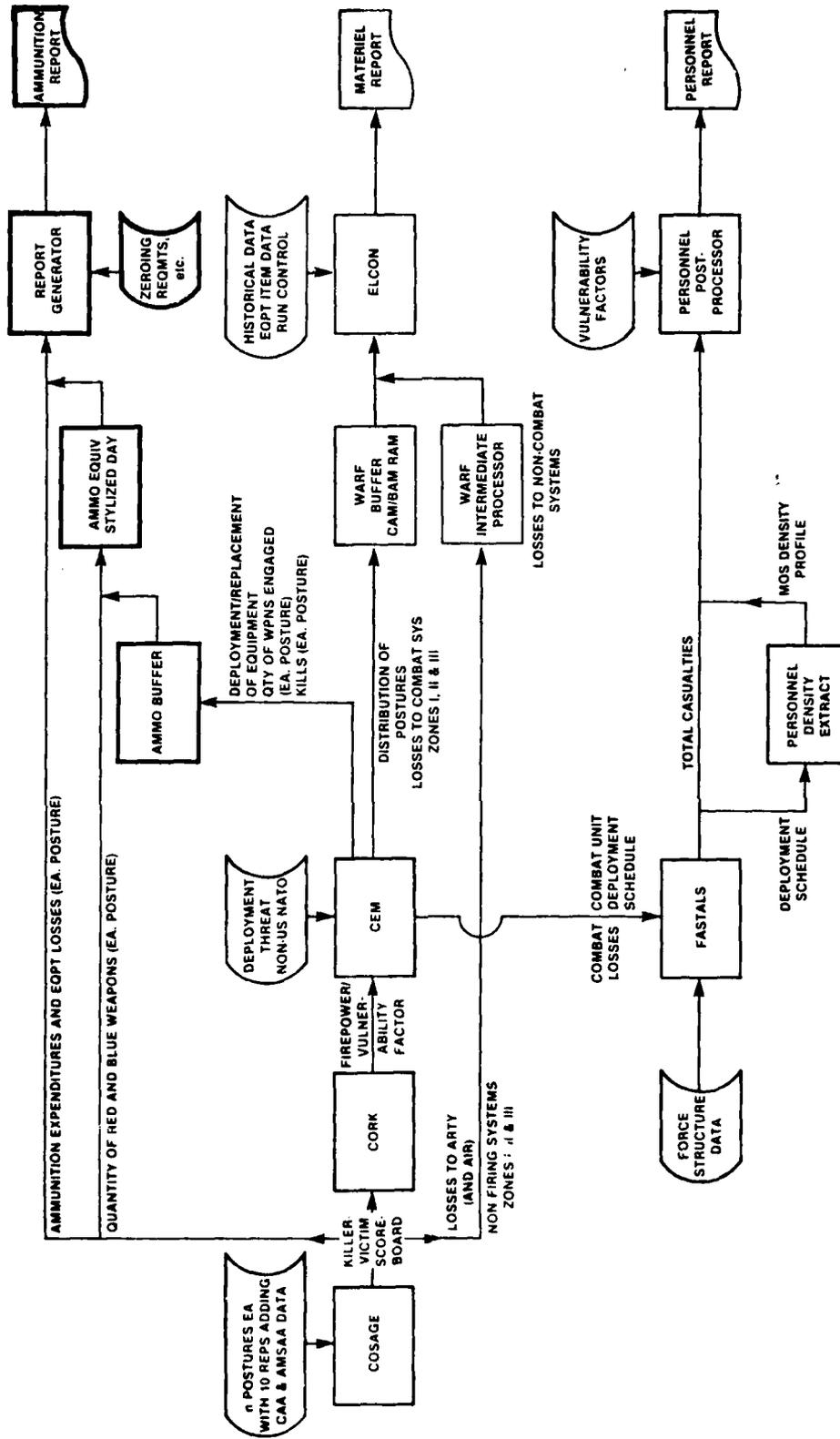
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SECTION II

SYSTEM SUMMARY

1. **GENERAL DESCRIPTION:** Figure II.1.1 depicts the overall structure and flow of the normal execution of the Ammunition Postprocessor and the order in which the individual routines are executed. As can be seen from the flow, the major source of the data used by the APP is supplied by the CEM and COSAGE Models. The major purpose of the APP is to continue the processing and reformatting of data produced by these systems into the final reports which detail for combat analysts and decision makers the ammunition requirements that are expected to be generated by a theater level conflict of campaign (180 days) duration.

Another aspect of the APP structure is presented in Figure II.1.2, the APP Input/Output Summary. This chart organizes files and programs used in the APP in an effort to identify all programs and files which make up the APP. In addition it denotes the files as required as input by specific programs and which files are produced as output by each program.

The output from the Concepts Evaluation Model defines weapon system activity level and attrition for a theater level, campaign long, period of combat; the Combat Sample Generator provides the high resolution combat (24 hours) results.

1.1 **DATA REQUIREMENTS:** The overview of the data, by functional description is as follows:

o Combat Sample Generator provides to the Ammunition Buffer program:
  --blue weapon system data:
  oo   munition characteristics.
  oo   stylized quantities of engaged blue equipment by type for 24-hour combat by posture.
  oo   stylized ammunition expenditures for 24-hour combat by posture.
  --   red weapon system data:
  oo   stylized loss of red equipment by type to blue equipment by type for 24-hour combat by posture

o Combat Sample Generator Provides to CEM:
  -- Killer-Victim scoreboards by posture.
  -- ammunition expenditures (rounds, tonnage) by posture.

o CEM provides to the Ammunition Buffer program:
  -- blue weapon data, daily:
  oo   deployment data.
  oo   in - theater replacements.
  oo   repair/returned to duty.
  oo   replacements from pool.
  oo   replacements to pool from higher level.
  oo   surviving assets.

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-- blue weapon data, daily, by combat (engagement type) posture:
oo   quantity engaged by red.
oo   "K" or catastrophic kills.
oo   "M" or mobility only kills.

-- red Weapon data, daily, by type of equipment and combat (engagement type) posture:
oo   quantity engaged by blue.
oo   quantity hit by blue.

The weapon systems analyzed in the APP is driven by those simulated and modeled in the high resolution model and the theater model; those in turn, are driven by the force being analyzed within a specified out year, i.e., fiscal year 1987, 1988, etc.

2.   POSTPROCESSOR ORGANIZATION: The study flow is initiated by the preparation and application of two primary simulations: CEM and COSAGE.   The CORK program in utilized to prepare COSAGE output for input to CEM.   When the COSAGE output is completed, the analyst may begin preparing the selected COSAGE output data for subsequent use by the APP; once the CEM output is available to the analyst, he can begin to sequentially execute the Ammunition Buffer Program, the Equivalent Stylized Day program, and finally, the Report Generator Program.

2.1   SYSTEM FLOW: The system flow is a depicted in the graphics that follow (Figure II.1.1).   The Ammunition Buffer program establishes the dataset for expenditures equivalencing and mapping equipment types, and sample data from the CEM.   The Equivalent Stylized Day program computes the ESD values given the buffered expenditures from CEM and the stylized loss data from COSAGE.   The Report Generator completes the rates computations and writes out the computed values.

2.2   SYSTEM PARAMETERS: The methodology follows several military analytical concepts that are best expressed as parameters to the modeling effort, and subsequently flow into the ammunition post processor application. These are summarized below:

Military Equipment Categories: Equipments are grouped into categories based upon such military characteristics as vulnerability, mobility, armor, armament and mission. By grouping equipment types into such categories, aggregation of data occurs which is beneficial in analysis, when there is no significant difference in system behaviour on a hypothetical battlefield. Categories employed in this software are:

1   =   personnel
2   =   tanks
3   =   light armored vehicles (APC's)
4   =   helicopters
5   =   anti-tank and mortor weapons
6   =   artillery weapons systems

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Equipment types: Military equipment types are associated with specific combat weapon systems. The quantities of equipment types represented are limited generally by the modeling (software) effort and their relative significance (analytically) on the hypothetical battlefield. Each equipment type belongs to a common set or category as discussed above. The upper limits on the number of equipment types per category, and examples are as follows (each force has the same quantity of equipment types):

Personnel	--	1 type
Tanks	--	12 types
		M - 48
		M - 60
		M - 1
APC's	--	12 types
		M - 113
		M - 114
Helicopters	--	5 types
		AH - 1G
		AH - 1S
		AH - 64
A/T - Mortors	--	8 types
		4.2 inch mortor
		81 mm mortor
		DRAGON
		TOW
Artillery	--	12 types
		105 Howitzer
		155 SP howitzer
		8 inch howitzer

The user should be aware that "equipment types" is occasionally used as a synonym to "weapon system" or "weapon" in the methodology.

Combat Engagement Types: Military analysis has developed methods of expressing the traditional force to force activity on the battlefield based upon one force's mission. For analysis, in this methodology, there are 8 significant types of engagements.

1 = blue attacking a red delaying force.
2 = blue attacking a red force in prepared defenses.
3 = blue attacking a red force in a hasty defense.
4 = blue - red meeting engagement.
5 = red attacking a blue force in a hasty defense.
6 = red attacking a blue force in a prepared defense.
7 = red attacking a blue delaying force.
8 = red and blue, inactive or static; may be called defense light.

An engagement type is also referred to as a posture which alludes to the

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quantity of each force involved, or force ratio. In the analysis of requirements in the WARRAMP methodology these engagement types are equivalent to CEM sample data.

Theater Cycle: A basic period of theater combat modeled in CEM is four days, hence a theater cycle is of four (modeled) days duration and there are 45 cycles in the campaign (180 - day war). Typically the intensity of combat increases and decreases throughout the war. Initial deployments are attritted, followed by resupply and additional deployments of reserve forces; each theater cycle is unique and provides data representative of the modeled force in combat for the particular period of time.

Stylized Force: A stylized force for analytical purposes under the WARRAMP methodology is a blue and red force portrayed (in a data set) with representative types of equipment, munitions and personnel levels. It may be a composite force or organization that would not exist in reality; the purpose is to model and simulate the battlefield dynamics of these componets to gather results useful in analysis.

Combat Sample: A combat sample is the outcome (output or results) of a blue and red force arrayed on the battlefield, engaged in combat, and is normally produced with a high-resolution model that simulates the aspects of warfare in detail. The forces are so composed (by data input to the model) to portray each type of blue and red equipment and munition of analytical interest. A combat sample is typically results of warfare simulated for one day (24 hours) with a stylized force array.

Combat Sample Set: A combat sample set is typically composed of four combat samples, as described above. Each sample is the results of a simulation run, and a sample type is designated by the combat activity of the blue force. The four types typically used are attack (AT), delay (DE), defense intense (DI) and defense light (DL). The combat sample set has one sample of each type of combat activity. The production of each sample type requires different force compositions and different force arrays, also called postures, because the force is postured (initially in the simulation) to attack, delay, or defend (intense, and light or static.)

Combat Slice: The use of the analytical sector called "combat slice" is drawn from the low - resolution theater level model and typically the red array formed by deployed red unit assets. A combat slice is usually identified by the engagement types and is refered to as a CEM Sample.

Equivalent Stylized Day: The blue force expenditures which occur in each combat or force slice are expressed in equivalent stylized days. A day of combat, within the theater model, with a combat slice is equivalenced to the stylized day (by posture or type) as represented by a combat sample discussed above. The ESD is an analytical method to express the experience (in expenditures or loss) of blue equipment items or munitions overtime, by posture in the theater. Therefore, each blue

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munitions or equipment of analytical interest will have an ESD. In the current methodology up to 40 ESD's are computed. The ESD computations utilize ratios expressed as the "actual"red equipment types lost to blue equipment types over "stylized" red equipment types lost to blue equipment types. The user should refer to a recent study report for a complete discussion of ESD computations methodology, or item Z of Appendix A, references.

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AMMUNITION POSTPROCESSOR SYSTEM
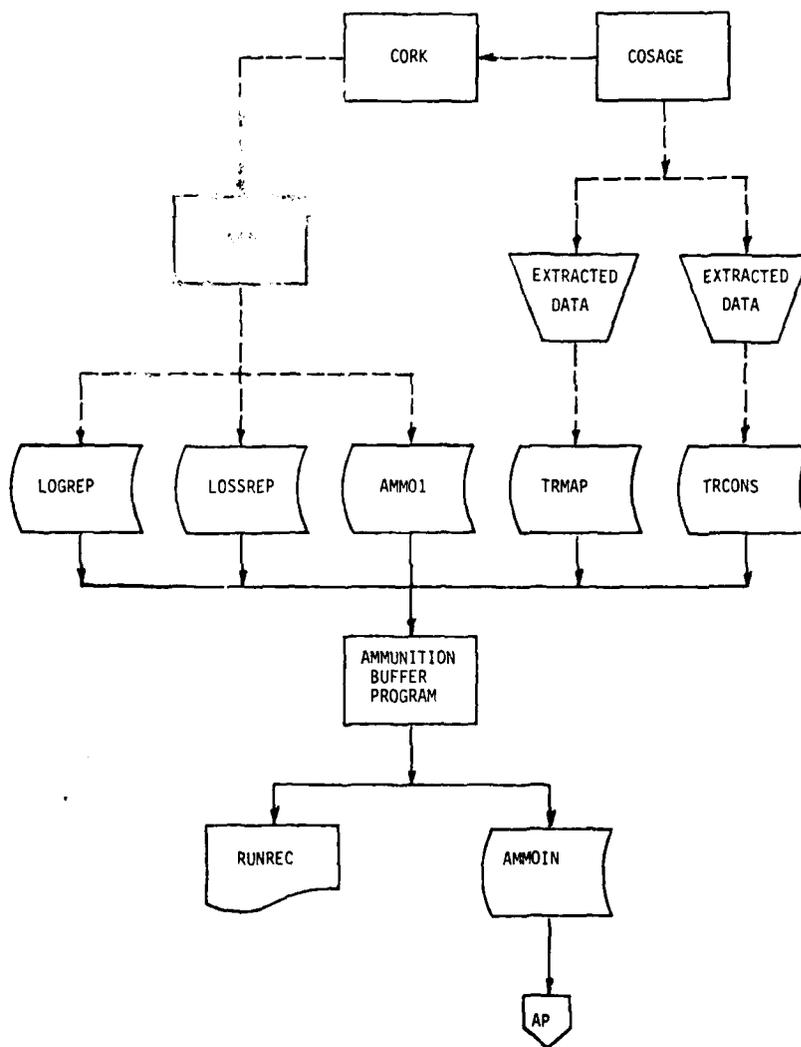
Figure II.1.1

Figure II. 1. 1 (Cont.)

10
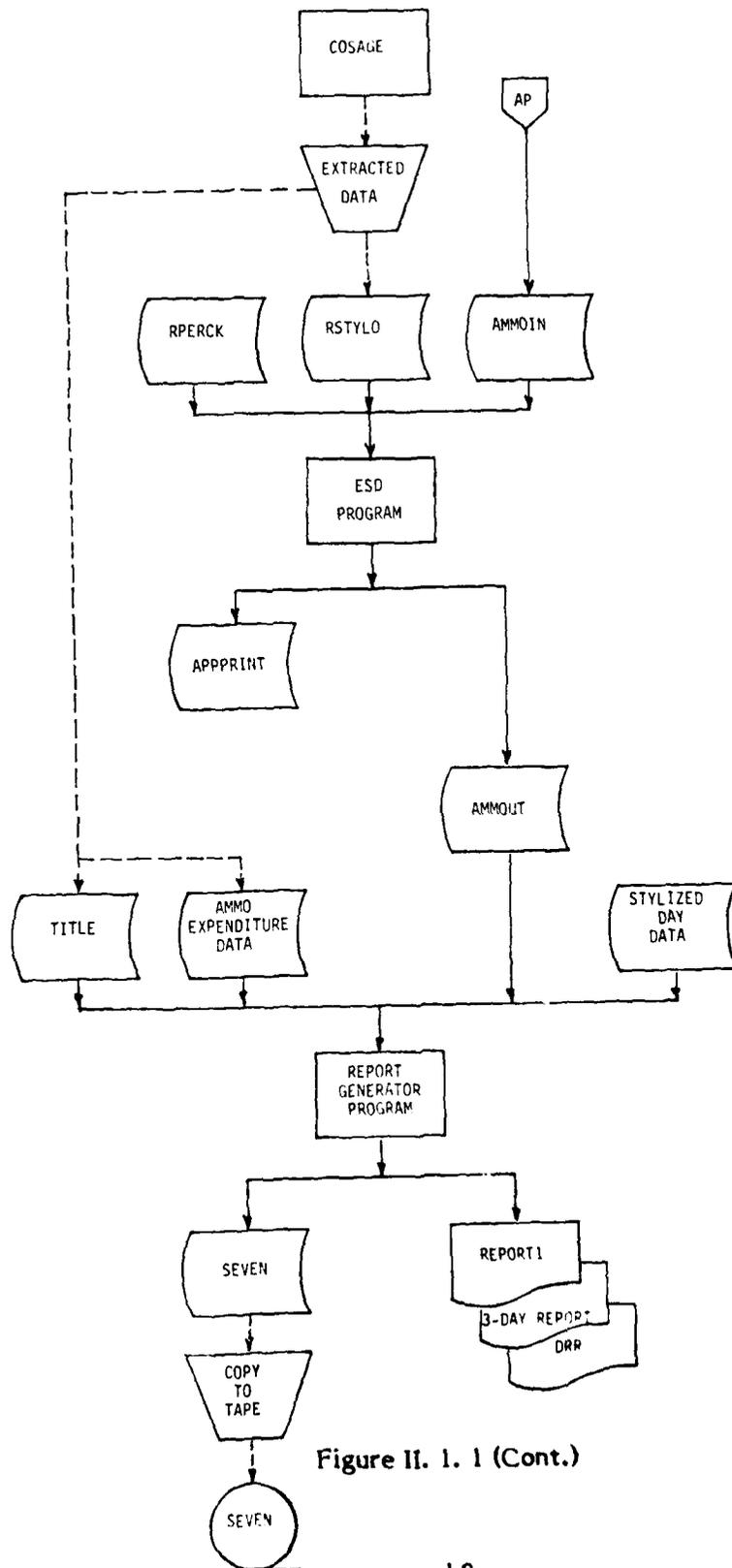
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SECTION III

CHAPTER 1

AMMUNITION BUFFER PROGRAM

1.1 **DESCRIPTION:** The Ammunition Buffer Program of the Ammunition Postprocessor (APP) has three purposes. The first purpose is to allow the combat analyst to enter control and mapping information to the system which describes the environment in which the APP is operating and directs its execution. The second purpose is to identify, select and format, logistics, and combat loss data produced by the Concepts Evaluation Model (CEM). This data will be used as input to the remaining programs of the APP. A key computation is Loss due to Permanent Kill (LOSTPK) ratio. This value is computed from the input LOGREP data and then is employed to factor (partition) the "hit" data into K - kill and M - kill quantities.

LOSTPK (Equipment Type, Category, Side, Theater Cycle) =

$$\frac{\text{Permanent Loss}}{\text{Total Loss} + \text{Permanent Loss}}$$

The LOSTPK value is used to compute losses for direct fire systems only. Artillery, or indirect fire loss quantities are computed as:

Artillery K - kills	=	0.02
	x	Surviving quantity artillery
	x	Ratio personnel engaged

Artillery M - kills are computed by the same formula. The quantity of artillery engaged for each side is computed as:

Artillery Engaged	=	2.0
	x	Surviving quantity artillery
	x	Ratio personnel engaged

The third purpose is to allow the analyst to directly enter equipment and personnel quantity data which is also used as input by the following programs of the APP.

The Ammunition Buffer produces two output files. One is a list of error conditions detected by the buffer, the other is the data file that is used as input by the following programs of the APP.

The program is written in the FORTRAN IV programming language.

1.2 **STRUCTURE:** Figure III.1.1 displays the overall structure of this utility which identifies the input files required and the output files produced. The

number on the upper left of each flow chart symbol denotes the logical unit used in the runstream. The internal number denotes the sequence that input files are called by the program.

1.3 DATA BASE: The data base which is used to support this process consists of five input files and one output file. These files are not part of a formal database or data management system. Three of the input files, the LOGREP, LOSSREP, and AMMOI are produced for the APP by the Concepts Evaluation Model (CEM); the remaining two files, TRMAPS and TRCONS, are maintained by the combat analyst. The files are processed sequentially, and normally reside on mass storage devices, within files permanently cataloged by the current APP combat analyst.

1.4 RUNSTREAM: Figure III.1.2 depicts the runstream which is typically used to control the execution of the APP. The runstream is cataloged on the system as a "START" file (element) and is normally submitted as a batch run to the system from a terminal. The input data files must be prepared in advance of run submission. In accordance with USACAA security policy, these files are classified and access is controlled through read and write keys. The following functions are accomplished:

o   The run is activated and run information supplied to the system.

o   The input files from CEM are identified and assigned to appropriate devices.

o   Through the system editor, via the @ED command, the user-maintained files TRMAPS and TRCONS are assigned to the appropriate logical unit. In the example it can be seen that the user further specified particular versions or elements of these files. For example the V version of the TRCONS file will be used in this example run.

o   Two temporary files are assigned to be used to hold output from the APP.

o   The RUNREC file is assigned, labeled and breakpointed to hold run output.

o   The APP (called CEMTRBUF) object code is executed via the @XQT command.

o   The breakpoint (output file) is closed.

o   Through the system editor, the first 40 and last 20 lines of the 37T output file are printed onto the user's run output (PRINT$) file.

o   Applying the system editor, the output file, **AMMOIN is transformed from temporary storage to permanent storage and the first 25 lines are printed out for verification onto the user's run output (PRINT$) file.

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1.5   INPUT.   The Ammo Buffer requires five input files. As noted earlier, three of these files are produced by CEM and require no further maintenance by the combat analyst. These files are the LOGREP, LOSSREP, and AMMO1. The first two of these are designed and labeled so that if printed out they are self explanatory and readable by analyst. Examples of these reports can be found in Figures III.1.3, III.1.4 and III.1.5, respectively.

o   The CEM logistics report (LOGREP) has several components and not all logistics data is used by this program. The LOGREP components are (1) The Force Theaterwide Logistic Summary, and (2) The Force Logistic Experience by major item type. The CEM logistics report reader portion of this program performs a record by record check of the data file looking for keywords located in specific positions in the logistics report. Once the tests are satisfied, the program extracts the specific data required by the program. Only the force theater wide logistic summary and the force logistic experience by major item type summaries are used. The first two pages of Figure III.1.3 show samples of the theaterwide logistic summary, and the last two pages of Figure III.1.3 shows samples of the logistics experience by major item type.

o   The LOSSREP file is labeled and captioned as the Dailey Combat Damaged (PERM + TEMP) vs Cause Table. The LOSSREP components are : daily reports for each side, with each days loss report being partioned into a TOTAL section, PART 1, PART 2, and PART 3. The LOSSREP reader portion of the program performs a record by record check of the data (LOSSREP) file looking for specific keywords located in specific positions in the report. Once the key word tests are satisfied, the program extracts the specific data required. Figure III.1.4 provides a sample of the data file. The printed labels provide explanations for the report.

o   The AMMO1 input file provides (from CEM) the numbers of equipment engaged and hit for each of the 6 equipment categories, by equipment type. The file is unlabeled, with exception to the first record which provides a title and separates each day's data. Thus there are approximately 193 records of data for each day's activity. This file provides only "hit" data and "engaged" data; the program computes the quantity that is "K - kill" and M - kill" using the LOSTPK value for the equipment type, category, side and theater cycle. Figure III.1.5 presents an example of the input data. .

In the data file a block of six (category) constitutes data for one side, either engaged or hit, for one engagement type. For example, records 2 through 7 are the quantities of engaged equipment for the blue force in engagement type 1 (blue attacking red delaying force). Records 8 through 13 are the quantities of equipment hit for the blue force in engagement type 1.

FILE: AMMO1
STORAGE MEDIUM: Mass Storage
SOURCE: Output from CEM

RECORD LAYOUT:

POSITION	DESCRIPTION	FORMAT

-RECORD 1-

	Header label for day	Alpha

-RECORD 2-

1-9	Personnel Engaged in blue force in engagement type 1.	F9.1

-RECORD 3-

1-108	For each of the twelve blue tanks (category 2), the quantity engaged, sequentially from left to right by equipment type (CEM weapon number), in engagement type 1.	12F9.1

-RECORD 4-

1-108	For each of the twelve blue APC's (category 3), the quantity engaged, sequentially from left to right by equipment type in equipment type 1.	12F9.1

-RECORD 5-

1-45	For each of the five blue helicopters (category 4), the quantity engaged, sequentially from left to right by equipment type in engagement type 1.	5F9.1

-RECORD 6-

1-108	For each of the twelve blue anti-tank or mortors (category 5), the quantity engaged, sequentially from left to right by equipment type in engagement type 1.	12F9.1

-RECORD 7-

1-72	For each of the eight blue artillery (category 6) pieces, the quantity engaged, sequentially from left to right by equipment type in engagement type 1.	8F9.1

-RECORDS 8 - 13-

Data as above, except the values are
the quantity hit.

-RECORDS 14 - 19-

Data as above in records 2 - 7, only for
the red side.

-RECORDS 20 - 25-

Data as above in records 8 - 13, only
for the red side.

-RECORDS 26 - 49-

Data as above in records 2 - 25, only
for engagement type 2 (blue attacking
red prepared defense).

-RECORDS 50 - 73-

Data as above in records 2 - 25, only
for engagement type 3 (blue attacking
red hasty defense).

The remaining two files used by the Ammo Buffer are the TRCONS and
TRMAPS files. Unlike the three files produced by the CEM, these two files
are maintained by and are under the control of the combat analyst. The
files are used by the Ammo Buffer to identify the combatants and the type
and quantity weapons being considered in this particular analysis and to
describe the general environment that the battle is being fought. While any
portion of these files may be modified by the analyst for a particular study,
normally very little change is required from study to study. The analyst
would use the on-line system editor in the demand mode (terminal) to modify
and maintain the files.

o   TRMAPS input data file - The file layout and description of the data
        found in the TRMAPS file is as follows. The sample data is shown in
        Figure III.1.6. The "TRMAPS" label is a carry-over from the
        methodology when the Theater Rates model (hence the "TR") was used;
        the data is "mapping" or equivalencing data for the methodology.

        FILE :**TRMAPS
        STORAGE MEDIUM : MASS STORAGE
        SOURCE : Manually developed and maintained using the system editor.

        RECORD LAYOUT

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POSITION	DESCRIPTION	FIELD FORMAT

-RECORD 1-

| 1-3 | Maximum number of Theater cycles | I 3 |

-RECORD 2-

| 1-24 | 1st Data Array Defining Alpha-numerics. There will be 6 variable labels defining weapon categories. These values must be consistant with the CEM LOGREP labels as they are used in scanning the file. | 6 (A4) |

-RECORD 3-

| 1-36 | 2nd Data Array Defining Alpha-numerics. There will be 6 variable labels defining weapon categories. These values must be consistant with the CEM LOGREP labels as they are used in scanning the file. | 6(A6) |

PERSNL	=	Military personnel
TANK	=	Tank
APC	=	Armored Personnel Carrier
HELO	=	Helicopter, attack
AT/M	=	Anti-tank, mortor weapons
ARTY	=	Indirect Fire (Artillery) System

-RECORD 4, 5, 6, 7-

| 1-66 | 3rd Data Array Defining Alpha-constant numerics. These values, presented as integer, are used in reading the CEM LOGREP and are set to alphanumeric for logic tests in scanning the data (LOGREP) file. They are the theater cycle numbers to be analyzed. | 11(A6) |

-RECORD 8-

| 1-18 | Number (maximum) of possible weapons types in each of the 6 CEMH/L categories for the 1st side of the battle | 6(I3) |

-RECORD 9-

1-18	Number (maximum) of weapon types in each of the 6 CEMH/L categories for the 2nd side of the battle	6(I3)

-RECORD 10-15-

1-60	Playing status of each blue weapon system 1 record for each category:
	  1 = Played or modeled
	  0 = Not Played or modeled
		20(I3)

-RECORD 16-21-

1-60	Playing status of each red weapon system, are record for each category:
	  1 = Modeled
	  0 = Not Modeled
	If the system is of category 3, then,
	  1 = Red APC
	  9 = Red ICV
		I 3

-RECORD 22-

Free Format	Five data values in order: Max number of weapons, (equipment), blue Max number of weapons (equipment), red Number of samples Number of equivalent stylized days Number of Engagement types	I

-RECORD 23-24-

Free Format	Blue CEM mapping numbers, these are positioned by order; the quantity must equal the number input on record 22.	I

-RECORD 25-26-

Free Format	Red CEM mapping numbers; these are positioned by order; the quantity must equal the number input or record 22.	I

-RECORD 27-

Free Format	Red AMMO mapping numbers, these are positional and the quantity must equal the number input on record 22.	I

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o   **TRCONS file denotes the stylized quantity (in the case of personnel, the number of troops) of each item of CEM equipment that will be played in each of the four combat postures of the study (for each of the items that are being played as identified in the TRMAPS file). This file is also a carryover from the period when the Theater Rates model was used, hence the "TR"; the data contained is the controlling data. The program reads this file using the free format option of FORTRAN. Thus there is no rigid formating scheme that must be followed with the exception of separating each entry by a space. However, in the interest of consistency and organization it can be seen from the data example in Figure III.1.7 that the quantity data for each item of equipment and its four postures is detailed on a separate line and each new item receives a new line. The TRMAP identified, on records 23 and 24, 15 CEM weapon (equipment), thus there are 15 records, as for each in this file.

1.6   OUTPUT: The Ammo Buffer utility produces two output files. The first is the Run Record Report (**RUNREC). It is produced on Unit 6 (PRINT$) of the system, and is a report which tracks the execution of the utility and provides the analyst a summary of some of the major events of the execution of the utility. A sample of the output is provided in Figure III.1.8. A general description of format is as follows:

FILE:**RUNREC
STORAGE MEDIUM: Mass Storage - disk resident
SOURCE: The PRINT$ output from the program execution of the AMMUNITION BUFFER program; a breakpointed file.

POSITION	DESCRIPTION	FIELD FORMAT
	-RECORD 1-	
	Execution statement	
	-RECORD 2-	
	Heading label written from program	
	-RECORD 3-	
First	Type (weapon) counter	Free Format-I
Second	Weapon category	Free Format-I
	1 = Personnel	
	2 = Tanks	
	3 = Light Armor	
	4 = Helicopters	
	5 = Anti-tank and Mortors	
	6 = Artillery	
Third	The side or force to whom the assets belong	Free Format-I

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```
1 = Blue
2 = Red
```

-RECORD 4-

1-5	Theatre cycle number value from 1 to 45	I 5
6-16	Quantity of the major item type authorized	F 10.0
17-26	Quantity of the major item type on hand	F 10.0
27-33	The percent of the major item type on hand	F 7.0
34-95	The major item type data in order for the cycle:	12 (F8.0)

      1 - Quantity resupply to theater stocks
      2 - Quantity repaired
      3 - Total Gains
      4 - Theatre stock at end of cycle
      5 - Quantity in repair at end of cycle
      6 - Temporary cycle combat losses (to repair)
      7 - Permanent losses
      8 - Total combat losses
      9 - Temporary non-combat losses
    10 - Permanent (non combat) losses
    11 - Sum of all losses (Perm + Temp)
    12 - Total Temporary losses

-RECORD 5, 6-

Repeat of format described above
in records 3 and 4 for theater cycle 2

-RECORDS 7 - 92-

Repeat of above format for 5 and 6,
2 records for each theater cycle.

-RECORDS 93 - EOF-

The volume of data prohibits a detailed
discussion, but the sequence tracks the
execution of the program. An examination of
the program code is necessary if the user
desires a detailed examination.

The second output file, **AMMOIN, is the major product of the utility. This file will contain the control information provided by the user in addition to the logistic, loss and ammunition data selected by the combat analyst and provided by the Combat Evaluation Model (CEM). This file is formated for use in the following programs of the APP and not to be immediately read by the combat analyst. A record layout of the file is as follows and an example of the data is provided in Figure III.1.9.

The order of output to the file is (in column) 1) deployments, 2) replacements to resource pools for distribution, 3), return to duty (to the unit) from direct support (DS) maintenance, 4) return to resource pool from general support (GS) maintenance, 5) replacement to theater stock plus GS maintenance returns to pool or stock and 6) surviving assets. The records are formated as follows:

FILE: **AMMOIN
STORAGE MEDIUM: Mass storage - disk resident; a program file in SDF cataloged by the analysts.
SOURCE: Output created by the execution of the Ammo Buffer program.

POSITION DESCRIPTION   FIELD FORMAT

-RECORD 1-

First	Total of red and blue weapon system types modeled	Free-I
Second	The number of modeled categories	Free-I
Third	The number of combat samples represented in the data	Free-I
Fourth	The number of equivalent stylized days modeled	Free-I
Fifth	The number of engagement types modeled or CEM samples.	Free-I

-RECORD 2-

First-sixth	The maximum quantity of weapon systems in each category for the blue force	Free-I

-RECORD 3-

First-sixth	The maximum quantity of weapon systems in each category for the red force	Free-I

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-RECORD 4 - 9-

First- sixth	The CEM mapping numbers for each of the 30 blue force systems modeled; 99 denotes that the system is not accounted for in this processing	Free-I

-RECORD 10 - 11-

First- third	The CEM mapping numbers for red weapon systems	Free-I

-RECORD 12-

First- sixth	The Ammo Rates mapping numbers for red weapon systems	Free-I

-RECORD 13 - 28-

First- fourth	Each record contains stylized quantity data for one blue weapon system per sample (example is 4), the 16 records represent the 16 CEM weapons	Free-I

-RECORD 29-

First	The total number of days; which is the number of theater cycles (45) times the number of days per cycle (4).	Free-I

-RECORD 30-

First	Deployment quantity-blue - category 1 (only one type in cat 1)	Free-F
Second	Replacements to pool-blue - category 1	Free-F
Third	Return to duty-blue - category 1	Free-F
Fourth	Return to pool-blue - category 1	Free-F
Fifth	Replacement to stock-blue - category 1	Free-F
Sixth	Surviving Assets - blue - category 1	Free-F

23

-RECORD 31-32-

Blank

-RECORD 33-34-

These twelve records have data   Free-F
for the 6 deployment status (columns)
for the Category 2 weapon items (tanks);
there is one record for each of the 12
(in this case) types of systems in the
category (tanks) for the blue force.

-RECORD 45-46

Blank

-RECORD 47-58-

These twelve records have data for   Free-F
the 6 deployment status (columns)
for the category 3 weapon system items
(light armored vehicles); there is one
record for each of the twelve types
of the systems in the category for the
blue force.

-RECORD 59-60-

Blank

-RECORD 61-65-

These five records have data for   Free-F
the six deployment status (columns)
for the category 4 items (helicopters);
there is one record for each of the 5
types of the systems in the category
for the blue force.

-RECORD 66-67-

Blank

-RECORD 68-70-

These twelve records have data for   Free-F
the six deployment status (columns)
for the category 5 items (anti-tank
systems and mortars); there is one
record for each of the 12 types of

24

systems in the category for the
blue force.

-RECORD 80-81-

Blank

-RECORD 82-89-

These eight records have data for the six deployment status (columns) for the category 6 items (artillery); there is one record for each of the eight types of systems in the category for the blue force.		Free-F

-RECORD 90-97-

Blank

-RECORD 98-

1-9	The sum of blue personnel engaged in engagement type 1	F 9.1
10-18	The sum of blue personnel that are K-kills in engagement type 1	F 9.1
19-27	The sum of blue personnel that are M-kills in engagement type 1	F 9.1

-RECORD 99-

1-108	The sum of blue tanks of each type 1 thru 4 that are engaged, K-kills and M-kills in engagement type 1	12 (F 9.1)

-RECORD 100-

1-108	The sum of blue tanks of each type 5 thru 8 that are engaged, K-kills,and M-kills in engagement type 1	12 (F9.1)

-RECORD 101-

1-108	The sum of biue tanks of each type 9 thru 12 that are engaged K-kills, and M-kills in engagement type 1	12 (F9.1)

-RECORD 102-

1-108	The sum of blue APC's of each type 1 thru 4 that are engaged, K-kills and M-kills in engagement type 1	12 (F9.1)

-RECORD 103-

1-108	The sum of blue APC's of each type 5 thru 8 that are engaged, K-kills, and M-kills in engagement type 1	12 (F9.1)

-RECORD 104-

1-108	The sum of blue APC's of each type 9 thru 12 that are engaged, K-kills, and M-kills in engagement type 1.	12 (F9.1)

-RECORD 105-

1-108	The sum of blue helicopters of type 1-4 that are engaged, K-kills and M-kills in engagement type 1.	12 (F9.1)

-RECORD 106-

1-27	The sum of blue helicopters of type 5 that are engaged, K-kills and M-kills in engagement type 1	3 (F9.1)

-RECORD 107-

1-108	The sum of blue anti-tank and mortar systems 1 thru 4 that are engaged, K-kills and M-kills in engagement type 1	12 (F9.1)

-RECORD 108-

1-108	The sum of blue anti-tank and mortar systems of type 5 - 8 that are engaged, K-kills and M-kills in engagement type 1	12 (F9.1)

-RECORD 109-

1-108	The sum of blue anti-tank and mortar systems 9 thru 12 that are engaged, K-kills, and M-kills in engagement type 1	12 (F9.1)

-RECORD 110-

1-108	The sum of blue artillery systems type 1 thru 4 that are engaged, K-kills and M-kills in engagement type 1	12 (F9.1)

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-RECORD 111-

1-108	The sum of blue artillery systems of type 5 thru 8 that are engaged, K-kills and M-kills in engagement type 1	12 (F9.1)

-RECORD 112-

1-9	The sum of red personnel losses in engagement type 1	F9.1
11-18	The sum of red tanks losses in engagement type 1	F9.1
19-27	The sum of red ICVs losses in engagement type 1	F9.1
28-36	The sum of red APC losses in engagement type 1	F9.1
37-45	The sum of red APC and ICV losses in engagement type 1	F9.1
46-54	The sum of red armor losses in in engagement type 1	F9.1

-RECORD 113 - 127-

Repeat of the above
format with 15 records
constituting data for
engagement type 2

-RECORDS 128 - EOF

Repeat of the format in records 98 - 112
with groupings of 15 records for engagement
types 3 through 8.

1.7   PERFORMANCE.   In order for the Ammo Buffer to execute successfully
the following system resources will be required.

CORE:	55,000 words (55K) main memory
CPU TIME:	3 1/2 minutes
CLOCK TIME:	15 minutes
PERIPHERAL DEVICES:	5 - assigned space 1000 tracks
	2 - assigned space 128 tracks (default)

27

-RECORDS 128 - EOF

Repeat of the format in records 98 - 112
with groupings of 15 records for engagement
types 3 through 8.

1.7   <u>PERFORMANCE.</u> In order for the Ammo Buffer to execute successfully
the following system resources will be required.

CORE:	55,000 words (55K) main memory
CPU TIME:	3 1/2 minutes
CLOCK TIME:	15 minutes
PERIPHERAL DEVICES:	5 - assigned space 1000 tracks 2 - assigned space 128 tracks (default)
COMMENTS:	This program is normally submitted as a batch run from the computer terminal.
ERROR DIAGNOSTICS:	There are no explicit error routines or debugging statements written into this utility. In event of system error, program error or data error the user must examine the run output to determine the error source and then, systematically trace through possible causes to determine the fault.
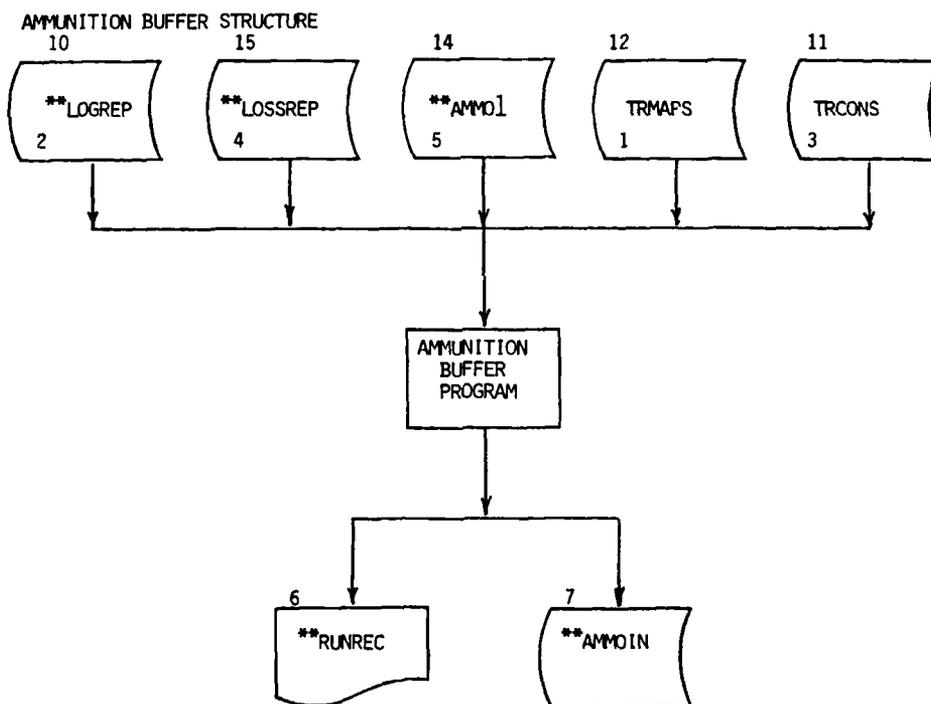
AMMUNITION BUFFER STRUCTURE

10	15	14	12	11
**LOGREP	**LOSSREP	**AMMO1	TRMAPS	TRCONS
2	4	5	1	3

AMMUNITION
BUFFER
PROGRAM

6	7
**RUNREC	**AMMOIN

Figure III.1.1

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```
 1      @RUN,/TPRTS  A556U,E236UAU229,CONFIDENTIAL,H9,40U   .   AMMORUN
 2      @PRT,S CONFIDENTIAL*56ESDGEN/    /    .RUN/T6-16JULB0
 3      @ASG,A CONFIDENTIAL*3/AMMOIN/    /   .
 4      @ASG,A CONFIDENTIAL*3/AMMO1/    /    .
 5      @ASG,A CONFIDENTIAL*3/LOGREP/    /   .
 6      @ASG,A CONFIDENTIAL*3/LOSSREP/    /   .
 7      @ASG,T 1U.,///1UUU
 8      @USE 1U.,CONFIDENTIAL*37LOGREP/   /   .
 9      @ASG,T 14.,///1UUU
1U      @USE 14.,CONFIDENTIAL*37AMMO1/   /   .
11      @ASG,T 15.,///1UUU
12      @USE 15.,CONFIDENTIAL*37LOSSREP/   /   .
13      @ASG,T 11.
14      @ED CONFIDENTIAL*56ESDGEN/   /   .TRCONS/V,11.
15      EXI
16      @ASG,T 12.
17      @ED CONFIDENTIAL*56ESDGEN/   /   .TRMAPS/V,12.
18      EXI
19      @ASG,T 7.,///1UUU
2U      @ASG,T 8.,///1UUU
21      @DELETE,C CONFIDENTIAL*56RUNREC/   /   .
22      @ASG,UP CONFIDENTIAL*56RUNREC/   /   .,///1UUU
23      @USE R,CONFIDENTIAL*56RUNREC/   /   .
24      @BRKPT PRINT$/R
25      @ADT CONFIDENTIAL*56ESDGEN/   /   .CEMTRBUF
26      @BRKPT PRINT$
27      @ED,R R.
28      LNP 4U
29      LXS
3U      -2U
31      P 2U
32      OMI
33      @ED 7.,CONFIDENTIAL*3/AMMOIN/CWA/ANC.
34      P 25
35      @FIN
```

Figure III.1.2

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CEM REPORT GENERATOR
>>KOREA87=RUNSEC/KOREA87-QB   QC 04MAY80 *UNCLASSIFIED*

BLUE FORCE THEATERWIDE LOGISTIC SUMMARY

| THEATER RESRCES | RESOURCES ON HAND | | | | LOSSES TO COMBAT UNITS | | | | | GAINS TO THEATER STOCKS | | GAINS TO UNIT |
	COMBAT UNITS	THEATER STOCKS	IN REPAIR	TOTAL	COMBAT TEMP	COMBAT PERM	NONCOMBAT TEMP	NONCOMBAT PERM	TOTAL	FROM RESUPPLY	FROM REPAIR	AT END OF THEATER CYCLE 3
PERSNL	219535.7	5724.0	38135.7	86339504	8839.4	8060208	840.9	405.1	90668.2	48346	.0	4839600
1	157331.4	29.0	2850.7	1861180	423.6	3019.9	63.3	31.2	35380.0	346	.0	34460
2	203804.3	5695.0	35285.0	24478404	8415.8	7758209	757.7	373.8	87130602	48000	.0	4800000
POL	11364866.2	16378575.1	.0	175150612	.0	4154101	.0	328.3	41889.4	987500	.0	4194962
1	11027702	11045170.1	.0	12167940	.0	286104	.0	17.6	28790.0	51030	.0	4860007
2	10242090.0	15271205800	.0	16298268.9	.0	3869907	.0	310.7	39010.5	936500	.0	3966424
AMMO	15780423004825680.0	.0	10063943720	.0	103426	.0	100.8	10373.3	15208	.0	1036307
1	11972.0110002599.20	.0	010003794400	.0	622.2	.0	1.4	6236.6	9707	.0	625.3
2	13983261	4565760.1	.0	5964081	.0	9740.4	.0	9.4	974907	5501	.0	974604
TNKS 1	102.9	849.2	14.1	968.2	2.7	1.4	8.0	.4	120.6	160	.0	7.8
TNKS 3	6.4	.0	2.3	8.7	.7	.1	.5	.0	1.3	0	.0	.0
TNKS 5	179.2	61.2	15.7	256.0	3.8	7.9	11.9	2.3	25.9	38 (2)	16.9 16.9	26.0
TNKS 6	880.8	1.0	150.5	1032.2	63.5	111.5	67.0	10.3	252.3	61 (1) (2)	142.6 150.0 127.0	202.7
TNKSUM	1169.2	911.3	184.6	2265.1	70.7	120.9	87.3	13.1	2920.0	259.	158.4	236.6
APCS 1	22.6	749.5	6.3	780.4	3.5	.8	1.3	.1	5.7	226	.0	4.6
APCS 2	147.2	408.4	53.1	608.7	25.3	2.9	8.5	.9	37.6	135	.0	28.7
APCS 3	40.1	293.6	11.0	349.7	4.6	1.1	2.3	.3	8.3	90	.0	6.6
APCS 4	29.3	205.1	8.6	243.0	4.4	.5	1.7	.2	6.8	71	.0	5.3
APCS 5	71.0	.3	30.7	1020.0	24.1	10.7	3.5	.7	39.0	12	27.7	39.7

Figure III.1.3

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CEN REPORT GENERATOR
P3KOREAB7-RUNSEC/KOREAB7-05 8C 06MAY80 *UNCLASSIFIED*

BLUE FORCE THEATERWIDE LOGISTIC SUMMARY

AT END OF THEATER CYCLE 3

(CONTINUED FROM PRECEDING PAGE)

THEATER RESRCES	RESOURCES ON HAND				LOSSES TO COMBAT UNITS					GAINS TO THEATER STOCKS		GAINS TO UNIT
	COMBAT UNITS	THEATER STOCKS	IN REPAIR	TOTAL	COMBAT TEMP	COMBAT PERM	NONCOMBAT TEMP	NONCOMBAT PERM	TOTAL	FROM RESUPPLY	FRCP REPAIR	
APCS 6	565.9	.0	317.7	883.6	72.3	84.0	29.0	5.3	191.5	(1) 16	(1) 1.8 / (2) 25.8	135.2
APCS 7	149.4	259.4	41.2	449.0	21.4	24.7	7.5	1.3	54.9	(1) 133	(1) 119.2 / (2) 115.4 / 107.8	54.4
APCSUM	1020.6	1916.2	270.6	3207.3	155.7	64.7	54.6	6.9	283.8	483.	(1) 33.0 / (2) 6.7 / 26.3 / 179.9	279.6
MELO 1	42.0	.0	8.1	50.1	1.9	4.8	6.3	.5	13.5	5	6.9 / .9	11.9
MELO 3	45.1	.0	21.6	66.7	15.0	33.1	4.6	1.1	55.8	0	(1) 20.7 / (2) .9 / 19.8	20.7
MELO 4	44.7	.0	9.8	54.5	2.4	5.0	7.4	.8	15.6	0	(1) 10.5 / 10.5	10.5
MELSUM	131.8	.0	39.5	171.4	19.3	42.9	20.2	2.5	84.9	5.	38.0	43.0
AT/M 1	45.0	99999.0	.0	100044.0	.0	.0	.0	.0	.0	0	.0	.0
AT/M 3	130.9	99981.7	.0	100092.6	.0	30.0	.0	.0	30.0	0	.0	15.0
AT/M 4	59.9	82.0	.0	142.9	.0	71.0	.0	.0	71.0	54	.0	38.5
AT/M 5	2072.5	.0	.0	2072.5	.0	453.5	.0	.0	453.5	421	.0	421.0
AT/M 6	1052.5	.0	.0	1052.5	.0	251.0	.0	.0	251.0	0	.0	.0
AT/M 7	114.2	13167.2	.0	13281.4	.0	30.7	.0	.0	30.7	419	.0	30.8

Figure III.1.3 (Cont)

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CEM REPORT GENERATOR
73KOREA82-RUNSEC/KOREA87-OS 8C 06MAY80 •UNCLASSIFIED•

BLUE

COMBAT UNIT SUMMARY

ALL UNITS AT END OF DIVISION CYCLE 16

THEATER RESRCES	COMBAT UNIT STATUS AFTER RESUPPLY			COMBAT UNIT SUPPORT BEFORE RESUPPLY			TOTAL UNIT LOSSES	CUMULATIVE COMBAT UNIT LOSSES				TOTAL
								COMBAT		NONCOMBAT		
	AUTH-ORIZED	ON HAND	PER-CENT	AVAILABLE	REQUIRED	PER-CENT		TEMP	PERM	TEMP	PERM	
PERSNL	394245.9	241784.2	61.3	8543.3	16045.8	5.3	11320.6	26712.3	25235.9	1763.2	870.0	28356.5
1	39914.5	18919.5	47.4	43.2	21038.9	.2	4836.1	2217.8	1523.1	146.0	72.0	21667.0
2	354330.4	222864.8	62.9	8500.0	13980.9	6.1	10637.6	24494.5	23004.8	1617.2	798.0	24191.4
POL	11347570	11364330	100.0	*********	6462.5	999.9	43711.9	.0	83164.5	.0	1706.0	64870.5
1	110293.0	110269.4	100.0	*********	471.7	999.9	3375.4	.0	6841.5	.0	279.5	7120.9
2	10264440	10261630	100.0	*********	5990.7	999.9	40036.0	.0	74323.1	.0	1426.6	77749.6
AMMO	151868.7	151794.0	100.0	*********	1497.6	999.9	10392.1	.0	10533.6	.0	51.6	10585.1
1	11975.9	11970.5	100.0	*********	105.3	999.9	799.2	.0	6536.2	.0	9.5	1545.7
2	139892.8	139823.5	100.0	442158.7	1392.4	999.9	9592.9	.0	16997.4	.0	42.1	17039.6
TNKS 1	108.0	107.5	99.6	698.9	2.3	999.9	6.4	1.4	.7	4.0	.2	6.4
TNKS 3	9.0	7.7	85.2	.0	1.3	.0	1.3	.9	.2	.2	.0	1.3
TNKS 5	180.0	179.0	99.5	36.5	4.8	767.4	29.2	17.0	22.8	21.3	4.9	66.1
TNKS 6	1292.0	930.4	72.0	32.9	391.8	8.4	293.4	220.5	298.7	138.6	22.2	680.0
TNKSUM	1589.0	1284.6	97.1	768.3	400.2	192.0	330.3	239.7	322.5	165.2	27.4	793.8
APCS 1	24.0	23.8	99.3	528.7	.9	999.9	4.2	2.9	.6	.6	.1	4.2
APCS 2	157.0	156.1	99.4	305.7	4.5	999.9	21.8	15.1	1.9	4.2	.4	21.8
APCS 3	42.0	41.8	99.6	211.0	.9	999.9	5.0	2.9	.8	1.1	.2	5.0
APCS 4	31.0	30.9	99.5	139.9	.7	999.9	2.8	1.6	.2	.8	.1	2.8

Figure III.1.3 (Cont)

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CEM REPORT GENERATOR
73KOREA87-RUNSEC/KOREA87-05 8C 06MAY80 ●UNCLASSIFIED.

COMBAT UNIT SUMMARY

ALL UNITS AT END OF DIVISION CYCLE 16

BLUE

THEATER RESRCES	COMBAT UNIT STATUS AFTER RESUPPLY			COMBAT UNIT SUPPORT BEFORE RESUPPLY			TOTAL UNIT LOSSES	CUMULATIVE COMBAT UNIT LOSSES				
								COMBAT		NONCOMBAT		
	AUTHORIZED	ON HAND	PER-CENT	AVAILABLE	REQUIRED	PER-CENT		TEMP	PERM	TEMP	PERM	TOTAL
APCS 5	104.0	70.3	67.6	6.0	48.2	16.8	40.0	64.0	28.1	6.7	1.2	100.0
APCS 6	754.0	562.1	74.6	24.9	216.8	11.5	152.1	257.8	81.2	60.2	11.1	410.3
APCS 7	150.0	144.8	96.5	156.2	13.5	999.9	72.9	80.2	75.3	14.5	2.6	172.7
APCSUM	1262.0	1029.8	81.6	1373.1	277.5	494.9	298.8	424.6	188.2	88.2	15.9	716.8
				(CONTINUED FROM PRECEDING PAGE)								
MELO 1	98.0	93.7	91.0	1.6	6.0	27.2	17.3	3.9	10.2	3.0	.3	17.3
MELO 3	54.0	93.8	81.1	2.3	17.4	12.2	54.3	26.5	58.7	11.0	1.9	98.1
MELO 4	74.0	49.8	67.3	.0	24.2	.0	24.2	6.4	13.2	4.1	.5	24.2
MELSUM	176.0	137.3	78.0	3.8	47.5	7.9	95.8	36.8	82.1	18.1	2.7	139.6
AT/M 1	45.0	45.0	100.0	99990.0	.0	.0	.0	.0	.0	.0	.0	.0
AT/M 3	147.0	145.1	98.7	99985.1	9.4	999.9	23.4	.0	23.4	.0	.0	23.4
AT/M 4	96.0	92.4	96.3	81.7	17.8	459.1	44.1	.0	44.1	.0	.0	44.1
AT/M 5	2277.0	2105.0	92.4	52.6	224.7	23.4	461.2	.0	1014.0	.0	.0	1014.0
AT/M 6	2234.0	1303.5	58.3	8782.7	938.5	.0	339.7	.0	930.5	.0	.0	930.5
AT/M 7	115.0	114.1	99.2	4.0	4.6	999.9	25.7	.0	60.0	.0	.0	60.0
AT/M 8	350.0	224.8	64.2	129.2	124.2	3.1	59.2	.0	189.2	.0	.0	189.2
AT/M 9	334.0	334.0	100.0	1604.0	.0	.0	.0	.0	.0	.0	.0	.0
AT/M 10	1995.0	1995.0	100.0	918.0	.0	.0	.0	.0	.0	.0	.0	.0
AT/M 11	66.0	66.0	100.0	312.0	.0	.0	.0	.0	.0	.0	.0	.0

Figure III.1.3 (Cont)

LOSSES DURING DAY   1
------ ------ ---   BLUE   TOTAL

			LOSSES OF SIDE	BLUE			
			RED CATEGORY CAUSING LOSS				
BLUE CATEGORY	TANKS	APCS	AT/M	HELOS	ARTY	CAS	TOTAL
LOST							
TANKS (PERM)	169.83	33.80	9.05	111.00	4.77	90.70	419.15
(TEMP)	103.96	21.62	5.11	76.90	34.97	42.68	285.25
APC (PERM)	92.89	43.17	3.77	10.08	13.60	68.30	231.82
(TEMP)	299.72	158.19	14.45	36.94	78.04	152.03	739.37
AT/M	57.20	190.84	7.11	6.11	424.81	19.11	705.20
PERSONNEL (INCLUDES AID STATION & R.T.D.):							
CREW	908.58	302.85	44.51	386.73	167.27	470.48	2280.42
HELO CREW							47.35
NONCRW	609.62	1362.92	46.70	47.04	4451.01	203.22	6720.51
ARTILLERY	.00	.00	.00	.00	.00	.00	.00
HELOS							49.51

			LOSSES OF SIDE	RED			
			BLUE CATEGORY CAUSING LOSS				
RED CATEGORY	TANKS	APCS	AT/M	HELOS	ARTY	CAS	TOTAL
LOST							
TANKS (PERM)	196.96	104.03	43.23	162.99	14.07	126.17	647.45
(TEMP)	99.97	47.97	27.99	83.07	24.86	59.37	343.23
APC (PERM)	141.14	196.91	56.21	32.18	8.37	149.67	584.49
(TEMP)	182.99	243.58	90.29	41.68	12.48	70.44	641.44
AT/M	21.24	50.50	10.51	9.53	325.37	45.35	462.51
PERSONNEL (INCLUDES AID STATION & R.T.D.):							
CREW	1002.81	978.65	352.77	519.10	96.66	659.93	3609.93
HELO CREW							56.39
NONCRW	106.06	248.00	49.34	38.31	2092.09	232.66	2766.46
ARTILLERY	.00	.00	.00	.00	.00	.00	.00
HELOS							70.49

Figure III.1.4

35

LOSSES DURING DAY   1
------ ------ ---   BLUE   PART 1

BLUF CATEGORY LOST	TANKS	APCS	RED AT/M	LOSSES OF SIDE BLUE CATEGORY CAUSING LOSS HELOS	ARTY	CAS	TOTAL
TANKS (PERM)	5.99	.50	.13	4.01	.24	6.57	17.43
(TEMP)	23.68	3.69	.72	23.88	2.79	3.09	57.85
APC (PERM)	6.87	5.02	.22	2.76	1.82	4.02	20.70
(TEMP)	17.41	12.42	.57	6.48	8.41	8.95	54.24
AT/M	5.06	20.70	1.43	.68	33.40	1.28	62.54

PERSONNEL (INCLUDES AID STATION & R.T.D.):

CREW	73.28	25.83	2.16	55.28	16.90	29.64	203.08
HELO CREW							9.25
NONCRW	35.01	148.65	6.52	6.40	305.77	9.94	512.29
ARTILLERY	.00	.00	.00	.00	.00	.00	.00
HELOS							11.41

RED CATEGORY LOST	TANKS	APCS	BLUE AT/M	LOSSES OF SIDE RED CATEGORY CAUSING LOSS HELOS	ARTY	CAS	TOTAL
TANKS (PERM)	30.26	8.27	1.48	38.37	4.87	6.71	89.97
(TEMP)	15.65	3.63	.91	19.54	8.83	3.16	51.73
APC (PERM)	20.71	9.50	2.00	10.21	2.26	8.76	53.44
(TEMP)	30.62	16.12	3.78	15.91	3.48	4.12	74.02
AT/M	2.62	2.16	.26	1.72	49.54	2.52	58.82

PERSONNEL (INCLUDES AID STATION & R.T.D.):

CREW	156.75	60.16	13.23	135.72	31.31	36.59	433.75
HELO CREW							6.20
NONCRW	13.02	14.25	1.42	8.23	275.14	12.93	324.99
ARTILLERY	.00	.00	.00	.00	.00	.00	.00
HELOS							7.75

Figure III.1.4 (Cont)

36

DAILY COMBAT DAMAGED (PERM + TEMP) VS CAUSE TABLE
***** ****** ******* ***** * ***** ** ***** *****
73EUROPE88. RUN F8865   05DEC81   *UNCLASSIFIED*

LOSSES DURING DAY   1
------ ------ ---   BLUE   PART 2

| | | | | LOSSES OF SIDE | BLUE | | |
BLUE CATEGORY LOST	TANKS	APCS	RED AT/M	CATEGORY CAUSING HELOS	LOSS ARTY	CAS	TOTAL
TANKS (PERM)	69.41	15.29	3.38	61.35	2.10	39.53	191.06
(TEMP)	33.77	8.23	1.66	31.54	15.61	18.60	109.42
APC (PERM)	22.09	21.91	1.46	4.90	6.10	27.71	84.17
(TEMP)	115.61	78.35	5.27	19.87	31.63	61.68	312.41
AT/M	27.23	118.19	3.33	3.71	217.48	9.67	379.61
PERSONNEL (INCLUDES AID STATION & R.T.O.):							
CREW	298.58	125.92	14.44	190.80	63.17	178.88	871.79
HELO CREW							11.91
NONCRW	144.47	515.47	12.11	17.34	1125.24	51.06	1865.69
ARTILLERY	.00	.00	.00	.00	.00	.00	.00
HELOS							11.91

| | | | | LOSSES OF SIDE | RED | | |
RED CATEGORY LOST	TANKS	APCS	BLUE AT/M	CATEGORY CAUSING HELOS	LOSS ARTY	CAS	TOTAL
TANKS (PERM)	86.46	47.76	11.98	92.92	4.11	47.21	240.45
(TEMP)	44.07	22.55	8.03	22.15	7.14	22.22	126.16
APC (PERM)	63.58	65.35	15.24	8.68	3.07	61.13	216.75
(TEMP)	85.59	91.51	27.45	12.07	4.84	28.77	250.22
AT/M	9.17	19.77	2.96	2.37	137.11	15.96	187.32
PERSONNEL (INCLUDES AID STATION & R.T.O.):							
CREW	455.10	372.44	101.73	138.62	30.64	255.31	1354.04
HELO CREW							27.90
NONCRW	47.15	102.44	14.44	11.17	824.78	91.00	1090.99
ARTILLERY	.00	.00	.00	.00	.00	.00	.00
HELOS							34.87

Figure III.1.4 (Cont)

37

LOSSES DURING DAY   1
------ ------ ---   BLUE   PART 3

BLUE CATEGORY LOST	TANKS	APCS	RED AT/M	BLUE LOSSES OF SIDE BLUE CATEGORY CAUSING LOSS HELOS	ARTY	CAS	TOTAL
TANKS (PERM)	94.44	16.01	5.54	45.65	2.42	44.60	210.65
(TEMP)	46.51	9.70	2.73	21.48	16.56	20.99	117.97
APC (PERM)	63.94	16.23	2.09	2.43	5.68	36.57	126.95
(TEMP)	166.70	67.41	8.61	10.59	38.00	81.41	372.72
AT/M	24.92	51.96	2.36	1.72	173.93	8.17	263.05

PERSONNEL (INCLUDES AID STATION & R.T.O.):

	TANKS	APCS	AT/M	HELOS	ARTY	CAS	TOTAL
CREW	536.73	151.10	27.91	140.65	87.21	261.96	1205.55
HELO CREW							26.19
NONCRW	430.15	698.80	28.07	23.33	3020.00	142.22	4342.53
ARTILLERY	.00	.00	.00	.00	.00	.30	.00
HELOS							26.19

RED CATEGORY LOST	TANKS	APCS	BLUE AT/M	RED LOSSES OF SIDE RED CATEGORY CAUSING LOSS HELOS	ARTY	CAS	TOTAL
TANKS (PERM)	80.24	48.00	29.76	81.70	5.07	71.90	316.67
(TEMP)	40.25	21.78	19.34	41.38	8.87	33.84	165.15
APC (PERM)	56.85	122.36	38.97	13.30	2.99	79.67	314.14
(TEMP)	66.78	135.95	59.06	13.70	4.09	37.49	317.07
AT/M	9.46	28.57	7.29	5.44	138.73	26.87	216.36

PERSONNEL (INCLUDES AID STATION & R.T.O.):

	TANKS	APCS	AT/M	HELOS	ARTY	CAS	TOTAL
CREW	390.96	546.06	237.81	244.57	34.49	366.99	1820.89
HELO CREW							22.30
NONCRW	45.88	131.31	33.49	18.90	657.55	120.57	1007.65
ARTILLERY	.00	.00	.00	.00	.00	.00	.00
HELOS							27.87

Figure III.1.4 (Cont)

LOSSES DURING DAY   2
------ ------ ---   BLUE   TOTAL

| | | | RED | LOSSES OF SIDE BLUE
CATEGORY CAUSING LOSS | | | |
BLUE CATEGORY LOST	TANKS	APCS	AT/M	HELOS	ARTY	CAS	TOTAL
TANKS (PERM)	178.29	32.75	10.51	138.40	4.72	100.98	465.65
(TEMP)	166.74	36.40	10.56	118.08	39.44	47.52	418.74
APC (PERM)	78.32	59.56	5.83	9.84	12.39	61.72	227.68
(TEMP)	300.39	194.73	19.36	35.83	66.20	137.38	753.90
AT/M	67.21	283.46	9.22	6.15	523.95	23.34	913.33
PERSONNEL (INCLUDES AID STATION & R.T.O.):							
CREW	973.73	374.31	61.21	497.75	155.73	452.27	2515.02
HELO CREW							107.94
NONCRW	677.31	2229.10	65.32	77.81	4993.95	228.29	8271.78
ARTILLERY	.00	.00	.00	.00	.00	.00	.00
HELOS							119.50

| | | | BLUE | LOSSES OF SIDE RED
CATEGORY CAUSING LOSS | | | |
RED CATEGORY LOST	TANKS	APCS	AT/M	HELOS	ARTY	CAS	TOTAL
TANKS (PERM)	284.47	135.69	42.98	309.31	31.74	100.45	904.64
(TEMP)	144.58	63.69	28.35	157.39	55.56	47.27	496.85
APC (PERM)	202.59	203.86	55.67	82.03	15.00	123.56	682.70
(TEMP)	286.72	300.38	97.59	118.18	22.83	58.15	883.85
AT/M	44.18	69.70	10.74	24.17	619.68	43.61	812.09
PERSONNEL (INCLUDES AID STATION & R.T.O.):							
CREW	1479.70	1140.58	360.31	1083.20	201.52	526.37	4791.67
HELO CREW							122.01
NONCRW	243.03	406.89	63.18	136.85	3737.24	265.34	4852.53
ARTILLERY	.00	.00	.00	.00	.00	.00	.00
HELOS							152.51

Figure III.1.4 (Cont)

LOSSES DURING DAY   2
BLUE   PART 1

LOSSES OF SIDE BLUE

BLUE CATEGORY LOST	TANKS	APCS	RED CATEGORY CAUSING LOSS				TOTAL
			AT/M	HELOS	ARTY	CAS	
TANKS (PERM)	42.18	5.47	1.53	11.30	1.45	35.22	97.14
(TEMP)	100.14	21.71	6.14	55.36	14.50	16.57	214.42
APC (PERM)	36.85	26.81	2.48	4.19	4.62	20.64	95.60
(TEMP)	112.90	68.04	6.25	11.35	21.65	45.95	266.12
AT/M	24.45	104.88	3.12	1.91	172.73	7.30	314.40
PERSONNEL (INCLUDES AID STATION & R.T.D.):							
CREW	396.56	149.93	21.95	124.47	55.61	157.62	906.14
HELO CREW							48.91
NONCRW	222.38	1058.15	22.01	22.44	1773.13	76.43	3174.54
ARTILLERY	.00	.00	.00	.00	.00	.00	.00
HELOS							60.47

LOSSES OF SIDE RED

RED CATEGORY LOST	TANKS	APCS	BLUE CATEGORY CAUSING LOSS				TOTAL
			AT/M	HELOS	ARTY	CAS	
TANKS (PERM)	128.37	64.54	10.44	225.55	25.96	15.55	470.40
(TEMP)	65.49	28.86	6.54	114.54	45.71	7.32	268.46
APC (PERM)	97.17	79.61	13.66	66.46	11.00	20.49	288.38
(TEMP)	121.60	112.97	25.29	93.95	16.71	9.64	380.14
AT/M	23.90	31.63	3.32	18.16	363.19	10.01	450.20
PERSONNEL (INCLUDES AID STATION & R.T.D.):							
CREW	678.93	472.95	91.23	816.07	160.64	85.72	2305.54
HELO CREW							22.84
NONCRW	124.60	172.85	18.45	104.89	2038.49	57.26	2516.55
ARTILLERY	.00	.00	.00	.00	.00	.00	.00
HELOS							28.54

Figure III.1.4 (Cont)

LOSSES DURING DAY   2
73EUROPE88. RUN F8865 05DEC81   *UNCLASSIFIED*

BLUE   PART 2

| | LOSSES OF SIDE BLUE | | | | | | |
| | | RED | CATEGORY CAUSING LOSS | | | | |
BLUF CATEGORY LOST	TANKS	APCS	AT/M	HELOS	ARTY	CAS	TOTAL
TANKS (PERM)	84.37	18.62	5.82	79.66	2.25	47.01	237.73
(TEMP)	41.11	10.03	2.87	40.40	18.00	22.12	134.53
APC (PERM)	21.21	23.50	2.47	3.45	5.22	27.56	83.42
(TEMP)	118.93	87.36	8.95	14.80	28.76	61.34	320.14
AT/M	29.74	143.05	3.64	2.58	265.52	12.06	456.59
PERSONNEL (INCLUDES AID STATION & R.T.D.):							
CREW	332.14	143.44	24.60	221.63	63.37	192.40	977.58
HELO CREW							21.48
NONCRW	205.73	746.26	17.85	15.59	1725.60	79.71	2790.73
ARTILLERY	.00	.00	.00	.00	.00	.00	.00
HELOS							21.48

| | LOSSES OF SIDE RED | | | | | | |
| | | BLUE | CATEGORY CAUSING LOSS | | | | |
RED CATEGORY LOST	TANKS	APCS	AT/M	HELOS	ARTY	CAS	TOTAL
TANKS (PERM)	112.00	46.65	14.78	45.55	2.02	35.57	256.58
(TEMP)	57.64	23.31	10.10	23.41	3.61	16.74	134.80
APC (PERM)	76.28	63.63	18.60	11.83	1.64	44.53	216.52
(TEMP)	125.07	107.76	34.77	18.83	2.70	20.96	310.08
AT/M	16.67	25.50	4.42	4.90	159.64	17.38	228.51
PERSONNEL (INCLUDES AID STATION & R.T.D.):							
CREW	589.95	385.87	125.99	160.38	15.63	188.93	1466.76
HELO CREW							57.61
NONCRW	92.22	145.52	23.35	24.65	916.99	95.70	1298.42
ARTILLERY	.00	.00	.00	.00	.00	.00	.00
HELOS							72.01

Figure III.1.4 (Cont.)

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DAILY COMBAT DAMAGED (PERM + TEMP) VS CAUSE TABLE
***** ****** ******* ***** * ****** ** ***** *****
73EUROPER8. RUN F8865 05DEC81 *UNCLASSIFIED*

------ ------ ---   BLUE   PART 3

BLUE CATEGORY LOST	TANKS	APCS	RED AT/M	LOSSES OF SIDE BLUE CATEGORY CAUSING LOSS HELOS	ARTY	CAS	TOTAL
TANKS (PERM)	51.74	8.65	3.16	47.44	1.03	18.76	130.78
(TEMP)	25.48	4.66	1.56	22.32	6.94	6.83	69.79
APC (PERM)	20.26	9.24	.68	2.21	2.55	13.52	48.66
(TEMP)	68.57	39.33	4.16	9.68	15.79	30.10	167.64
AT/M	13.02	35.53	2.46	1.66	85.70	3.97	142.34
PERSONNEL (INCLUDES AID STATION & R.T.D.):							
CREW	245.04	80.94	14.66	151.65	36.76	102.26	631.32
HELO CREW							37.55
NONCRW	249.19	424.70	25.47	39.78	1495.23	72.15	2306.52
ARTILLERY	.00	.00	.00	.00	.00	.00	.00
HELOS							37.55

RED CATEGORY LOST	TANKS	APCS	BLUE AT/M	LOSSES OF SIDE RED CATEGORY CAUSING LOSS HELOS	ARTY	CAS	TOTAL
TANKS (PERM)	44.10	24.49	17.76	38.21	3.76	49.16	177.48
(TEMP)	21.46	11.52	11.71	19.43	6.23	23.14	93.49
APC (PERM)	29.14	60.67	23.41	3.73	2.34	58.50	177.74
(TEMP)	40.05	79.66	37.54	5.40	3.39	27.53	193.58
AT/M	3.61	12.57	3.01	1.11	96.85	16.23	133.38
PERSONNEL (INCLUDES AID STATION & R.T.D.):							
CREW	210.82	281.75	143.09	106.75	25.17	251.26	1018.85
HELO CREW							41.56
NONCRW	26.21	88.53	21.39	7.30	647.72	109.54	900.68
ARTILLERY	.00	.00	.00	.00	.00	.00	.00
HELOS							51.95

Figure III.1.4 (Cont.)

DAILY ENGAGED AND HIT WEAPONS

Figure III.1.5

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Figure III.1.5 (Cont.)

44

Figure III.1.5 (Cont.)

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DAILY ENGAGED AND HIT WEAPONS

Figure III.1.5 (Cont.)

```
 1        ⌐
 2        PE  TN  AP  HE  AT  AR
 3        PERSNLTANK  APC   HELC AT/M  ARTY
 4            2      3      4      5      6      7      8      9     1⁷    11    12
 5           13     14     15     16     17     18     19     20    21    22    23
 ⌐          24     25     26     27     28     29     3⌐    31    32    33    34
 7          35     3⌐     37     38     39     4⁴    41    42    43    44    45
 8       1 12 12  5 12  8
 9       1 12 12  5 17  8
 1⌐      1
11       1  1  ⌐  1  1  1  1  1  1  1  ⌐
12       1  1  1  1  1  1  1  1  1  1  1  1
13       1  1  1  1  1
14       1  1  1  ⌐  1  1  :  1  1  1  1  ⌐
15          1  1  1  1  1  1  1  1
16       1
17       1  1  1  1  1  1  1       ⌐  ⌐  ⌐  ⌐
1⌐       1  1  9  9  9  1  1  1  1  1  1  1
19       1  ⌐ 11  ⌐  1
2⌐       1  1  1  1  1  1  1  ⌐  1  1  1  1
21       1  1  1  1  1  1  1  1  1
22     3⌐ ⌐  4 4⌐ ⌐
23      1  3  2  2 9⌐  5 2⌐ 26 ⌐⌐ 14 ⌐⌐ 16 15 14 ⌐⌐
24     37 38 39 9⌐ 99 3⌐ 99 99 99 99 99 99 99 99 99
25     1  2  3
2⌐     4  5  6
27     1  2  3  4  5  6
```

Figure III.1.6

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UNCLASSIFIED*37ESDGEN(1)*TRCONS/18JUL8?
    1        2110A 23180 46294 91839
    2        58 60 135 286
    3        162 64 142 301
    4        179 184 412 875
    5        9 10 22 45
    6        112 100 271 72u
    7        41 41 112 204
    8        4? 43 100 212
    9        176 193 446 916
   10        336 370 860 1756
   11        57 63 146 316
   12        6 6 6 18
   13        9? 108 216 432
   14        36 44 91 180
   15        14 18 36 72
```

Figure III.1.7

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`1:QXQT S6ESDGEN/ / .CCMTHBUF`
`2: WEAPON DATA FOR RTD SURVIVING ASSETS READ`

#														
1	161961.	161946. 1	100.	27680.	0.	27680.	47340.	1798.	1762.	6224.	7986.	35.	18.	8035. 1
2	172112.	172078. 1	100.	27680.	0.	27680.	69714.	2926.	1089.	4194.	5283.	39.	15.	5337. 1
3	183568.	183556. 1	100.	27680.	0.	27680.	93391.	3819.	852.	3060.	3912.	40.	16.	3968. 1
4	192262.	192207. 1	100.	27680.	0.	27680.	113080.	5500.	1638.	6337.	7976.	43.	17.	8036. 1
5	216550.	216507. 1	100.	27680.	1798.	29478.	134688.	5393.	1644.	6149.	7793.	47.	18.	7858. 1
6	218330.	218235. 1	100.	27680.	1128.	10868.	133595.	6832.	2523.	9441.	11963.	44.	17.	12020. 2
7	241351.	241244. 1	100.	9740.	893.	10633.	133083.	8350.	2363.	8720.	11083.	48.	19.	11150. 2
8	262566.	262460. 1	100.	9740.	1682.	11422.	131751.	9330.	2609.	10073.	12681.	52.	20.	12758. 2
9	286381.	286220. 1	100.	9740.	1691.	11431.	120585.	12522.	4827.	17791.	22618.	56.	22.	22695. 4
10	312394.	312111. 1	100.	9740.	2567.	12307.	107169.	15759.	5781.	19978.	25720.	63.	24.	25806. 6
11	390692.	390590. 1	200.	9740.	2911.	12151.	91858.	19499.	6081.	21556.	27637.	70.	27.	27739. 7
12	354008.	353793. 1	100.	9740.	2661.	12401.	68765.	24766.	7855.	27202.	35057.	73.	28.	35157. 8
13	386350.	386151. 1	100.	9740.	4883.	14621.	47002.	26185.	8225.	28045.	36270.	77.	30.	36377. 8
14	386350.	386116. 1	100.	10259.	5804.	16063.	26039.	30960.	8500.	28457.	36957.	79.	30.	37066. 9
15	387745.	387427. 1	100.	10259.	6151.	16410.	1375.	34375.	9487.	31564.	41051.	79.	30.	41160. 9
16	389605.	374208. 1	96.	10259.	7927.	18186.	1523.	34188.	7662.	25354.	33016.	78.	30.	33125. 7
17	389605.	356410. 1	91.	10259.	8302.	18561.	1555.	34360.	8400.	27824.	36224.	75.	29.	36328. 8
18	389605.	386291. 1	89.	10259.	8579.	18838.	1578.	32555.	6702.	22137.	28839.	71.	27.	28938. 6
19	389606.	335636. 1	86.	10259.	9566.	19825.	1660.	30081.	7023.	23286.	30309.	69.	27.	30905. 7
20	389606.	327829. 1	84.	10259.	7780.	17999.	1507.	28415.	6007.	19865.	25872.	67.	26.	25965. 6
21	389608.	324770. 1	83.	11840.	8475.	20315.	1701.	25344.	5337.	17759.	23096.	67.	26.	23189. 5
22	389608.	321003. 1	82.	11840.	6773.	18613.	1559.	23881.	5204.	17232.	22436.	66.	25.	22528. 5
23	390659.	322748. 1	83.	11840.	7092.	18932.	1586.	21025.	4210.	13916.	18126.	66.	25.	18217. 4
24	390659.	325445. 1	83.	11840.	6074.	17914.	1500.	18576.	3559.	11654.	15213.	66.	25.	15308. 3
25	390659.	376075. 1	83.	11840.	5804.	17244.	1044.	17102.	3864.	12722.	16586.	67.	26.	16678. 3
26	390659.	328563. 1	84.	11840.	5271.	17111.	1433.	15323.	3425.	11124.	14549.	67.	26.	14591. 3
27	390659.	331278. 1	85.	11840.	4276.	16116.	1350.	14269.	3155.	10244.	13399.	67.	26.	13891. 3

Figure III.1.8

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RUNREC

RUNREC																			
58:	28	390659.	1	334155.	1	85.	11840.	1	3625.	15465.	1295.	13692.	2980.	9574.	12555.	68.	26.	12649.	3
59:	29	390659.	1	338121.	1	87.	10570.	1	3930.	14500.	1214.	12336.	2505.	8022.	10527.	68.	26.	10622.	2
60:	30	390659.	1	340360.	1	87.	10570.	1	3492.	14062.	1178.	11685.	2772.	8998.	11770.	69.	27.	11866.	2
61:	31	390659.	1	338921.	1	87.	10570.	1	3222.	13792.	1155.	12101.	3568.	11596.	15164.	70.	27.	15260.	3
62:	32	390659.	1	338760.	1	87.	10570.	1	3048.	13618.	1141.	12358.	3236.	10468.	13706.	70.	27.	13800.	3
63:	33	390659.	1	337778.	1	86.	10570.	1	2574.	13144.	1101.	13169.	3316.	10761.	14077.	68.	26.	14171.	3
64:	34	390659.	1	336944.	1	86.	10570.	1	2801.	13411.	1123.	13717.	3371.	10612.	14133.	68.	26.	14228.	3
65:	35	390659.	1	339880.	1	87.	10570.	1	3638.	14208.	1190.	12759.	2612.	8502.	11114.	68.	26.	11209.	2
66:	36	390659.	1	334227.	1	86.	8060.	1	3306.	7366.	617.	12700.	3178.	10320.	13499.	69.	26.	13593.	3
67:	37	390659.	1	331265.	1	85.	8060.	1	3384.	7444.	623.	11818.	2434.	7876.	10310.	68.	26.	10402.	2
68:	38	390659.	1	327761.	1	84.	8060.	1	3389.	7449.	624.	11068.	2573.	8295.	10868.	66.	25.	10960.	2
69:	39	390659.	1	325956.	1	83.	8060.	1	2680.	6740.	564.	10480.	2027.	6495.	8522.	65.	25.	8612.	2
70:	40	390659.	1	322837.	1	83.	8060.	1	3297.	7307.	612.	9739.	2439.	7851.	10291.	66.	25.	10382.	2
71:	41	390659.	1	319976.	1	82.	8060.	1	2502.	6562.	550.	9521.	2220.	7181.	9401.	65.	25.	9491.	2
72:	42	390659.	1	319106.	1	82.	8060.	1	2640.	6700.	561.	8733.	1787.	5689.	7475.	64.	25.	7565.	1
73:	43	390659.	1	318597.	1	82.	8060.	1	2092.	6152.	515.	8293.	1587.	5036.	6623.	64.	25.	6712.	1
74:	44	390659.	1	324623.	1	83.	13399.	1	2505.	15904.	1332.	7999.	2147.	6829.	8976.	65.	25.	9066.	2
75:	45	390659.	1	329101.	1	84.	13399.	1	2285.	15684.	1388.	8426.	2645.	8491.	11136.	66.	25.	11228.	2
94:	1	25.	1	18.	2	74.	0.	0	0.	0.	0.	3.	2.	4.	6.	1.	0.	7.	
95:	2	25.	1	16.	2	66.	0.	1	0.	0.	0.	4.	0.	0.	1.	1.	0.	2.	
96:	3	79.	1	69.	2	87.	0.	0	3.	3.	0.	6.	0.	0.	1.	3.	0.	4.	
97:	4	329.	1	288.	2	87.	0.	0	2.	2.	0.	29.	3.	6.	9.	22.	1.	33.	
98:	5	329.	1	229.	2	69.	0.	1	16.	16.	0.	47.	15.	40.	54.	19.	2.	75.	
99:	6	437.	1	232.	2	53.	0.	0	31.	31.	0.	66.	31.	44.	115.	19.	2.	136.	
100:	7	779.	1	581.	2	69.	0.	0	66.	66.	0.	50.	19.	46.	65.	32.	3.	99.	
101:	8	1425.	1	1142.	2	80.	113.		50.	163.	0.	108.	36.	93.	129.	71.	7.	208.	
102:	9	1909.	1	1588.	2	81.	115.		108.	221.	0.	153.	56.	138.	193.	97.	9.	299.	
103:	10	2355.	1	1919.	2	81.	112.		153.	265.	0.	195.	55.	130.	189.	101.	11.	340.	
104:	11	2731.	1	2133.	2	78.	112.		195.	307.	0.	242.	85.	211.	206.	157.	16.	469.	

Figure III.1.8 (Cont)

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Figure III.1.9

Figure III.1.9 (Cont.)

Figure III.1.9 (Cont.)

Figure III.1.9 (Cont.)

CHAPTER 2

EQUIVALENT STYLIZED DAY PROGRAM

2.1 **DESCRIPTION:** The purpose of the Equivalent Stylized Day (ESD) program is to compute the equivalent stylized days values and to produce the AMMOUT file, also referred to as the TRM output, using the AMMOIN data file supplied by the Ammo Buffer and the RPERCK and RSTYLO data files maintained by the combat analyst. The AMMOUT file is, in turn, used as one of the major inputs to the final program of the APP, the Report Generator. The ESD program is written in the SIMSCRIPT II.5 programming language.

2.2 **STRUCTURE:** The overall structure for the ESD program is depicted in Figure III.2.1. The number at the upper left corner of the file symbol deno⁺ ˙s the logical unit used during program execution; the number at the lowe. ⊇ft corner, interior, is the order of data utilization by the program.

2.3 **DATA BASE:** The ESD program uses three files for input and produces one main output file and one print file as its output. The files are maintained in sequential order on mass storage devices. Each file will be discussed in more detail in the following INPUT and OUTPUT paragraphs. These files are not part of a formal database structure.

2.4 **RUNSTREAM:** Figure III.2.2 depicts the runstream which is typically used to control the execution of the ESD program. The runstream is cataloged as a "START" file element and is executed by submitting the job as a batch run from the terminal. In so doing, the following functions are accomplished:

o   The appropriate run is activated and run information is supplied to the system.

o   The AMMOUT output file is assigned to the program, run, and assigned to logical unit 9.

o   The AMMOIN input data file is assigned to the program run, and will be @ ADD,'d to the execution.

o   The RPERCK file is conditionally (if present) deleted, a new file, space is allocated and set to the value of "P" via the @USE command. The current data file for RPERCK, version V, residing as an element in the ESDGEN program file is edited into the "P" file. "P" is set for input on logical unit 16.

o   The RSTYLO file is conditionally (if present) deleted, a new file and space is allocated, and set to the value of "S" via the @ USE command. The current data file for RSTYLO, version V, residing as an element in the ESDGEN program file is edited into the "S" file. "S" is set for input on logical unit 17.

o   The APPPRINT output file is unconditionally (if present) deleted, and a new file and space of 1600 tracks is allocated to the run. The value of the file is set to "A" via the @ USE command.

o   The "A" or APPPRINT file is breakpointed to capture the program execution and selected output statements.

o   The ESD program object code (ABS2) is executed and the AMMOIN data added to the runstream (logical unit 5).

o   The "A" or APPPRINT file which has been breakpointed, is closed.

o   The AMMOUT output data file is edited via a change command to replace all occurances of the scientific notation for zero (E+0*) to zero.

o   The first and last 25 lines of the AMMOUT file are printed onto the program runstream.

o   The breakpointed file "A" or APPPRINT is edited and the first fifty lines of the file is printed onto the program execution runstream.

o   The run is terminated on the system.

2.5   INPUT: The ESD program uses three input files. One file, **AMMOIN, is produced by the Ammo Buffer; the remaining two files, RPERCK and RSTYLO, are manually created and maintained by the combat analyst. Each file is discussed below.

o   AMMOIN - This file contains study control information provided by the combat analyst and logistic and loss data obtained from the Concepts Evaluation Model (CEM). A layout is as follows and example of the file can be seen in Figure III.2.3. A full discussion of the data is in Chapter 1.

FILE: **AMMOIN
STORAGE MEDIUM: Mass Storage - Cataloged file in Standard Data Format (SDF)
SOURCE: - Output produced by the Ammunition Buffer Program.

RECORD LAYOUT

POSITION	DESCRIPTION	FORMAT
	-RECORD 1-	
1-13	Number of Blue Weapon systems modeled	I13
14-26	Number of Red Weapon systems modeled	I13

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27-39	Number of Postures or Samples in the APP	113
40-52	Number of Equivalent Stylized Days (ESD's)	113
53-65	Number of postures or samples in the CEM	113

-RECORD 2, 3-

(Record type occurs twice; once for Blue and once for Red)

1-13	Max number of types of troops played	113
14-26	Max number of types of tanks played	113
27-39	Max number of types of light armored vehicles played	113
40-52	Max number of types of helicopters played	113
53-65	Max number of types of anti-tank and morter systems played	
66-78	Max number of types artillery systems played	113

-RECORD 4, 5, 6, 7, 8, 9-

These records are written using a free formating option. Therefore, positioning is critical, as significant elements are simply separated by at least one space. In this case, the maximum of 30 equipment types of the Blue force that are being played are identified. A CEM number of "99" indicates that an equipment item is not being modeled or played.

-RECORD 10, 11

Same as records 4 through 9 except this record type is used to identify the six Red weapon (equipment) types modeled.

-RECORD 12

Free format read of the red APP mapping numbers, normally equal to the numbers, in order, on records 10 and 11.

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-RECORD 13 - 28-

First - fourth	Each record contains stylized quantity data for each sample (4 columns) for each blue system (total 16)	I

-RECORD 29-

First	The total number of days of combat modeled.	I

-RECORD 30-

Data for category 1 equipment (personnel)

First	Deployed quantity - blue	Decimal
Second	Replacements to pool - blue	Decimal
Third	Returned to duty - blue	Decimal
Fourth	Returned to pool - blue	Decimal
Fifth	Replacement to stock - blue	Decimal
Sixth	Surviving assets - blue	Decimal

-RECORD 33 - 39-

This series of records details for each CEM type (Weapon Number) of the remaining five major types of equipment (i.e., tanks, APC's, helicopters, ATM's and artillery) six elements of data. These elements are:

    oo   Total quantity deployed;

    oo   Total quantity replaced to theater;

    oo   Total quantity returned to duty;

    oo   Total quantity repaired and issued from the pool;

    oo   Total quantity returned to the pool from maintenance;

    oo   Total quantity surviving at the end of the simulated combat period (180 days).

o   RPERCK - This file details, for each of the maximum of 30 Blue types of equipment, the percentage of K-kill to M-kill losses inflicted upon

the first four major types of Red targets (i.e., personnel, tanks, ICV's and APC's). There will be a maximum of 120 records in this file. The first 30 records will detail the percentage of losses inflicted by the 30 Blue types of equipment on red personnel; the second 30 will detail the percentage of losses inflicted on red tanks; the third by ICV's; and the fourth, by APC's. Each record will have two elements. The first element identifies the Blue equipment; the second identifies the percentage killed. A percentage of 99.9 indicates to the program that the blue weapon was not played. The data is input via free-format read statements. An example of this file is depicted in Figure III.2.4. The record format is as follows:

FILE: PF.RPERCK
STORAGE MEDIUM: Mass Storage Device
SOURCE: Input file cataloged and manually created by analysts.

RECORD FORMAT:

POSITION	DESCRIPTION	FIELD FORMAT
1-6	Skipped (blank)	S6
7-8	Blue weapon identification number	I2
9-12	Percent loss to a red weapon system	D(4,1)

o   RSTYLO - This is the third input file used by the ESD program and the other file which is manually maintained by the combat analyst. The file contains data on Red losses caused by specific Blue weapons expressed not as percentages, but as absolute losses. The file is organized into four groups of four element records; one group of records for each of the four major Red combat weapons; and in each record one element for each of the four combat postures played in the Ammo Post-processor. The fifth and sixth Red weapon loss groups are calculated by the programs. Red equipment 5 stylized losses of blue items are computed as the sum of the stylized losses for equipment 3 and 4. Red equipment 6 stylized losses of blue items are computed as the sum of stylized losses for equipment 2 and 5. In each Red loss record group there will be one record for each of the Blue weapons being played by the APP, less those weapons, red versus blue that had a perecent kill of 99.9 as input in the preceeding "RPERCK" file. The analyst must input data to match. For example, in lines 1 through 30 of the "RPERCK" file eleven (11) equipment items have a value other than 99.9. Therefore, there are 11 records of data (records 1 through 11) with each record containing the stylized losses (4) in the RSTYLO data file (one value for each sample). Figure III.2.5 depicts a typical RSTYLO file. The record format is as follows:

FILE: PF.RSTYLO
STORAGE MEDIUM: Mass Storage Device
SOURCE: Input file cataloged and manually created by the analyst.
RECORD FORMAT:

POSITION	DESCRIPTION	FIELD FORMAT
1-6	Skipped (blank)	S6
Data point 1	Red equipment (tanks) stylized to Blue Weapon	Decimal
Data point 2	Red equipment (APC) stylized loss to Blue	Decimal
Data point 3	Red equipment (AM) stylized loss to Blue Weapons	Decimal
Data point 4	Red Equipment (Helicopter) stylized loss to Blue Weapons	Decimal

2.6 OUTPUT. The ESD program produces two output files -- the **APPPRINT and the **AMMOUT files. The **APPPRINT file is a print file which tracks the progress of the program and writes out resulting data at strategic points in the processing. For example, the user can see the last column read for the 6th Red Weapon, from the **AMMOIN file, the stylized quantities read for Blue weapons and postures, etc. A sample of this output file is depicted in Figure III.2.6, and is also discussed in Chapter 3, paragraph 3.5.

o **AMMOUT file - The second output file produced by this program is the **AMMOUT file. This is the major product of this program. This file consists of a series of groups of 38 records (normally). There will be one group of records for each day of the simulated conflict. The quantity of records is based upon the number of samples. (There are four samples in this example). For example, if the conflict lasts 180 days there will be 180 groups of 38 records or 6,840 records in the entire file. Each group of records follows the format specified as follows. An example of the file is depicted in Figure III.2.7. Each record is positioned in content based upon the total systems modeled (in this case 30 blue, 6 red).

FILE: **AMMOUT
STORAGE MEDIUM: Mass Storage - Disk Resident
SOURCE: Output file cataloged and created by the program.

RECORD FORMAT:

POSITION	DESCRIPTION	FIELD FORMAT
	-RECORDS 1, 2-	
1-15	Blue weapon deployment	15 D (8,1)
	-RECORDS 3, 4-	
1-15	Blue weapon replacement	15 D (8, 1)
	-RECORDS 5, 6-	
1-15	Blue weapons returned to duty	15 D (8,1)
	-RECORDS 7, 8-	
1-15	Blue weapons replacement pool	15 D (8,1)
	-RECORDS 9, 10-	
1-15	Blue weapon returned to replacement pool	15 D (8,1)
	-RECORDS 11 - 12-	
1-15	Blue weapon surviving assets	15 D (8,1)
	-RECORDS 13 - 14	
1-15	Duplicate records of 11 and 12	15 D (8,1)
	-RECORDS 15 - 22-	
1 - 15	Blue weapon K-kills by sample (4 each)	15 D (8,1)
	-RECORDS 23-30-	
1-15	Blue weapon M-kills by sample (4 each)	15 D (8,1)
	-RECORD 31-38-	
1-20	Equipment per stylized day and sample (each record is 20 ESD's, 2 records are one sample.	20 D (5,2)

2.7 <u>PERFORMANCE.</u>   In order for the ESD program to execute successfully, the following system resources must be allocated:

CORE:	24,000 words (24K) main memory
CPU TIME:	3 minutes
CLOCK TIME:	18 minutes
PERIPHERAL DEVICES:	2 - assigned space 128 tracks (default) 1 - assigned space 1600 tracks
COMMENTS:	This program is normally submitted as a batch (mode) program from the users demand (mode) terminal.
ERROR DIAGNOSTICS:	There are no explicit error handling routines built into the ESD program. However, the APPRINT file produced by the program contains information taken from strategic points during the execution of the program. If problems do arise, this file can be used to help trouble-shoot the problems and provide an analysis of the data as it flowed through the program.

EQUIVALENT SYTLIZED DAY PROGRAM

```
16                17                5
┌──────────┐      ┌──────────┐      ┌──────────┐
│ **RPERCK │      │ **RSTYLO │      │ **AMMOIN │
│          │      │          │      │          │
│  2       │      │  3       │      │  1       │
└────┬─────┘      └────┬─────┘      └────┬─────┘
     │                 │                 │
     └─────────────────┼─────────────────┘
                       │
                       ▼
                 ┌───────────┐
                 │    ESD    │
                 │  PROGRAM  │
                 └─────┬─────┘
                       │
          ┌────────────┴────────────┐
          ▼                         ▼
     6                         9
┌──────────┐              ┌──────────┐
│ ** APPPRINT│            │ **AMMOUT │
│          │              │          │
└──────────┘              └──────────┘
```

Figure III.2.1

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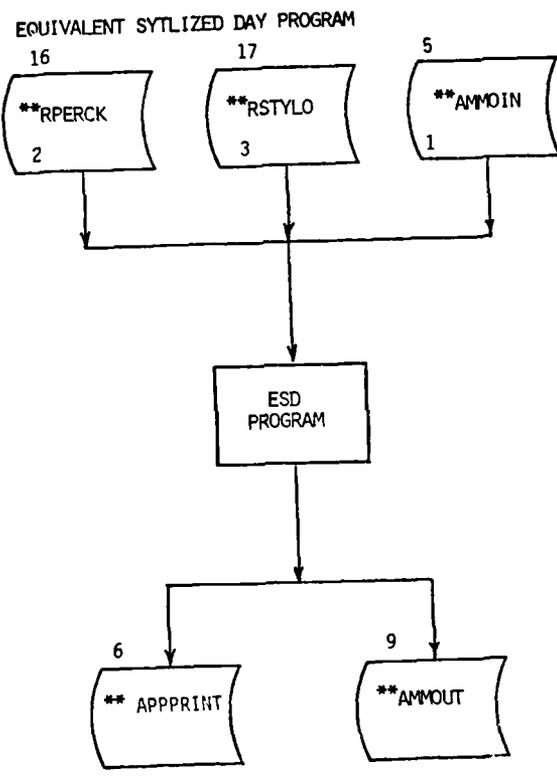
```
 1      @RUN,/TPRYS  A6560,E296UAU229,CONFIDENTIAL,59,9999  .   AMMURUN
 2      @ASG,A CONFIDENTIAL*37AMMOUT/    /    .
 3      @ASG,A CONFIDENTIAL*37AMMUIN/    /    .
 4      @USE SIMU9,,CONFIDENTIAL*37AMMOUT/    /    .
 5      @DELETE,C CONFIDENTIAL*56RPERCK/    /    .
 6      @ASG,UP CONFIDENTIAL*56RPERCK/    /    .
 7      @USE P,CONFIDENTIAL*56RPERCK/    /    .
 8      @ED CONFIDENTIAL*56ESUGEN/    /    .RPERCK/V,P.
 9      EXIT
10      @USE SIMU16,,P.
11      @DELETE,C CONFIDENTIAL*56RSTYLU/    /    .
12      @ASG,UP CONFIDENTIAL*56RSTYLU/    /    .
13      @USE S,,CONFIDENTIAL*56RSTYLU/    /    .
14      @ED CONFIDENTIAL*56ESUGEN/    /    .RSTYLU/V,S.
15      EXIT
16      @USE SIMU17,,S.
17      @DELETE,C CONFIDENTIAL*37APPPRINT/    /    .
18      @ASG,UP CONFIDENTIAL*37APPPRINT/    /    .,////1600
19      @USE A,CONFIDENTIAL*37APPPRINT/    /    .
20      @BRKPT PRINT$/A
21      @XQT CONFIDENTIAL*56ESUGEN/    /    .RB52
22      @ADD CONFIDENTIAL*37AMMOIN/    /    .
23      @BRKPT PRINT$
24      @ED,U CONFIDENTIAL*37AMMOUT/    /    .
25      C /E+U./ U. /A
26      LNP 25
27      LAS
28      -25
29      LNP 25
30      EXI
31      @ED,N A.
32      LNP 50
33      ONI
34      @FIN
```

Figure III.2.2

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Figure III.2.3

Figure III.2.3 (Cont)

Figure III.2.3 (Cont)

Figure III.2.3 (Cont)

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1	1	16.5						
2	2	16.5						
3	3	16.5						
4	4	16.5						
5	5	99.9						
6	6	16.5	57	27	99.9			
7	7	99.9	58	28	99.9			
8	8	99.9	59	29	99.9			
9	9	99.9	60	30	99.9			
10	10	16.5	61	1	99.9			
11	11	99.9	62	2	18.9			
12	12	16.5	63	3	18.9	114	24	99.9
13	13	99.9	64	4	18.9	115	25	99.9
14	14	99.9	65	5	99.9	116	26	99.9
15	15	99.9	66	6	18.9	117	27	99.9
16	16	16.5	67	7	18.9	118	28	99.9
17	17	16.5	68	8	18.9	119	29	99.9
18	18	16.5	69	9	18.9	120	30	99.9
19	19	99.9	70	10	18.9			
20	20	97.9	71	11	99.9			
21	21	16.5	72	12	18.9			
22	22	99.9	73	13	18.9			
23	23	99.9	74	14	18.9			
24	24	99.9	75	15	99.9			
25	25	99.9	76	16	18.9			
26	26	99.9	77	17	18.9			
27	27	99.9	78	18	18.9			
28	28	99.9	79	19	99.9			
29	29	99.9	80	20	99.9			
30	30	99.9	81	21	18.9			
31	1	99.9	82	22	99.9			
32	2	60.	83	23	99.9			
33	3	60.	84	24	99.9			
34	4	60.	85	25	99.9			
35	5	99.9	86	26	99.9			
36	6	60.	87	27	99.9			
37	7	47.	88	28	99.9			
38	8	48.	89	29	99.9			
39	9	48.	90	30	99.9			
40	10	48.	91	1	99.9			
41	11	99.9	92	2	40.			
42	12	48.	93	3	40.			
43	13	99.9	94	4	40.			
44	14	48.	95	5	99.9			
45	15	99.9	96	6	40.			
46	16	99.9	97	7	10.			
47	17	14.	98	8	10.			
48	18	99.9	99	9	10.			
49	19	99.9	100	10	10.			
50	20	99.9	101	11	99.9			
51	21	99.9	102	12	10.			
52	22	99.9	103	13	10.			
53	23	99.9	104	14	10.			
54	24	99.9	105	15	99.9			
55	25	99.9	106	16	9.			
56	26	99.9	107	17	9.			
			108	18	9.			
			109	19	99.9			
			110	20	99.9			
			111	21	9.			
			112	22	99.9			
			113	23	99.9			

Figure III.2.4

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```
 1      ? 6. 181*. 66.. 658.
 2      1 . 141. 2. 66.
 3      1 . 132. 2. 66.
 4      1 . 13 . 0. 67.
 5      2. 13 . 0. 27.
 6      11. 56. 0. 139.
 7      112. 132. 0. 69.
 8      5. 0. .. .32
 9      3 41. 3129. 2578. 5158.
10      1964. 1252. 1605. 1512.
11      619. 1228. 101. 1378.
12
13      13.7 4.7 8.23 1.29
14      1 .76 5.60 4.46 .75
15      5.71 26. .44 17.7
16      4.23 5.71 1.94 .03
17      .71 1.36 .07 .58
18      47.4 47. 11.4 9.6
19      24.7 13.6 8.2 7.8
20      7.55 1.58 6.76 5.25
21      2.92 7.63 6.45 13.9
22      1.48 1.85 1.76 5.05
23      2. 2 2.21 .18 9.74
24
25      4.95 9.22 1.19 .23
26      1.49 7.47 5.25 .85
27      6.91 8.27 .27 2.09
28      .76 3.01 .0 .4
29      .07 6.34 .1 .14
30      13.9 16.3 11.2 2.29
31      12.4 2.6 .0 1.17
32      .46 4. 1.02 .12
33      16.9 1.6 2.07 1.95
34      . .6 .17 .01
35      1. 9 2.18 .36 2.32
36      . .0 .1 .14
37      48.4 59.2 14.9 1.6.
38      6.21 5.85 1.98 2.17
39      2.83 3.2 .0 3.34
40
41      16.5 23.9 3.14 .0
42      17.2 11.7 5.92 5.27
43      23.4 13.9 2.67 1.76
44      .79 5.13 .73 .0
45      .18 3.34 .1 .1
46      44.4 39.6 5.2 4.1
47      12.7 4.7 4.6 .2
48      6.99 9.96 1.54 .92
49      14.6 13.8 2.62 3.53
50      .21 1.76 .11 .0
51      7.35 7.39 2.75 .95
52      .1 .0 .. .06
53      67.8 85.5 21.4 153.
54      8.96 8.43 7.18 3.12
55      4. 5 4.62 3.55 4.83
```

Figure III.2.5

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APPPRINT

```
1:aXQT 56ESDGEN/PTF/FTP.ABS3
2:   30 BLUE WPNS      6 RED WPNS    4 SAMPLES    40 ESD   8 N.CEM.SAMPLE
3:    1   12   12    5   12    8
4:    1   12   12    5   12    8
5:
6:/READ IN THE ESD MAP DATA/
7:ESD =    1  ESD.SEQ.NO =    1  RED.WPN =    1  BLUE.WPN =    1 B.RATIO.INDEX = 0
8:ESD =    2  ESD.SEQ.NO =    2  RED.WPN =    6  BLUE.WPN =    1 B.RATIO.INDEX = 1
9:ESD =    3  ESD.SEQ.NO =    3  RED.WPN =    1  BLUE.WPN =    1 B.RATIO.INDEX = 0
10:ESD =    4  ESD.SEQ.NO =    4  RED.WPN =    2  BLUE.WPN =    2 B.RATIO.INDEX = 0
11:ESD =    5  ESD.SEQ.NO =    5  RED.WPN =    3  BLUE.WPN =    2 B.RATIO.INDEX = 0
12:ESD =    6  ESD.SEQ.NO =    6  RED.WPN =    4  BLUE.WPN =    2 B.RATIO.INDEX = 0
13:ESD =    7  ESD.SEQ.NO =    7  RED.WPN =    2  BLUE.WPN =    3 B.RATIO.INDEX = 0
14:ESD =    8  ESD.SEQ.NO =    8  RED.WPN =    3  BLUE.WPN =    3 B.RATIO.INDEX = 0
15:ESD =    9  ESD.SEQ.NO =    9  RED.WPN =    4  BLUE.WPN =    3 B.RATIO.INDEX = 0
16:ESD =   10  ESD.SEQ.NO =   10  RED.WPN =    2  BLUE.WPN =    4 B.RATIO.INDEX = 0
17:ESD =   11  ESD.SEQ.NO =   11  RED.WPN =    3  BLUE.WPN =    4 B.RATIO.INDEX = 0
18:ESD =   12  ESD.SEQ.NO =   12  RED.WPN =    4  BLUE.WPN =    4 B.RATIO.INDEX = 0
19:ESD =   13  ESD.SEQ.NO =   13  RED.WPN =    2  BLUE.WPN =    5 B.RATIO.INDEX = 0
20:ESD =   14  ESD.SEQ.NO =   14  RED.WPN =    3  BLUE.WPN =    5 B.RATIO.INDEX = 0
21:ESD =   15  ESD.SEQ.NO =   15  RED.WPN =    4  BLUE.WPN =    5 B.RATIO.INDEX = 0
22:ESD =   16  ESD.SEQ.NO =   16  RED.WPN =    2  BLUE.WPN =    6 B.RATIO.INDEX = 0
23:ESD =   17  ESD.SEQ.NO =   17  RED.WPN =    3  BLUE.WPN =    6 B.RATIO.INDEX = 0
24:ESD =   18  ESD.SEQ.NO =   18  RED.WPN =    4  BLUE.WPN =    6 B.RATIO.INDEX = 0
25:ESD =   19  ESD.SEQ.NO =   19  RED.WPN =    1  BLUE.WPN =    7 B.RATIO.INDEX = 0
26:ESD =   20  ESD.SEQ.NO =   20  RED.WPN =    5  BLUE.WPN =    7 B.RATIO.INDEX = 0
27:ESD =   21  ESD.SEQ.NO =   21  RED.WPN =    2  BLUE.WPN =    8 B.RATIO.INDEX = 0
28:ESD =   22  ESD.SEQ.NO =   22  RED.WPN =    3  BLUE.WPN =    8 B.RATIO.INDEX = 0
29:ESD =   23  ESD.SEQ.NO =   23  RED.WPN =    4  BLUE.WPN =    8 B.RATIO.INDEX = 0
30:ESD =   24  ESD.SEQ.NO =   24  RED.WPN =    2  BLUE.WPN =    9 B.RATIO.INDEX = 0
31:ESD =   25  ESD.SEQ.NO =   25  RED.WPN =    3  BLUE.WPN =    9 B.RATIO.INDEX = 0
32:ESD =   26  ESD.SEQ.NO =   26  RED.WPN =    4  BLUE.WPN =    9 B.RATIO.INDEX = 0
33:ESD =   27  ESD.SEQ.NO =   27  RED.WPN =    6  BLUE.WPN =   10 B.RATIO.INDEX = 0
34:ESD =   28  ESD.SEQ.NO =   28  RED.WPN =    6  BLUE.WPN =   11 B.RATIO.INDEX = 0
35:ESD =   29  ESD.SEQ.NO =   29  RED.WPN =    2  BLUE.WPN =   13 B.RATIO.INDEX = 0
36:ESD =   30  ESD.SEQ.NO =   30  RED.WPN =    3  BLUE.WPN =   13 B.RATIO.INDEX = 0
37:ESD =   31  ESD.SEQ.NO =   31  RED.WPN =    4  BLUE.WPN =   13 B.RATIO.INDEX = 0
38:ESD =   32  ESD.SEQ.NO =   32  RED.WPN =    1  BLUE.WPN =   14 B.RATIO.INDEX = 0
39:ESD =   33  ESD.SEQ.NO =   33  RED.WPN =    6  BLUE.WPN =   14 B.RATIO.INDEX = 0
40:ESD =   34  ESD.SEQ.NO =   34  RED.WPN =    1  BLUE.WPN =   15 B.RATIO.INDEX = 0
41:ESD =   35  ESD.SEQ.NO =   35  RED.WPN =    6  BLUE.WPN =   15 B.RATIO.INDEX = 0
42:ESD =   36  ESD.SEQ.NO =   36  RED.WPN =    1  BLUE.WPN =   16 B.RATIO.INDEX = 0
43:ESD =   37  ESD.SEQ.NO =   37  RED.WPN =    6  BLUE.WPN =   16 B.RATIO.INDEX = 0
44:ESD =   38  ESD.SEQ.NO =   38  RED.WPN =    1  BLUE.WPN =    8 B.RATIO.INDEX = 0
45:ESD =   39  ESD.SEQ.NO =   39  RED.WPN =    1  BLUE.WPN =    9 B.RATIO.INDEX = 0
46:ESD =   40  ESD.SEQ.NO =   40  RED.WPN =    1  BLUE.WPN =    1 B.RATIO.INDEX = 1
47:/ESD MAP DATA READ IN/
48:/READ IN ARMOR INDICATORS/
49:/ARMOR INDICATORS READ IN/
50:
51: /READING MAPPING OF SELECTED BLCMAM WEAPONS/
52:LAST VALUE READ BLUE.ID(BLUE.WPN) WAS    99.
53:
54: /READING MAPPING OF SELECTED RDCMAM WEAPONS/
55:LAST VALUE READ RED.ID(RED.WPN) WAS     6.
56:
57: /READING MAPPING OF RDAMCM WPNS/
```

Figure III.2.6

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APPPRINT

```
58:LAST VALUE READ RD.WPN.NO(6) WAS      6.
59:
60: /STYLIZED QUANTITIFS READ FOR BLUE WEAPONS AND SAMPLES/
61:LAST VALUE READ B.STYLIZED .QTY(BLUE.WPN,SAMPLE) WAS     0.
62:/NUMBER UF DAYS ARE   18C
63:/PERCENT K-KILL FOR RED.WPN 1 TO 4 & BLUE KILLERS READ,LAST WAS 99.9
 64:    1.        1.        1.      86.C
 65:    1.        1.        1.      86.0
 66:    1.        2.        1.      24.4
 67:    1.        2.        1.      24.4
 68:    1.        3.        1.       0.C
 69:    1.        3.        1.       0.3
 70:    1.        4.        1.       0.
 71:    1.        4.        1.       0.
 72:    1.        1.        2.      47.1
 73:    1.        1.        2.      47.1
 74:    1.        2.        2.      31.0
 75:    1.        2.        2.      31.0
 76:    1.        3.        2.       0.
 77:    1.        3.        2.       0.
 78:    1.        4.        2.      31.C
 79:    1.        4.        2.      31.C
 80:    1.        1.        3.      33.0
 81:    1.        1.        3.      33.C
 82:    1.        2.        3.      25.3
 83:    1.        2.        3.      25.3
 84:    1.        3.        3.       0.1
 85:    1.        3.        3.       0.1
 86:    1.        4.        3.      29.6
 87:    1.        4.        3.      29.6
 88:    1.        1.        4.      25.8
 89:    1.        1.        4.      25.8
 90:    1.        2.        4.      25.5
 91:    1.        2.        4.      25.5
 92:    1.        3.        4.       0.1
 93:    1.        3.        4.       0.1
 94:    1.        4.        4.      12.2
 95:    1.        4.        4.      12.2
 96:    1.        1.        5.      14.2
 97:    1.        1.        5.      14.2
 98:    1.        2.        5.      15.0
 99:    1.        2.        5.      15.0
100:    1.        3.        5.       0.
101:    1.        3.        5.       0.
102:    1.        4.        5.      19.0
103:    1.        4.        5.      19.0
104:    1.        1.        6.      87.3
105:    1.        1.        6.      87.3
106:    1.        2.        6.      87.9
107:    1.        2.        6.      87.9
108:    1.        3.        6.       1.4
109:    1.        3.        6.       1.4
110:    1.        4.        6.      30.6
111:    1.        4.        6.      30.6
112:    1.        1.        7.      33.0
113:    1.        1.        7.      33.C
114:    1.        2.        7.      79.8
```

Figure III.2.6 (Cont)

Figure III.2.7

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CHAPTER 3

REPORT GENERATOR PROGRAM

3.1 **DESCRIPTION:** The purpose of this program is to bring together data produced by earlier programs and data maintained or supplied by the combat analyst, and produce the three final Ammunition Reports (i.e., Main Report, Three Day File Report and the Distribution of Requirements Report). This report details, for each type of munition, the total quantity lost or expended during the simulated combat period. The program is implemented in FORTRAN IV and consists of one routine.

The Report Generator computes ammunition requirements for four main consumption categories:

First, the quantity of munitions expended through weapon system zeroing or calibration. The movement of each system within the theater of operations is depicted in Figure III.3.1.A; the quantities of weapon systems that move through the deployment, replacement and repair system are outputs from CEM. The quantity of munitions required to calibrate a weapon system is an input made by the user/analyst.

Second, the quantity of munitions consumed through equipment loss or on-board losses. This includes losses of combat weapon systems (equipment types) such as tanks and armored personnel carriers. The calculated amount is based upon weapon system K-kills and average values of on-board quantities (basic load) less amounts of the munition fired prior to the weapon system (equipment) loss.

Third, the quantity of munitions expended while engaged based upon stylized values multiplied by previously computed Equivalent Stylized Days.

Fourth, the quantity of munitions destroyed in the logistic system either by loss at sea or within the theater logistic network.

3.2 **STRUCTURE:** Figure III.3.1 presents the overall structure of the Report Program. The numbers at the upper left corner denote the logical unit used for input or output. The interior number denotes the order of input to the program. Transparent to the user is the preparation of the Distribution Requirement Report and the 3 - Day Report; these are produced and copied into the output file REPORT1 by the program, and is not a part of the runstream.

3.2.A Distribution of Ammunition Requirements - The report generator program incorporates logic to include two significant sources of ammunition expenditures that are not directly related to target engagement, but impact upon the total ammunition requirement. These factors are ammunition expenditures for weapon zeroing and testing in the theater of operations, and at-sea losses or losses in transit to the theater of operations. The sea losses are historical factors as are the zeroing expenditures by weapon, by time period. The ammunition expenditure factors for each of the seven time

periods for each weapon provides a distribution as follows, where in the time periods are:

        1   :D-day thru day 15
        2   :Day 16 thru day 30
        3   :Day 31 thru day 60
        4   :Day 61 thru day 90
        5   :Day 91 thru day 120
        6   :Day 121 thru day 150
        7   :Day 151 thru day 180

and per each time period, the requirement factors are:

        1   :Initial (basic) amount
        2   :Combat losses in a Delay mission (DE)
        3   :Combat losses in a Defense Intense (DI) mission
        4   :Combat losses in a Defense Light (DL) mission
        5   :Combat losses in a Attack (AT) mission
        6   :Zeroing requirements on initial deployment
        7   :Zeroing requirements on return to duty at the unit
        8   :Zeroing requirements by replacements from pool to unit
        9   :Zeroing requirements by replacements to pool
       10   :Combat firing in the delay mission
       11   :Combat firing in the defense intense mission
       12   :Combat firing in the defense light (static) mission
       13   :Combat firing in the attack mission
       14   :Harassment and Interdiction (H & I) firing
       15   :Logistic losses in theater
       16   :Losses in transit at sea

3.2.B   Ammunition Expenditure Computations - Two methods may be employed by the combat analyst. The selection of the computation method is based upon the munitions (card type 3) of the Ammunition Expenditure Data (PF. Data) file for the specific weapon system.

Normal or Pile computation method: this method causes the 3-day ammunition expenditures (only) or the 3-day "piles" to be computed followed by the rates computations.

3 - Day Pile (Period) = zeroing requirement (period)
                        + stylized expenditures (period)

Before proceeding into the rates computations the sea losses (period) are computed and added to the 3 - Day Pile (period).

Rate computation: The rates computation may be entered following the 3 - day pile computation above, or entered into directly.

$$\text{Rate (period)} = \frac{\text{Rounds Expended (period)}}{\text{Average Deployment (period) x Days (Period)}}$$

3.3 DATA BASE: The data base which is used to support this program consists of four input files and four output products. The files are not part of one formal database, but maintained as seperate files by the analyst. The input files consist of the AMMOUT file which was produced by the ESD program, the TITLE file which is created by the combat analyst and includes identification data for the three reports generated by the program, the Sample Day Input file (also referred to as ISD) which denotes for each day in the study the number of samples or postures that are being played, and the AMMO (or DATA) expenditure file. The main output file **REPORT1 is partitioned into 3 reports as explained below; the fourth file is prepared for subsequent copying onto tape.

3.4 RUNSTREAM: Figure III.3.2 depicts the runstream that is used to control the execution of the REPORT program. The runstream is cataloged by the user as a "START" file element. Execution, or job submission is made by submitting this as a batch run from a terminal. As the runstream is processed it accomplishes the following functions:

o   The run is activated and submitted to the operating system;

o   Program file (56ESDGEN) which contains the input files is assigned;

o   The variable name "F." is to be used instead of the Program File name for the remainder of the processing;

o   The old output file REPORT1 (56REPORT)is deleted

o   The input file (AMMOUT) is assigned to the run.

o   Output file SEVEN is assigned and will use logical unit 7;

o   Logical units 3 and 2 are assigned to be used as temporary files to collect output. Unit 2 will collect the Three Day File report; Unit 3 will contain the Distribution of Requirements report;

o   The input file **AMMOUT is assigned to the logical unit 10;

o   A breakpoint file to capture the run output (REPORT) is opened.

o   These input data files are printed (@PRT,S) and captioned in the breakpoint file.

o   The program (REPORT86) is executed;

o   Using the @ADD command of EXEC8, three input files, Sample Day Input (ISD), Title, and Ammo Exenditures Input (DATA), are inserted here and are read by the program using Logical Unit 5;

o   Using the system editor, 100 lines of the output file **SEVEN and input file **AMMOUT are listed with line numbers;

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o   The Breakpoint file established is closed, released from the program run, and sent to the printer.

3.5   INPUT. The REPORT program uses four files as its input. These files are the **AMMOUT, PF.ISD, PF.TITLE, and PF.DATA. Each will be discussed below.

o   **AMMOUT - This file is produced by the ESD program which must have been run prior to this program. The file contains data describing Blue assets and their status for each day during the conflict. The file was previously known as the TRM (Theater Rates Model) output file. the file should have 6840 lines (records) of data for a 180-day conflict, with 38 lines of data per day. The file contents are as follows and an example of a portion of the file is found in Figure III.3.3.

In the first 30 lines, 15 sets of data are listed in two line pairs. The first line is for blue equipment types 1 thru 15 and the second line is blue equipment types 16 thru 30:

Lines 1 & 2: BLUDEP - Blue Deployments to the Theater Today

Lines 3 & 4: BREPA - Blue Replacements to the Theater Today
Lines 5 & 6:   BRTD - Blue Returns to Duty (from lower level maintenance) today

Lines 7 & 8: BREPU - Blue Replacements (from replacement pool) issued today

Lines 9 & 10:   BRTR -Blue Returns to Replacement pool today from higher level maintenance

Lines 11 & 12: BASS - Blue Surviving Assets Today

Lines 13 & 14: BLUON - Blue On Line Equipment (committed) today

Lines 15 thru 22:   BXTT - number of blue equipment "K" killed today (non-repairable) by posture - 2 lines for each posture (Delay, Defense Intense, Defense Light, and Attack)

Lines 23 thru 30:   BXMT - number of blue equipment "M" killed (repairable) today by posture - 2 lines for each posture (Delay, Defense Intense, Defense Light, and Attack)

Lines 31 thru 38:   ESDAY - daily ESD quantities by posture as above; the first line has ESD's 1 thru 20, and the second line has ESD's 21 thru 40.

o   PF.ISD - This file element is maintained and created by the Combat Analyst and is used to provide the number of samples or combat postures that will be used in each of the 180 days of the conflict. Each record in the file will contain a single number (i.e., a 1, 2, 3, or 4) in Column 2. Figure III.3.4 presents an example of a portion of the files.

o   PF.TITLE - This file element is maintained or created by the combat analyst. This file supplies to the program the titles to be used in each of the three reports produced by the program. It also contains data describing sea losses suffered by Blue forces in each of the 7 time periods of the analysis. Finally, it supplies formating data to the program indicating the number of lines per page for each report and the total number of pages in each report. These final two entries will follow the format of 3I2 or three entries of two integers each and will start in column l. Figure III.2.5 presents an example of this file.

o   PF.DATA - This file is also manually maintained or created by the Combat Analyst. It is also referred to as the Ammo Expenditures Input file. This file details for each weapon system and munition combination such data as identification data, deployment data, loss data and expenditure data. This data is organized into 6 card types. The file format is described as follows and an example of a portion of the file is presented in Figure III.3.6. The complete file would typically have approximately 700 lines (records).

FILE: PF.DATA
STORAGE MEDIUM: Mass Storage, disk resident, cataloged as an element of the anlyst's program files.
SOURCE: Manually produced from the weapon system modeled in COSAGE and CEM.

POSITION	DESCRIPTION	FIELD FORMAT

Card Type 1 - weapon card - one required:

POSITION	DESCRIPTION	FIELD FORMAT
1-2	Card Type	I2
3-42	Weapon name data	10A4

Card Type 2 - Deployment card - one required; the quantity deployed in each period:

POSITION	DESCRIPTION	FIELD FORMAT
1-2	Card Type	I2
3-10	D-Day (Dep(1))	F8.0
11-18	1-15 (Dep(2))	F8.0
19-26	16-30 (Dep(3))	F8.0
27-34	31-60 (Dep(4))	F8.0
35-42	61-90 (Dep(5))	F8.0
43-50	91-120 (Dep (6))	F8.0

51-58	121-150 (Dep (7))	F8.0
59-66	151-180 (Dep(8))	F8.0
67	Print indicator (IPRT) 1 = Do not print deployment 0 = Print deployment	I1

Card Type 3 - Munitions card - one required:

1-2	Card Type	I2
3-32	Munition name	5A6
33	Business round indicator 1 = Business round 0 = Nonbusiness round	I1
34	Computation method 0 = Normal (pile) method 1 = Use the rates from the factors card (rate method)	I1
41-50	Weight of munition in pounds	F10.0

Immediately following each type 3 card, there must be a card containing the SSN (Special Study Number) and all LIN's (line item numbers) for the munition identified on the type 3 card.

Card type 4 - Expenditures per time period factors card. This is either a pile or rate factor for the period - one required:

1-2	Card Type	I2
3-7	Log Loss Factor, Fac (1)	F5.0
8-12	H & I factor, Fac (2)	F5.0
13	Blank	1X
14-19	Factor (3), days 1-15	F6.0
20	Blank	1X
21-26	Factor (4), days 16-30	F6.0
27	Blank	1X
28-33	Factor (5), days 31-60	F6.0

34	Blank	1X
35-40	Factor (6), days 61-90	F6.0
41	Blank	1X
42-47	Factor (7), days 91-120	F6.0
48	Blank	1X
49-54	Factor (8), days 121-150	F6.0
55	Blank	1X
56-61	Factor (9), days 151-180	F6.0
62	Blank	1X
63-67	Scale factor	I5

Card type 5 - Stylized losses per system, per posture factor card zero or more required:

1-2	Card Type	I2
3-5	Blank	3X
6-10	System number	I5
11-20	Stylized losses per system - DE	F10.0
21-30	Stylized losses per system - DI	F10.0
31-40	Stylized losses per system - DL	F10.0
41-50	Stylized losses per system - AT	F10.0
51-60	Zero - the number of rounds to zero	F10.0

Card type 6 - Stylized expenditure per posture card - one to fifty required:

| 1-2 | Card Type
6 or 99 Card Type: 99 = Last | I2 |

3-5	Sample number; 999, for all samples	I3
6-10	ESD number	I5
11-20	Stylized expenditure - DE	F10.0
21-30	Stylized expenditure - DI	F10.0
31-40	Stylized expenditure - DL	F10.0
41-50	Stylized expenditure - AT	F10.0

3.6   OUTPUT: This program has 4 outputs; three reports and one file which is forwarded to the Office of the Deputy Chief of Staff, Logistics (DCSLOG). The three reports are the **REPORT1, Distribution of Requirements (DRR) Report, and the Three Day Pile Report. Each will be described below. The user should note that when output, REPORT1, the DRR and 3 Day Pile report are all within the same file.

o   **SEVEN - This data file which is written to unit seven (hence the name) which eventually is written to magnetic tape for shipping to ODCSLOG. The file contains such information as the Special Study Number (SSN), list of weapons and munitions, line numbers for each munition, and the rate at which this munition is being consumed during each time period. The format for this file is depicted in Figure III.3.7 and the file is labeled. The program file (mass storage) to tape copy is not a part of the program runstream.

o   REPORT1 - This report details for each weapon/munitions combination the quantity of this munition deployed and consumed for each time period in the study. An example of the report is found in Figure III.3.8 and the report is labeled. This file typically produces 40 pages (2200 lines) of output.

o   Distribution of Requirements Report - This second report details for each weapon/munition combination, for each time period, the quantity of the munition consumed. This quantity is further broken out by the reason the munition was consumed (for example, quantity lost and expended in each of the four combat postures, quantity used in zeroing the weapon at each stage in its repair or deployment, amount lost in transporting by sea, etc.. An example of the report is presented in Figure III.3.9 and the report is labeled. The file typicaly consists of approximately 66 pages (3700 lines) of output.

o   Three Day Pile Report - This third and final report presents for each weapon/munition combination in three day increments the quantity of this munition that this weapon will require. There is also a presentation of munitions issued in bulk (e.g., small arms rounds, summed by units of 1,000 troops). Figure III.3.10 presents an example of this report and the

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report is labeled. The file typically consists of approximately 16 pages (900 lines) of output.

3.7   PERFORMANCE: This program historically has required the following resources for normal program execution in the operating system.

CORE:	25,000 words (25K) main memory
CPU TIME:	3 minutes
CLOCK TIME:	18 minutes
DISK UNITS	1 - assigned space 1000 tracks 1 - assigned space 500 tracks 1 - assigned space 200 tracks 3 - assigned space 128 tracks (default)
COMMENTS:	The program is normally submitted as a batch (mode) program from the demand terminal. The creation of the **SEVEN tape is accomplished by the user, as a seperate function. This task is normally completed at the computer terminal in the demand mode.
ERROR CONDITIONS:	Specific error statements are not built into the program. User's must examine the run output to perform data debugging and source level debugging. Refer to the programmers maintenance manual and contact the maintenance programmer for additional assistance.

REPORT GENERATOR STRUCTURE
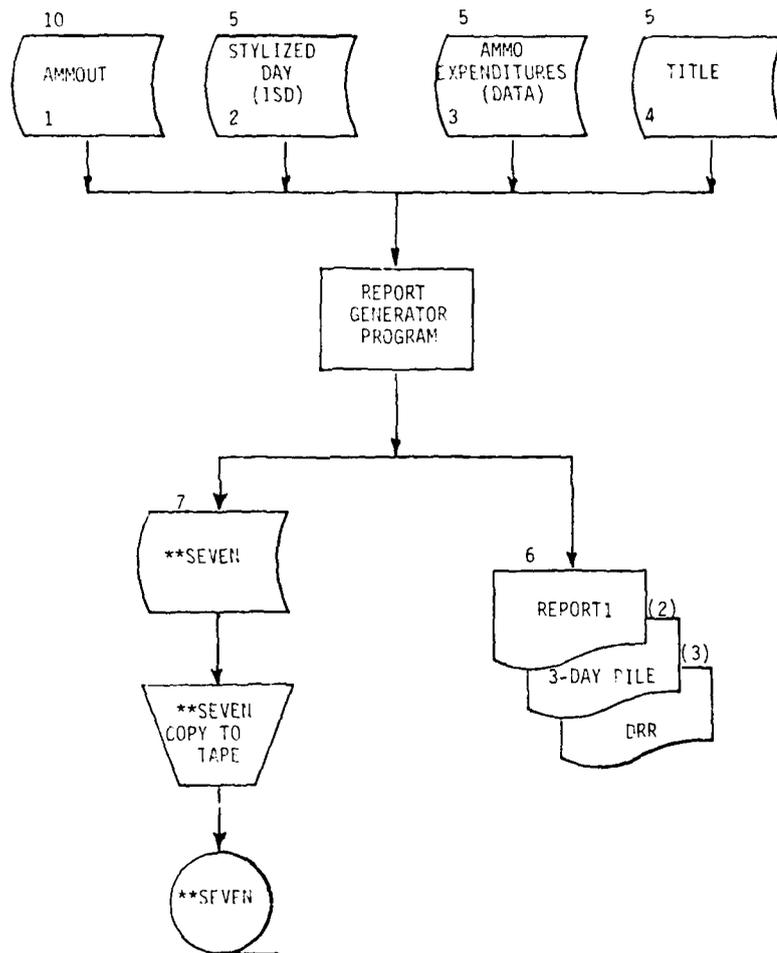
Figure III.3.1
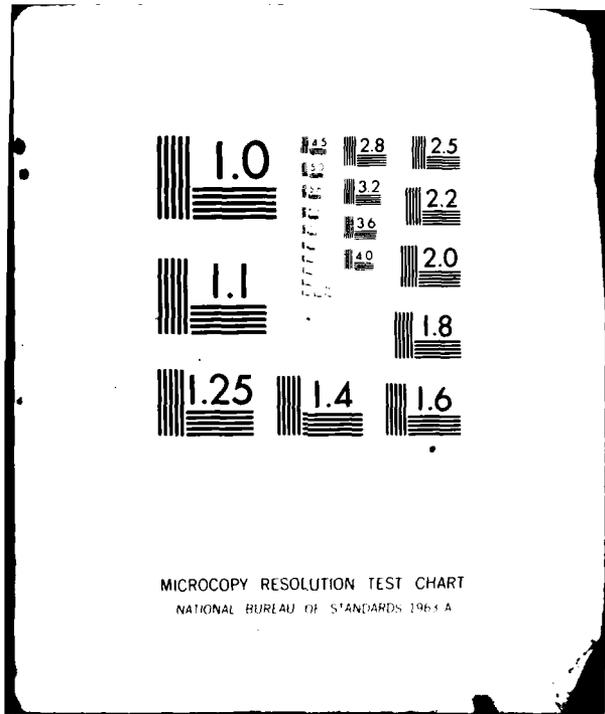
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963-A
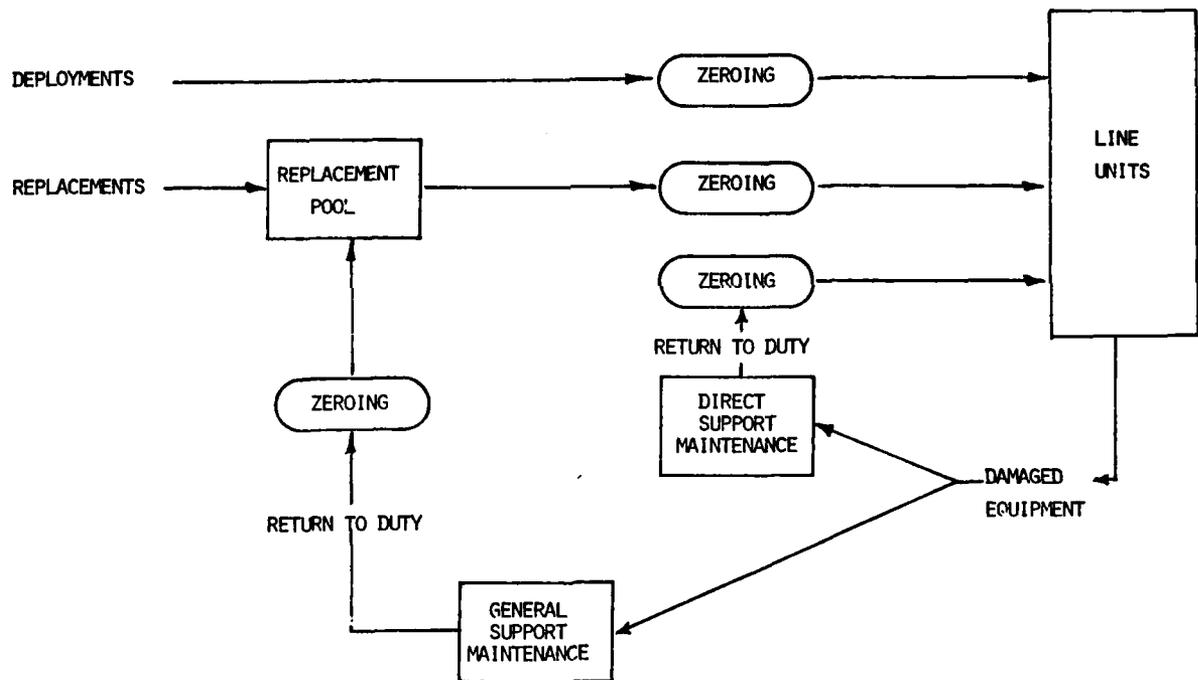
Figure III.3.1A

```
1      &RUN.E/TP  A1560,E236UAU229,UNCLASSIFIED,15,2UUU/1UUUU
2      &ASG.A  CUNFIDENTIAL*56ESDGEN/     /    .
3      &USE F..,CUNFIDENTIAL*56ESDGEN/     /    .
4      &DELETE,C 56REPORT.
5      &ASG.A  CONFIDENTIAL*37AMMOUT/     /    .
6      &ASG.A  56SEVEN.
7      &USE /..,56SEVEN.
8      &ASG.T  3.,,///5UU
9      &ASG.T  2.,,///2UU
10     &USE 1U..CONFIDENTIAL*37AMMOUT/     /    .
11     &ASG.UP  56REPORT..,///1UUU
12     &BRKPT PRINT$/56REPORT
13     &PRT.5 CUNFIDENTIAL*56ESDGEN/     /    .REPORT66
14     &PRT.5  F.150
15     &PRT.5  F.TITLE86/V
16     &PRT.5  F.DATA86/V
17     &XUT  F.REPORT66
18     &ADU  F.150
19     &ADU  F.TITLE88/V
20     &ADU  F.DATA86/V
21     &ED.R 56SEVEN.
22     LNP 1UU
23     OMI
24     &ED.R CONFIDENTIAL*37AMMOUT/     /    .
25     LNP!
26     OMI
27     &BRKPT PRINT$
28     &FREE  56REPORT.
29     &SYM.5U  56REPORT...,PR
```

Figure III.3.2

Figure III.3.3

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1	1	57	2	114	1	171	1
2	1	58	1	115	2	172	1
3	1	59	1	116	2	173	1
4	2	60	1	117	1	174	1
5	1	61	1	118	1	175	1
6	1	62	1	119	1	176	2
7	1	63	2	120	2	177	1
8	1	64	1	121	1	178	1
9	2	65	2	122	2	179	1
10	1	66	1	123	2	180	1
11	1	67	2	124	2		
12	1	68	1	125	1		
13	2	69	1	126	1		
14	1	70	2	127	1		
15	1	71	2	128	2		
16	1	72	1	129	1		
17	1	73	2	130	2		
18	1	74	2	131	2		
19	1	75	1	132	1		
20	1	76	2	133	1		
21	1	77	2	134	1		
22	1	78	1	135	1		
23	1	79	2	136	2		
24	1	80	1	137	1		
25	1	81	1	138	1		
26	2	82	1	139	1		
27	1	83	1	140	1		
28	1	84	1	141	1		
29	2	85	1	142	1		
30	1	86	2	143	1		
31	2	87	2	144	2		
32	2	88	1	145	1		
33	2	89	2	146	1		
34	1	90	2	147	1		
35	1	91	1	148	1		
36	2	92	1	149	2		
37	2	93	2	150	1		
38	2	94	1	151	2		
39	1	95	1	152	2		
40	1	96	2	153	1		
41	1	97	1	154	1		
42	2	98	1	155	2		
43	2	99	2	156	2		
44	1	100	2	157	2		
45	2	101	1	158	1		
46	1	102	1	159	1		
47	1	103	2	160	1		
48	1	104	2	161	1		
49	1	105	1	162	1		
50	2	106	1	163	1		
51	1	107	2	164	1		
52	1	108	1	165	1		
53	2	109	1	166	1		
54	2	110	2	167	1		
55	1	111	1	168	1		
56	2	112	2	169	1		
		113	2	170	1		

Figure III.3.4

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```
CONFIDENTIAL*56ESDGEN(1)*TITLE88/V
    1        (5) RATES AND REQ. FOR CONV. MUNITIONS FOR WARRAMP V(3 APR 81)
    2
    3        (C) THREE DAY INCREMENTAL REQUIREMENT FOR CONVENTIONAL MUNITIONS FOR EU
    4        ROPE P80 WARRAMP V
    5        EUROPE-P80 WARRAMP V                        DISTRIBUTION OF REQUIREME
    6        NT
    7          0.0   0.0  .031  .027 0.00 0:00 0.00
    8        5U5U4U
    9        4L1000
```

Figure III.3.5

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DATA

```
 1: 1RIFLE,M16A1  5.56MM
 2: 2   422921   133010   170688   214863    18280     9986     5118     2026
 3: 3BALL                                       10                .04
 4:E007C1 R94967 R94977
 5: 4   .14          84F6     61E6     43E6      4E6      2E6      1E6
 6: 5      1          0          0          0          0     17.
 7:99999      3          0        7.4      235.9     44.5
 8: 3TRACER                                    10                .04
 9:E007C2 R94967 R94977
10: 4  .14
11:99999      3          0        1.85      58.98    11.13
12: 1SQUAD AUTOMATIC WPN (SAW) 5.56 MM
13: 2    6598     2075     2663     3352      285      156       80
14: 3BALL                                       10                .04
15:E046C1 Z40270
16: 4   .14          4F6     1.6E6    1.5E6    3.6E6   763680    77440 103680
17: 5      1          0          0          0          0     .0389
18:99999      3      52763     110791     13920   231784
19: 3TRACER                                    10                .04
20:E046C2 240270
21: 4  .14
22: 5      1          0          0          C          0      2.58
23:99999      3      13191      27698       3480    57946
24: 1REVOLVER,CAL .38
25: 2   1E20     1E20     1E20     1E20     1E20     1E20     1E20     1E201
26: 3BALL                                       01                .04
27:E050C0 R91107 R91244
28: 4      0       0       .89      .89      .89      .89      .89      .89
29:99999
30: 1PISTOL,CAL .45
31: 2   1E20     1E20     1E20     1E20     1E20     1E20     1E20     1E201
32: 3BALL                                       01                .06
33:E057C0 N96741
34: 4      0       0       .30      .30      .30      .30      .30      .30      .30
35:99999
36: 1SUBMACHINEGUN,CAL .45
37: 2   1E20     1E20     1E20     1E20     1E20     1E20     1E20     1E201
38: 3BALL                                       01                .06
39:E057C0 US6346
40: 4      0       0       .61      .61      .61      .61      .61      .61
41:99999
42: 1SHOTGUN,12 GAUGE
43: 2   1E20     1E20     1E20     1E20     1E20     1E20     1E20     1E201
44: 3"00" BUCKSHOT                              01                .19
45:E002C0 T39223
46: 4      C       0      5.C4     5.04     5.04     5.04     5.04     5.04     5.04
47:99999
48: 1MACHINEGUN,7.62   (GROUND MOUNT)
49: 2   16266     3522     4115     9488     2100      140      188      130
50: 3BALL/TRACER                               10                .10
51:E02002 213388 L92366
52: 4  .14        12.5E6   3.25E6   3.38E6    7.5E6   1.75E6  129800  150400
53: 5      1          0          C          0          0      .98
54:99999      3      28446      8355P      12861    38448
55: 1MACHINEGUN, 7.62   (IFV & CFV MOUNT)
56: 2    1229      228      211      384      138
57: 3BALL-TRACER (4 TO 1)                      10                .10
```

Figure III.3.6

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DATA

```
115: 4   .14
116: 5      1G    3360.30     3360.30     3360.30     3360.00  144.
117:99999
118: 3TRACER                              10                  .04
119:E04602 Z41940
120: 4   .14
121: 5      10     840.30      840.30      840.30      840.00   36.
122:99999
123: 1GUN, 25MM, BUSHMASTER (IFV & CFV MTD)
124: 2    1229      228      211       522       0
125: 3HEIT                                10                 1.32
126:E08201 Z41940 Z42003
127: 4   .14
128: 5      14     536.30      687.00     1047.00      668.00    4.
129: 5      10     236.30      274.00      781.00      285.00    4.
130: 6999    3    2020.0      452.0         9.0      210.0
131: 6999   33       .30        .00         .00        .00
132: 6999   34    000.30      000.00      217.16      000.00
133: 6999   35       .00        .30         .00        .00
134: 6999   36    000.30     0000.30       00.00      000.00
135: 6999   34    000.30       00.00       43.43      000.30
136:99909   36    000.30      000.00        0.00      000.30
137: 3APDS-T                               10                 1.20
138:E08202 Z41940 Z42003
139: 4   .14
140: 5      14     717.30      579.00      440.00      798.30    1.
141: 5      10     298.00      570.00      110.00      586.30    1.
142: 6999   33    000.30      000.00        0.00      000.30
143: 6999   34    000.30      000.30       54.84       00.30
144: 6999   35    000.30      000.30        0.00      000.00
145: 6999   36    000.30      000.30      0C0.30      000.00
146: 6999   34    000.30      000.30        0.00      000.30
147:99999   36    000.30      000.30       00.00      000.30
148: 1GRENADE LAUNCHER,40MM (M79/M203)
149: 2    23356     5536      5750     15114      2831       114       144       10G
150: 34433 HE-DP                            10                 .78
151:E12600 L44575 L44595
152: 4   .14    0 28892.     6750. 15114.     2831.      114.      144.      100.
153:99999    3     5728     10729      3245      1950
154: 34583 SIG STAR PARA (WHITE)    01                 1.04
155:E12000 L44575 L44595
156: 4     0    0    .02      .02      .02      .02      .02      .02      .02
157:99999
158: 3 M662 SIG STAR PARA (RED)    01                 1.04
159:E12400 L44575 L44595
160: 4     0    0    .02      .02      .02      .02      .02      .02      .02
161:99999
162: 3 M661 SIG STAR PARA (GREEN)    01                 1.04
163:E13300 L44575 L44595
164: 4     G    0    .02      .02      .02      .02      .02      .02      .02
165:99999
166: 3xM713 SIG SMOKE (RED)         01                 1.71
167:E11300 L44575 L44595
168: 4     C    0    .07      .07      .07      .07      .07      .07      .07
169:99999
170: 3xM715 SIG SMOKE (GREEN)       01                 1.71
171:E11400 L44575 L44595
```

Figure III.3.6 (Cont)

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DATA

```
58:E02C02 740038
59: 4  .14      1F7 487600
6C: 5       14   7600.00    7600.00    7600.00    7600.00   5C.
61: 5       10   4400.00    4400.00    4400.00    4400.00   50.
62:99909    3        0          0          0          0
63: 1MACHINEGUN, 7.62  (TANK MOUNTED)
64: 2    3447      306       1066      2331        0
65: 3BALL-TRACER (4 TO 1)              10              .1C
66:E020C2 L92352 Z39970
67: 4  .14
68: 5        2  11400.00   11400.00   11400.00   11400.00   5C.
69: 5        3   5960.00    5960.00    5960.00    5960.00   50.
70: 5        4   5960.00    5960.00    5960.00    5960.00   5C.
71: 5        6  11400.00   11400.00   11400.00   11400.00   50.
72:99999    17   1019.00    2535.00     544.00     240.00
73: 1MACHINEGUN,M2HB,CAL .5C (GROUND MOUNT)
74: 2    2610      425       992       2156      352
75: 3API/API-T                        10              .44
76:EC6900 L91938 L92975 L91427
77: 4  .14
78: 5        1        0          0          0          0      2.96
79:99999    3     30576      51556      2340       5880
80: 1MACHINEGUN,M2HB,CAL .50 (APC MOUNT)
81: 2    2496      134       832       2074        0
82: 3API-APIT                         10              .44
83:EC6900 L91701
84: 4  .14           1E6 242600 727800    1E6 525200
85: 5       13    600.00     600.00     600.00     600.00   40.
86: 5       12    600.00     600.00     600.00     600.00   40.
87: 6999    4C     28.00      16.00     262.00     113.00
88: 6999    4C      2.8        1.6C      26.20      11.30
89:99999    38    000.00     000.00     000.00     000.00
90: 1MACHINEGUN,CAL .50 (TANK MOUNTED) M85
91: 2    3447      306       1066      2331        0
92: 3API-APIT                         10              .44
93:EC8400 L92112
94: 4  .06
95: 5        2   1000.00    1000.00    1000.00    1000.00   40.
96: 5        3    900.00     900.00     900.00     900.00   40.
97: 5        4    900.00     900.00     900.00     900.00   40.
98: 5        6   1000.00    1000.00    1000.00    1000.00   4C.
99: 6999    14    000.00    0000.00     000.00     000.00
100: 6999    17    000.00    0000.00     000.00     000.00
101: 6999    16   0000.00    0000.00     000.00     000.00
102: 6999    15    000.00     000.00      00.00      00.00
103: 6999     4     0C.00     000.00       0.00       0.00
104: 6999     5     00.00     000.00       0.00       0.00
105: 6999     6    000.00     000.00       0.00       0.00
106: 6999     7      0.00      00.00       0.00       0.00
107: 6999     9     00.00      00.00       0.00       0.00
108: 6999    10     00.00      00.00       0.00       0.00
109: 6999    11     00.00      00.00       0.00      00.00
110:99999    12      0.00       0.00       0.00       0.00
111: 1SUBMACHINE GUN 5.56MM(PORT FIRING)
112: 2    3906      726       672       2076        0
113: 3BALL                            10              .04
114:E04601 Z41940
```

Figure III.3.6 (Cont)

SEVEN

```
114:
116:
117:SSN    E    2        MACHINEGUN,7.62  (GROUND MOUNT)
118:                      BALL/TRACER
119:
120:
121: CAA FACTORS        L  38
122:EUROPE- 1            57.712
123:EUROPE- 2            17.957
124:EUROPE- 3            26.279
125:EUROPE- 4            26.279
126:EUROPE- 5            29.403
127:EUROPE- 6            29.403
128:EUROPE- 7            17.211
129:EUROPE- 8            17.211
130:EUROPE- 9            19.426
131:EUROPE-10            19.426
132:EUROPE-11            17.015
133:EUROPE-12            17.015
134:
135:
136:SSN    E    2        MACHINEGUN, 7.62  (IFV & CFV MOUNT)
137:                      BALL-TRACER (4 TO 1)
138:
139:
140: CAA FACTORS        C7   5      J  750
141:EUROPE- 1           723.471    723.471
142:EUROPE- 2           143.715    143.715
143:EUROPE- 3           145.672    145.672
144:EUROPE- 4           145.672    145.672
145:EUROPE- 5            72.732     72.732
146:EUROPE- 6            72.732     72.732
147:EUROPE- 7            27.894     27.894
148:EUROPE- 8            27.894     27.894
149:EUROPE- 9            13.722     13.722
150:EUROPE-10            13.722     13.722
151:EUROPE-11             7.748      7.748
152:EUROPE-12             7.748      7.748
153:
154:
155:SSN    E    2        MACHINEGUN, 7.62  (TANK MOUNTED)
156:                      BALL-TRACER (4 TO 1)
157:
158:
159: CAA FACTORS        L   2      Z3   0
160:EUROPE- 1           162.206    162.206
161:EUROPE- 2           214.559    214.559
162:EUROPE- 3           217.154    217.154
163:EUROPE- 4           217.154    217.154
164:EUROPE- 5           124.432    124.432
165:EUROPE- 6           124.432    124.432
166:EUROPE- 7            62.194     62.194
167:EUROPE- 8            62.194     62.194
168:EUROPE- 9            61.627     61.627
169:EUROPE-10            61.627     61.627
170:EUROPE-11            35.660     35.660
171:EUROPE-12            35.660     35.660
```

Figure III.3.7

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(J) RAILS AND REQ. FOR CONV. MUNITIONS FOR WARRAMP V

RIFLE,M16A1 5.56MM

	O-DAY	1-15	16-30	1-30	31-60	61-90	1-60
PERIODS (DAYS):	422921.						
TOTAL DEPLOYMENT:		555931.	726619.	726619.	941482.	959762.	941482.
AVERAGE DEPLOYMENT:		489426.	641275.	56535C.	834050.	950622.	699700.

	1-90	91-120	121-150	151-180	91-180	1-180
PERIOD (DAYS):						
TOTAL DEPLOYMENT:	959762.	969748.	974866.	976892.	976892.	976892.
AVERAGE DEPLOYMENT:	783341.	964755.	972307.	975579.	970980.	877161.

BALL

	1-15	16-30	1-30	31-60	61-90	1-60
PERIOD (DAYS):						
QUANTITY:	99698166.	71741649.	171439814.	54569655.	5914286.	226009468.
TONNAGE:	1993.96	1934.83	3428.80	1091.39	118.28	4520.19
RATE:	13.28	7.46	10.11	2.18	.21	5.38

	1-90	91-120	121-150	151-180	91-180	1-180
PERIOD (DAYS):						
QUANTITY:	231923712.	4204953.	4672030.	1991101.	10868085.	242791796.
TONNAGE:	4638.47	84.10	93.44	39.82	217.36	4855.84
RATE:	3.29	.15	.16	.07	.12	1.54

TRACER

	1-15	16-30	1-30	31-60	61-90	1-60
PERIOD (DAYS):						
QUANTITY:	936.	15231237.	15232173.	39400719.	28382530.	58632892.
TONNAGE:	.02	304.62	304.64	788.01	567.65	1092.66
RATE:	.000	1.583	.898	1.575	.995	1.301

	1-90	91-120	121-150	151-180	91-180	1-180
PERIOD (DAYS):						
QUANTITY:	83015422.	5747225.	43504966.	44682849.	93943939.	176959360.
TONNAGE:	1660.31	114.94	870.10	893.83	1878.88	3539.19
RATE:	1.178	.199	1.491	1.527	1.075	1.121

WEAPON TOTALS

	1-15	16-30	1-30	31-60	61-90	1-60
PERIOD (DAYS):						
QUANTITY:	99699101.	86972886.	186671986.	93970374.	34296776.	280642360.
TONNAGE:	1993.98	1739.46	3733.44	1889.41	685.94	5612.85
RATE:	13.58	9.04	11.01	3.76	1.20	6.68

	1-90	91-120	121-150	151-180	91-180	1-180
PERIOD (DAYS):						
QUANTITY:	314939132.	9952178.	48176996.	46682849.	104812023.	41975156.
TONNAGE:	6298.78	199.04	965.54	933.66	2096.24	8395.02
RATE:	4.47	.34	1.65	1.59	1.20	2.66

SQUAD AUTOMATIC WPN (SAW) 5.56 MM

	O-DAY	1-15	16-30	1-30	31-60	61-90	1-60
PERIODS (DAYS):	6596.						
TOTAL DEPLOYMENT:		8673.	11336.	11336.	14688.	14973.	14688.
AVERAGE DEPLOYMENT:		7635.	10004.	8820.	13912.	14830.	10916.

	1-90	91-120	121-150	151-180	91-180	1-180
PERIOD (DAYS):						
TOTAL DEPLOYMENT:	14973.	15129.	15209.	15209.	15209.	15209.
AVERAGE DEPLOYMENT:	12221.	15051.	15169.	15209.	15143.	13667.

Figure III.3.8

(U) RATES AND REQ. FOR CONV. MUNITIONS FOR WARRAMP V

BULK ALLOTMENT ITEMS (UNIT/1000 MEN/DAY)
(CONTINUED)

SMOKE POT, FLOATING, M7A1

PERIOD (DAYS):	1-15	16-30	1-30	31-60	61-90	1-60
QUANTITY:	3206.	8656.	11862.	26322.	19824.	38184.
TONNAGE:	70.91	191.48	262.39	587.74	438.50	848.63
RATE:	.42	.95	.71	1.12	.71	.95

PERIOD (DAYS):	1-90	91-120	121-150	151-180	91-180	1-180
QUANTITY:	58008.	9529.	23542.	27025.	60096.	118103.
TONNAGE:	1283.13	210.78	520.75	597.80	1329.32	2612.45
RATE:	.85	.33	.81	.93	.69	.76

STARTER, FIRE, M2

PERIOD (DAYS):	1-15	16-30	1-30	31-60	61-90	1-60
QUANTITY:	1406.	1406.	2812.	2899.	2888.	5711.
TONNAGE:	.06	.06	.11	.12	.12	.23
RATE:	.18	.15	.17	.12	.10	.14

PERIOD (DAYS):	1-90	91-120	121-150	151-180	91-180	1-180
QUANTITY:	8599.	2812.	2812.	2812.	8436.	17034.
TONNAGE:	.34	.11	.11	.11	.34	.68
RATE:	.13	.10	.10	.10	.10	.11

MOPMS

PERIOD (DAYS):	1-15	16-30	1-30	31-60	61-90	1-60
QUANTITY:	3188.	3040.	6227.	11315.	8120.	17542.
TONNAGE:	.00	.00	.00	.00	.00	.00
RATE:	.41	.33	.37	.48	.29	.44

PERIOD (DAYS):	1-90	91-120	121-150	151-180	91-180	1-180
QUANTITY:	25662.	6779.	6135.	8387.	21301.	46963.
TONNAGE:	.00	.00	.00	.00	.00	.00
RATE:	.38	.24	.21	.29	.25	.30

WEAPON TOTALS

PERIOD (DAYS):	1-15	16-30	1-30	31-60	61-90	1-60
QUANTITY:	1938219.	1899195.	3837415.	6320119.	5395077.	10157533.
TONNAGE:	3056.71	2975.33	6032.04	8803.94	6640.64	14835.98
RATE:	252.18	208.27	228.35	269.30	193.27	252.22

PERIOD (DAYS):	1-90	91-120	121-150	151-180	91-180	1-180
QUANTITY:	15552611.	5037616.	6166091.	7546019.	18749726.	34302335.
TONNAGE:	21476.62	5307.52	8007.66	11052.95	24368.13	45844.75
RATE:	228.09	175.12	213.39	260.45	216.42	221.56

SUMMARY OF TONNAGE FOR ALL MUNITIONS

PERIOD (DAYS):	1-15	16-30	1-30	31-60	61-90	1-60
TOTAL TONNAGE:	494935.69	399806.87	894742.55	1076973.75	876946.25	1971716.48

PERIOD (DAYS):	1-90	91-120	121-150	151-180	91-180	1-180
TOTAL TONNAGE:	2846662.91	662111.59	845934.79	329941.19	1637987.36	4286669.19

Figure III.3.8 (Cont)

RIFLE,M16A1 5.56MM
BALL

PERIOD (DAYS):	1-15	16-30	31-60	61-90	91-120	121-150	151-180
FAC-IN:	0.	0.	0.	0.	0.	0.	0.
LOS-DC:	84000000.	61000000.	83000000.	40000000.	20000000.	10000000.	0.
LOS-DI:	0.	0.	0.	0.	0.	0.	0.
LOS-DL:	0.	0.	0.	0.	0.	0.	0.
LOS-AT:	0.	0.	0.	0.	0.	0.	0.
ZL-DEP:	2622012.	892211.	1623721.	468877.	60536.	78921.	86319.
ZL-RTL:	64034.	79813.	217410.	126361.	60536.	78921.	0.
ZL-REP:	765207.	956398.	1576369.	846638.	1602311.	3010326.	1687075.
ZL-RTR:	0.	0.	0.	0.	0.	0.	0.
EXP-DL:	77.	65.	207.	95.	36.	74.	99.
EXP-DI:	3211.	2805.	10941.	9438.	5645.	8740.	12868.
FXP-DL:	74.	74.	186.	135.	28.	212.	218.
EXP-AT:	0.	0.	0.	0.	0.	0.	0.
HI :	12243634.	8810378.	6500036.	707216.	516396.	573758.	244521.
LOG :	0.	0.	1640795.	155486.	0.	0.	0.
SEA :	99698173.	71741653.	54569663.	5912286.	4204954.	4672031.	1091101.
TOTAL :							

RIFLE,M16A1 5.56MM
TRACER

PERIOD (DAYS):	1-15	16-30	31-60	61-90	91-120	121-150	151-180
FAC-IN:	0.	0.	0.	0.	0.	0.	0.
LOS-DC:	0.	0.	0.	0.	0.	0.	0.
LOS-DI:	0.	0.	0.	0.	0.	0.	0.
LOS-OL:	0.	0.	0.	0.	0.	0.	0.
LOS-AT:	0.	0.	0.	0.	0.	0.	0.
ZL-DEP:	0.	0.	0.	0.	0.	0.	0.
ZL-RTD:	0.	0.	0.	0.	0.	0.	0.
ZL-REP:	0.	0.	0.	0.	0.	0.	0.
ZL-RTR:	0.	0.	0.	0.	0.	0.	0.
EXP-DL:	19.	16.	52.	24.	9.	18.	25.
EXP-DI:	802.	700.	2732.	2357.	1409.	2182.	3213.
EXP-AT:	0.	1360018.	3352004.	2424003.	5040007.	3816005.	39200051.
HI :	0.	0.	4693196.	3393938.	0.	0.	0.
LOG :	115.	1970503.	1184697.	746181.	705800.	5392715.	5884460.
SEA :	0.	0.	0.	0.	0.	0.	0.
TOTAL :	936.	15231238.	39400719.	28382530.	5747225.	43504965.	46917486.

Figure III.3.9

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SQUAD AUTOMATIC WPN (SAW) 5.56 MM
BALL

PERIOD (DAYS):	1- 15	16- 30	31- 60	61- 90	91-120	121-150	151-180
FAC-IN:	4000000.	1600000.	1500000.	3600000.	763680.	77480.	103680.
LOS-DE:	0.	0.	0.	0.	0.	0.	0.
LOS-DI:	0.	0.	0.	0.	0.	0.	0.
LOS-DL:	0.	0.	0.	0.	0.	0.	0.
LOS-AT:	0.	0.	0.	0.	0.	0.	0.
ZE-DEP:	6000.	2042.	3715.	1073.	184.	181.	198.
ZE-RTD:	147.	183.	497.	289.	3666.	6888.	3769.
ZE-REP:	1751.	2188.	3607.	1022.			
ZE-RTR:							
EXP-DE:	70702.	144043.	529213.	392557.	906996.	94973.	1485707.
EXP-DI:	1159982.	978284.	3099932.	1426988.	537336.	1103478.	759336.
EXP-DL:	189451.	165509.	645610.	556939.	333106.	515736.	1135742.
EXP-AT:		387079.	971175.	702305.	146024.	1105610.	
M1 :							
LOG :	759924.	459106.	945525.	935364.	376739.	406605.	988380.
SEA :			238677.	205646.			
TOTAL :	6187957.	3738434.	7937951.	7822184.	3067731.	3310909.	3976811.

SQUAD AUTOMATIC WPN (SAW) 5.56 MM
TRACER

PERIOD (DAYS):	1- 15	16- 30	31- 60	61- 90	91-120	121-150	151-180
FAC-IN:	0.	0.	0.	0.	0.	0.	0.
LOS-DE:	0.	0.	0.	0.	0.	0.	0.
LOS-DI:	0.	0.	0.	0.	0.	0.	0.
LOS-DL:	0.	0.	0.	0.	0.	0.	0.
LOS-AT:	0.	0.	0.	0.	0.	0.	0.
ZE-DEP:	397929.	135406.	246424.	71159.			
ZE-RTD:	9718.	12113.	32995.	19177.	12222.	11977.	13100.
ZE-RFP:	116131.	145134.	239233.	67784.	243174.	456861.	249968.
ZE-RTR:							
EXP-DE:	17676.	36011.	132306.	98141.	226753.	23784.	371430.
EXP-DI:	289998.	244573.	778992.	356750.	134335.	275872.	189834.
EXP-DL:	47363.	41377.	161402.	139235.	83276.	128934.	283935.
EXP-AT:		96770.	242794.	175576.	36506.	276402.	
M1 :							
LOG :	123034.	99594.	256221.	129895.	103077.	164331.	155157.
SEA :			64677.	28558.			
TOTAL :	1001849.	810978.	2151046.	1086276.	839345.	1338122.	1263825.

Figure III.3.9 (Cont)

WARRAMP   TEST   DISTRIBUTION OF REQUIREMENT

REVOLVER,CAL .38
BALL

PERIOD (DAYS):	1- 15	16- 30	31- 60	61- 90	91-120	121-150	151-180
FAC-IN:	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LOS-DE:	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LOS-DI:	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LOS-DL:	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LOS-AT:	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZE-DEP:	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZE-RTD:	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZL-RCP:	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZL-RTR:	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EXP-DE:	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EXP-DI:	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EXP-AT:	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HI :							
LOG :							
SEA :							
TOTAL :	0.0	0.0	0.0	0.0	0.0	0.0	0.0

PISTOL,CAL .45
BALL

PERIOD (DAYS):	1- 15	16- 30	31- 60	61- 90	91-120	121-150	151-180
FAC-IN:	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LOS-DE:	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LOS-DI:	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LOS-DL:	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LOS-AT:	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZE-DEP:	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZL-RTD:	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZL-RCP:	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZL-RTR:	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EXP-DE:	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EXP-DI:	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EXP-AT:	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HI :							
LOG :							
SEA :							
TOTAL :	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Figure III.3.9 (Cont)

LARRAMP   TEST   DISTRIBUTION OF REQUIREME NT

SUBMACHINEGUN,CAL .45
    BALL

PERIOD (DAYS):	1- 15	16- 30	31- 60	61- 90	91-120	121-150	151-180
FAC-IN:							
LOS-DE:							
LOS-DI:							
LOS-DL:							
LOS-AT:							
ZE-DEP:							
ZE-HTD:							
ZE-REP:							
ZE-RTR:							
EXP-DE:							
EXP-DI:							
EXP-AT:							
HI :							
LOG :							
SEA :							
TOTAL :							

SHOTGUN,12 GAUGE
    00 BUCKSHOT

PERIOD (DAYS):	1- 15	16- 30	31- 60	61- 90	91-120	121-150	151-180
FAC-IN:							
LOS-DE:							
LOS-DI:							
LOS-DL:							
LOS-AT:							
ZE-DEP:							
ZE-RTD:							
ZE-REP:							
ZE-RTR:							
EXP-DE:							
EXP-DI:							
EXP-DL:							
EXP-AT:							
HI :							
LOG :							
SEA :							
TOTAL :							

Figure III.3.9 (Cont)

BULK ALLOTMENT ITEMS (UNIT/1000 MEN/DAY)
SMOKE POT, FLOATING, M7A1

PERIOD (DAYS):	1- 15	16- 30	31- 60	61- 90	91-120	121-150	151-180
FAC-IN:	0.	0.	0.	0.	0.	0.	0.
LOS-DE:	0.	0.	0.	0.	0.	0.	0.
LOS-DI:	0.	0.	0.	0.	0.	0.	0.
LOS-DL:	0.	0.	0.	0.	0.	0.	0.
LOS-AT:	0.	0.	0.	0.	0.	0.	0.
ZE-DEP:	0.	0.	0.	0.	0.	0.	0.
ZE-RTU:							
ZE-REP:							
ZE-RTR:							
EXP-DE:	214.	437.	1605.	1190.	2750.	288.	0.
EXP-DI:	503.	424.	1343.	618.	233.	478.	644.
EXP-DL:	2395.	2093.	8163.	7042.	4212.	6521.	9601.
EXP-AT:	0.	5451.	13676.	9890.	2056.	15569.	15994.
HI :	0.	0.	0.	0.	0.	0.	0.
LOG :	93.	252.	744.	562.	278.	686.	787.
SEA :	0.	0.	791.	521.	0.	0.	0.
TOTAL :	3206.	8656.	26322.	19824.	9529.	23542.	27025.

BULK ALLOTMENT ITEMS (UNIT/1000 MEN/DAY)
STARTER, FIRE, M2

PERIOD (DAYS):	1- 15	16- 30	31- 60	61- 90	91-120	121-150	151-180
FAC-IN:	1365.	1365.	2730.	2730.	2730.	2730.	2730.
LOS-DE:	0.	0.	0.	0.	0.	0.	0.
LOS-DI:	0.	0.	0.	0.	0.	0.	0.
LOS-DL:	0.	0.	0.	0.	0.	0.	0.
LOS-AT:	0.	0.	0.	0.	0.	0.	0.
ZE-DEP:	0.	0.	0.	0.	0.	0.	0.
ZE-RTU:	0.	0.	0.	0.	0.	0.	0.
ZE-REP:	0.	0.	0.	0.	0.	0.	0.
ZE-RTR:	0.	0.	0.	0.	0.	0.	0.
EXP-DE:	0.	0.	0.	0.	0.	0.	0.
EXP-DI:	0.	0.	0.	0.	0.	0.	0.
EXP-DL:	0.	0.	0.	0.	0.	0.	0.
EXP-AT:	0.	0.	0.	0.	0.	0.	0.
HI :	41.	41.	82.	82.	82.	82.	82.
LOG :	0.	0.	87.	76.	82.	82.	82.
SEA :	0.	0.	0.	0.	0.	0.	0.
TOTAL :	1406.	1406.	2899.	2888.	2812.	2812.	2812.

Figure III.3.9 (Cont)

(U) THREE DAY INCREMENTAL REQUIREMENT FOR CONVENTIONAL MUNITIONS FOR

Column groupings: WARRAMP — TEST

RIFLE, M16A1 5.56MM — BALL

1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24	25-27	28-30
2521083.	317525.	334153.	237633.	577884.	558187.	514869.	154195.	160201.	819203.

31-33	34-36	37-39	40-42	43-45	46-48	49-51	52-54	55-57	58-60
432143.	215873.	630688.	694667.	529130.	339371.	317519.	531464.	113288.	104727.

61-63	64-66	67-69	70-72	73-75	76-78	79-81	82-84	85-87	88-90
618208.	80264.	72160.	57908.	54129.	50960.	55740.	68453.	67778.	72568.

RIFLE, M16A1 5.56MM — TRACER

1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24	25-27	28-30
101.	203.	188.	207.	237.	240.	2189009.	6475335.	3374524.	3192128.

31-33	34-36	37-39	40-42	43-45	46-48	49-51	52-54	55-57	58-60
5472184.	5198712.	5472297.	8104344.	2553958.	2280371.	3009959.	3374717.	3648339.	3101145.

61-63	64-66	67-69	70-72	73-75	76-78	79-81	82-84	85-87	88-90
4651509.	7648343.	4742711.	3739496.	2097918.	2827452.	2280235.	912260.	1277038.	1459393.

SQUAD AUTOMATIC WPN (SAW) 5.56 MM — BALL

1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24	25-27	28-30
229516.	362352.	408359.	382309.	245421.	270042.	298401.	403181.	387336.	595074.

31-33	34-36	37-39	40-42	43-45	46-48	49-51	52-54	55-57	58-60
640117.	763489.	762856.	598644.	627721.	560224.	538840.	427973.	588543.	480867.

61-63	64-66	67-69	70-72	73-75	76-78	79-81	82-84	85-87	88-90
460654.	404127.	444121.	453910.	352301.	351217.	272902.	257710.	223508.	292591.

SQUAD AUTOMATIC WPN (SAW) 5.56 MM — TRACER

1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24	25-27	28-30
438487.	138473.	152498.	131366.	141024.	151859.	152318.	124027.	112980.	271796.

31-33	34-36	37-39	40-42	43-45	46-48	49-51	52-54	55-57	58-60
225256.	223323.	285891.	254482.	236715.	191143.	182500.	187156.	164060.	135843.

61-63	64-66	67-69	70-72	73-75	76-78	79-81	82-84	85-87	88-90
208445.	113051.	121753.	122054.	96070.	95357.	76386.	74620.	65979.	80002.

MACHINEGUN, 7.62 (IFV & CFV MOUNT) — BALL/TRACER

1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24	25-27	28-30
316957.	298267.	332115.	304608.	215194.	243341.	219476.	206090.	215703.	419286.

31-33	34-36	37-39	40-42	43-45	46-48	49-51	52-54	55-57	58-60
389738.	487735.	524780.	419415.	464563.	409151.	385711.	300802.	388268.	314628.

61-63	64-66	67-69	70-72	73-75	76-78	79-81	82-84	85-87	88-90
314629.	258139.	264330.	289782.	231947.	216582.	162873.	179296.	149989.	189002.

MACHINEGUN, 7.62 (GROUND MOUNT) — BALL-TRACER (4 TO 1)

1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24	25-27	28-30
395204.	352317.	499737.	563696.	453857.	546881.	551999.	721039.	693131.	882189.

31-33	34-36	37-39	40-42	43-45	46-48	49-51	52-54	55-57	58-60
945505.	964050.	929782.	710779.	660042.	772297.	778289.	717345.	702403.	711257.

61-63	64-66	67-69	70-72	73-75	76-78	79-81	82-84	85-87	88-90
764723.	749849.	721107.	758795.	586496.	533354.	487997.	378148.	352739.	338066.

Figure III.3.10

(U) THREE DAY INCREMENTAL REQUIREMNT FOR CONVENTIONAL MUNITIONS FOR

WARRAMP   TEST   # Z OF 1#)

MACHINE GUN, 7.62 (TANK MOUNTED)
BALL-TRACER (4 TO 1)

PERIOD (DAYS):	1- 3	4- 6	7- 9	10-12	13-15	16-18	19-21	22-24	25-27	28-30
QUANTITY:	1132624.	1626936.	2366628.	1536453.	1008622.	1102271.	1097475.	1895396.	1670011.	2563537.
PERIOD (DAYS):	31-33	34-36	37-39	40-42	43-45	46-48	49-51	52-54	55-57	58-60
QUANTITY:	2715310.	3398711.	3374836.	2406274.	2371694.	2276729.	2034546.	1910107.	2146914.	1855677.
PERIOD (DAYS):	61-63	64-66	67-69	70-72	73-75	76-78	79-81	82-84	85-87	88-90
QUANTITY:	2091217.	1836970.	1789799.	2100684.	1394696.	1550988.	1471229.	1886618.	1085729.	1328066.

MACHINEGUN,M2HB,CAL .50 (GROUND MOUNT)
API/AP1-7

PERIOD (DAYS):	1- 3	4- 6	7- 9	10-12	13-15	16-18	19-21	22-24	25-27	28-30
QUANTITY:	536677.	249902.	235902.	207595.	163553.	206714.	188367.	123605.	139329.	392192.
PERIOD (DAYS):	31-33	34-36	37-39	40-42	43-45	46-48	49-51	52-54	55-57	58-60
QUANTITY:	307643.	317693.	376449.	330940.	331139.	268917.	243150.	229674.	233658.	186137.
PERIOD (DAYS):	61-63	64-66	67-69	70-72	73-75	76-78	79-81	82-84	85-87	88-90
QUANTITY:	240850.	133058.	180946.	155088.	131774.	125575.	99468.	109156.	88307.	126427.

MACHINEGUN,CAL .50 (APC MOUNT)
AP1-AP17

PERIOD (DAYS):	1- 3	4- 6	7- 9	10-12	13-15	16-18	19-21	22-24	25-27	28-30
QUANTITY:	287112.	174231.	215222.	148296.	103282.	130022.	150144.	253093.	231335.	327020.
PERIOD (DAYS):	31-33	34-36	37-39	40-42	43-45	46-48	49-51	52-54	55-57	58-60
QUANTITY:	307452.	331549.	354276.	287454.	251500.	243261.	246517.	255628.	266449.	256240.
PERIOD (DAYS):	61-63	64-66	67-69	70-72	73-75	76-78	79-81	82-84	85-87	88-90
QUANTITY:	295241.	238346.	236057.	243558.	179237.	198296.	185988.	129818.	185566.	153365.

MACHINEGUN,CAL .50 (TANK MOUNTED) M85
API-AP17

PERIOD (DAYS):	1- 3	4- 6	7- 9	10-12	13-15	16-18	19-21	22-24	25-27	28-30
QUANTITY:	262028.	218408.	295761.	170461.	104292.	108642.	119270.	221531.	198128.	319029.
PERIOD (DAYS):	31-33	34-36	37-39	40-42	43-45	46-48	49-51	52-54	55-57	58-60
QUANTITY:	307926.	393051.	402959.	316067.	308733.	266584.	253655.	237945.	256628.	234979.
PERIOD (DAYS):	61-63	64-66	67-69	70-72	73-75	76-78	79-81	82-84	85-87	88-90
QUANTITY:	275218.	219344.	216004.	246057.	163981.	189871.	182036.	131925.	133240.	162760.

SUBMACHINE GUN 5.56MM(PORT FIRING)
BALL

PERIOD (DAYS):	1- 3	4- 6	7- 9	10-12	13-15	16-18	19-21	22-24	25-27	28-30
QUANTITY:	288535.	146004.	158869.	177944.	144619.	172751.	182661.	228352.	221649.	301086.
PERIOD (DAYS):	31-33	34-36	37-39	40-42	43-45	46-48	49-51	52-54	55-57	58-60
QUANTITY:	304188.	305543.	297994.	236111.	230645.	244040.	253824.	235570.	249572.	276645.
PERIOD (DAYS):	61-63	64-66	67-69	70-72	73-75	76-78	79-81	82-84	85-87	88-90
QUANTITY:	257638.	234191.	225598.	236548.	182190.	165763.	139958.	116980.	109637.	108953.

SUBMACHINE GUN 5.56MM(PORT FIRING)
TRACER

PERIOD (DAYS):	1- 3	4- 6	7- 9	10-12	13-15	16-18	19-21	22-24	25-27	28-30
QUANTITY:	72133.	36501.	39717.	44486.	36155.	43188.	45665.	57088.	55412.	75271.
PERIOD (DAYS):	31-33	34-36	37-39	40-42	43-45	46-48	49-51	52-54	55-57	58-60
QUANTITY:	76047.	75886.	74490.	59028.	57661.	61010.	63456.	58892.	62393.	56661.
PERIOD (DAYS):	61-63	64-66	67-69	70-72	73-75	76-78	79-81	82-84	85-87	88-90
QUANTITY:	64410.	58548.	56399.	59136.	45548.	41481.	34889.	29245.	27709.	26238.

Figure III.3.10 (Cont)

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Appendix A

References

A. COSAGE Data Requirements Document, 1st Ed, USACAA, Documentation CAA-D-80-8, dated 1 Jun 80.

B. Wartime Requirements for Ammunition, Materiel and Personnel (WARRAMP) Five-year Master Plan, CAA Memorandum, 12 October 1979.

C. Wartime Requirements for Ammunition, Materiel and Personnel (WARRAMP) Analytical Methodology, Technical Paper, CAA-TP-78-4, USACAA, dated August 1978.

D. Equipment Loss Consolidator (ELCON) Methodology, Documentation, CAA-D-79-3, USACAA, dated August 1979.

E. The Forewon Force-Planning System, Appendix C, User's Guide for Force Analysis Simulation of Theater Administrative and Logistic Support (FASTALS), Documentation, Research Analysis Corporation, RAC-R-86, dated May 1971.

F. Army Automation, Documentation Standards for Development and Maintenance of computer Software Memorandum, USACAA, CAA Memorandum 18-2, dated 26 October 1979.

G. Army Automation, Software Design and Development, HQDA, TB 18-103, dated January 1980.

H. Army Automation, Technical Documentation, HQDA, TB 18-111 dated January 1979.

I. Automated Data Systems Documentation Standards, Department of Defense, DOD Standard 7935.1-S, dated 13 September 1977.

J. System for Estimating Materiel Wartime Attrition and Replacement Requirements (SYMWAR), Vols I and II, RAC-TP-404, Sep 70 and Jan 71, respectively (on file at DDC).

K. Selected Analysis of 1972-1973 Equipment Attrition Factors, Vols I and II, ODCSLOG, 11 Apr 73.

L. An Analysis of Methods for Determining Wartime Materiel Requirements, Phase I, Vols I and II, CAA, Jun 73.

M. Wartime Active Replacements Factors (WARF), Phase II, System Design, CAA, Jan 74.

N. Wartime Replacement Factors--FY 80 (WARF-80), CAA (CAA-SR-75-9), Jul 75.

O. Wartime Replacement Factors (WARF) Systems Documentation, CAA, Apr 76.

P.   Wartime Replacement Factors--FY 78-82 (WARF 78-82), Vol II, Main Report, CAA (CAA-SR-78-13), Oct 78.

Q.   Wartime Requirements for Ammunition and Materiel, Fy 81-85. (AMMO P-85/WARF-85), Vol. I, Main Report, CAA (CAA-SR-79-1), Feb 79.

R.   Wartime Requirements for Ammunition and Materiel, FY 82-86 (AMMO P-86/WARF-85), Vol I, Main Report, CAA.

S.   SIMSCRIPT II.5 Programming Language, Kiviat, et.al; edited by E.C. Russell, 1975, CACI, Inc., 12011 San Vicente Blvd, Los Angeles, CA 90049

T.   SIMSCRIPT II.5 Reference Handbook, 1976, CACI, Inc., 12011 San Vicente Blvd, Los Angeles, CA 90049

U.   SIMSCRIPT II.5 User's Manual - UNIVAC 1100 Series Computer Systems 1977, CACI, Inc., 12011 San Vicente Blvd, Los Angeles, CA 90049.

V.   Target Acquisition Model, USACAA, Documentation CAA-D-74-2, dated December 1974.

W.   Red Artillery Model, USACAA, Documentation CAA-D-74-2, dated December 1974.

X.   Sperry UNIVAC 1100 Series Executive System Programmer Reference Manual, Volumes 1 - 4, UP 4144.1 through UP 4144.4, 1975 Sperry Rand Corporation, with updates.

Y.   Force Analysis Simulation of Theater Administrative and Logistics Support Model (FASTALS), prepared for the U.S. Army Logistics Center by Computer Sciences Corporation, April 1980, Contract GS-045-22715.

Z.   THEATER RATES MODEL, Documentation CAA-D-7409, War Gaming Directoriate, USACAA, dated December 1974.

Appendix B

Terms and Abbreviations

APP — Ammunition Post Processor - A related group of computer software programs that is a part of the WARRAMP methodology; used to compute the expected consumption of ammunition of selected calibres of a force in a conflict.

CEM — Concepts Evaluation Model - A low resolution theater combat model that simulates the combat between two opponent forces over a specific period of time producing force results.

COSAGE — Combat Sample Generator, a high resolution model that simulates tactical combat between a red and blue force; a production model that produces force on force results.

ELCON — Equipment Loss Consolidator

ESD — Equivalent Stylized Day of Wartime) combat between a postured blue and red forces used to provide an activity comparison between forces.

HMS — Heavy Materiel Supply Units (Companies).

ITMID — Item Identification File.

K-KILL — A catastrophic kill of the item (target) rendering it incapable of returning fire or movement and is non-repairable.

LA — Lethal area of indirect fire (area type) weapon systems.

LEA — Logistics Evaluation Agency.

LIN — Line Item Number (Code) - LINCODE.

LOC — Lines of Communications.

MIE — Major items of equipment.

M-KILL — A hit on an item (target) that renders it immobile, but repairable and capable of returning fire.

ODCSOPS — Office of the Deputy Chief of Staff (Army) for Operations.

PK — Probability of Kill.

RAM — Red Artillery Model.

RTD — Returned To Duty; personnel or repaired equipment.

SSPK	Single Shot Probability of Kill.
SRC	Standard Requirements Code.
TAM	Target Acquisition Model.
TOE	Table of Organization and Equipment.
TRCONS	Theater Rate Consolidation data file.
TRMAP	Theater Rate Mapping data file.
TRM	Theater Rates Model, used to simulate a theater conflict, generating stylized combat periods; used to compute ammunition consumption rates for several weapon - munition combinations.
WARF	Wartime Replacement Factors, also known as Wartime Active replacement factors. Rates of loss or specified periods or time increments for selected combat materiel items.
WIMP	WARF Intermediate Materiel Processor.

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