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Fort Leavenworth, Kansas 66027

DIVWAG MODEL DOCUMENTATION
VOLUME II
PROGRAMMER/ANALYST MANUAL

ACN 21704

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SECTION V

PERIOD OUTPUT PROCESSOR

CHAPTER 1

GENERAL DESCRIPTION OF THE PERIOD OUTPUT PROCESSOR

1. OVERVIEW. The DIVWAG system Period Output Processor uses the DIVWAG data files as input and produces reports. These reports are the status and activity report, intelligence report, barrier report, and the planning report. Appendix C to this section provides complete description of these reports. These reports reflect overall activity and status of the participating forces and their member units during the previous game period.

2. GENERATED REPORTS:

a. Status and Activity Report. The status and activity report consists primarily of the materiel and personnel status of all resolution units and units above resolution level and all unit activity during the previous game period.

b. Intelligence Report. The intelligence report is printed for each force and consists of known intelligence information concerning the opposing force.

c. Barrier Report. The barrier report is also printed for each force and reflects any engineer activity for that force during the previous period.

d. Period Planning Report. The period planning report lists each unit in unit identification record number order and in alphabetical order, giving the unit's location, unit type designator, and the page number where the unit's status and activity report may be found.

CHAPTER 2

EXECUTIVE CONTROL AND UTILITY ROUTINES

1. INTRODUCTION. The executive control and utility routines of the Period Output Processor consist of the driver, routine REPCTL, and associated routine INITAL in addition to the utility routine HEADER. Appendix A of this chapter provides a detailed description of these routines.

2. REPCTL. Routine REPCTL calls each of the appropriate report-producing programs in the designated order. First, the barrier report followed by the Blue force report and finally the Red force report.

3. INITAL. The initialization of variables in common is performed by routine INITAL. This routine is composed of selected segments of routine INITAL to read appropriate variables and tables from data file 36 and store them in common.

4. HEADER. Routine HEADER is called when a new report page is begun. It prints the complete page heading information.

APPENDIX A

EXECUTIVE CONTROL AND UTILITY PROGRAM DESCRIPTIONS

1. INTRODUCTION. The Period Output Processor is controlled by the routine REPCTL that calls routines to output each type report, as well as supporting routines, in the proper sequence. Special purpose and utility routines general to several areas of the processor include the routines INITIAL and HEADER.

2. ROUTINE REPCTL:

a. Purpose. REPCTL is the main controlling routine for preparing the game period reports. REPCTL calls a series of routines to prepare and print the following specialized types of reports: engineer, intelligence, unit status, and planning.

b. Input Variables:

Name	Source	Contents
IFNT(56,3)	Disk	File name table.
CARD1(20)	Card	Header card image.
ISAVE(5)	DF36	Buffer for five words saved on data file 36: DAY, HOUR, MINUTE, TCLOCK, LGTPER.

c. Output Variables. None.

d. Logical Flow (Figure V-2-A-1):

(1) Block 1. The file name table (IFNT) is input from the DIVWAG data file by the standard call to routine GETFLE.

(2) Block 2. Call routine INITIAL to retrieve common data from data file 36 and place it into appropriate variables for use within this routine.

(3) Blocks 3, 4, and L200. REPCTL reads one input card to provide the header for the reports; however, if no card is provided, a default header is substituted: DIVWAG WAR GAME.

(4) Blocks 5 and 6. Five key words are brought into the ISAVE array from data file 36 and moved to variables: DAY, HOUR, MINUTE, TCLOCK, and LGTPER.

(5) Blocks 7, 8, and 9. The beginning and ending times (centiminutes) of the period are computed, as are the day, hour, and minute of the beginning of the period.

(6) Block 10. The number (N) of report groups is set to one to give one set of reports; however, if N was set to two, two copies of intelligence, unit status, and planning reports would be printed rather than one.

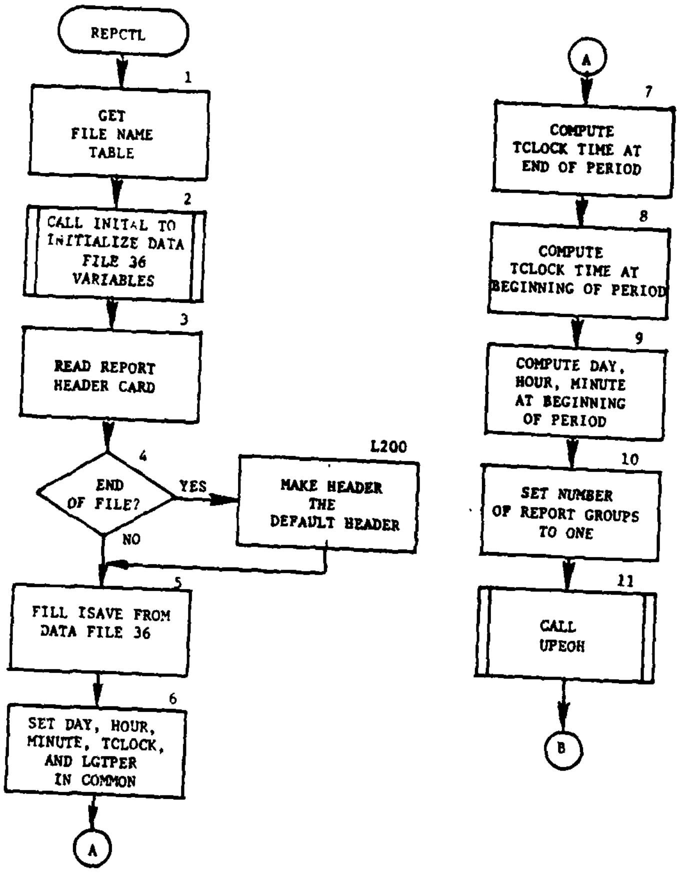


Figure V-2-A-1. Routine REPCTL (Continued on Next Page)

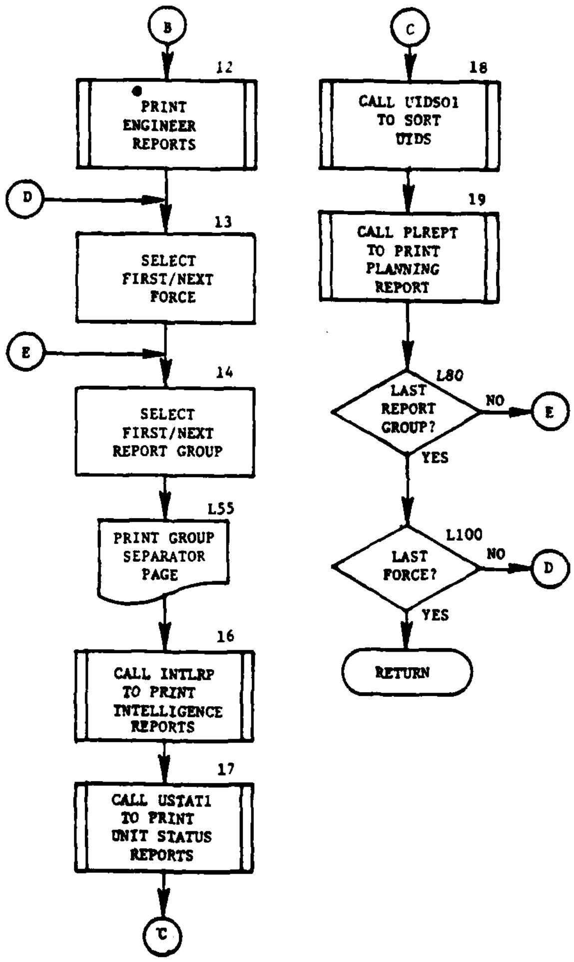


Figure V-2-A-1. Routine REPCTL (Concluded)

(7) Block 11. Routine UPEOH is called to update the equipment on hand (EOH) tables for all nonresolution units that have subordinate resolution units.

(8) Block 12. Routine ENGRE1 is called to print the engineer activity report.

(9) Block 13. Initialize or increment a loop to select each force (Blue and Red).

(10) Block 14. Initialize or increment a loop to prepare one or more copies of the reports. Currently, only one copy will be prepared because the number is set to one.

(11) Block L55. Print period report group number, force name, and banner page.

(12) Block 16. Routine INTLRP is called to print the intelligence report.

(13) Block 17. Routine USTAT1 is called to print the unit status reports that describe equipment on hand and activities performed.

(14) Block 18. Routine UIDS01 is called to sort the unit identifications into alphanumerical order for the planning report.

(15) Block 19. Routine PLREPT is called to print the planning report that also serves as a directory to the unit status reports.

(16) Blocks L80 and L100. If the number of requested reports has not been printed, transfer control to block 14. If the Red force report has not been printed, transfer control to block 13. If both forces have been processed, return control to the calling routine.

3. ROUTINE INITIL:

a. Purpose. The purpose of routine INITIAL is to load the Period Output Processor's common area.

b. Input Variables:

Name	Source	Contents
IRST1	DF36	Restart flag.
XYZONE(9,4)	DF36	Weather zone coordinates.
XEVCOD	DF36	Code index of last event.
SPTUID	DF36	IUID of unit created in transfer event.
XNORD	DF36	Index of last order number.

Name	Source	Contents
NTERR	DF36	Terrain cell size.
BPOINT	DF36	Index to last Blue unit.
RPOINT	DF36	Index to last Red unit.
KMIN	DF36	Minute of previous clock update.
RNDSED	DF36	Random number generator seed.
SWITCH(4)	DF36	Simulated sense switch.
SLOPE	DF36	Battlefield orientation slope.
RSTIME	DF36	Restart dump interval.
MINHLD	DF36	Minute holding location.
DAY	DF36	Current day.
HOUR	DF36	Current hour.
MINUTE	DF36	Current minute.
LGTPER	DF36	Period length in centiminutes.
CMPRNT	DF36	Computer running time in minutes.
INTFLG	DF36	Initialization flag: 1 = period, 2 = restart, 3 = game.

c. Output Variables. All of the input variables are returned to the calling routine in common ONE.

d. Logical Flow. The logic and flow of routine INITIAL are straightforward and direct. Any requirement of that logic or flow can be readily obtained by referring to the routine listing.

4. ROUTINE HEADER. This routine prints a header at the top of each report page. Contents include: a game title, current (real) date and time, page number, and beginning and ending times of the game period for which reports are being produced.

APPENDIX B

SOURCE LISTINGS FOR PERIOD OUTPUT PROCESSOR EXECUTIVE CONTROL AND UTILITY ROUTINES

(AVAILABLE UNDER SEPARATE COVER)

CHAPTER 3

STATUS AND ACTIVITY REPORTS

1. INTRODUCTION. The status and activity report routines of the Period Output Processor consist of the status file updating routine UPEOH with its supporting routine DNCHA1, and the unit status reporting routine USTAT1 with its supporting routines PUTDET, EOHLOC, EOHPER, and UACTR. Utility routines used within the processor are ZERO, GETUSF, GET31, HEADER, and OVFL. Appendix B of this chapter provides a detailed description of these routines.

2. STATUS FILE UPDATING SYSTEM FLOW. Status file updating is provided by routine UPEOH which updates unit status file records of high level non-resolution units. Routine DNCHA1 provides the subordinate linkage so the routine UPEOH can access all subordinate units for updating.

3. UNIT STATUS REPORTING SYSTEM FLOW. The unit status reporting routine USTAT and its major supporting routines PUTDET, EOHLOC, EOHPER and UACTR provide an updated record of the status and activity of all higher level units and lower level resolution units. This record provides the equipment and personnel status as well as any activity involved in during the previous period.

APPENDIX A

INPUT REQUIREMENTS FOR STATUS AND ACTIVITY REPORTS

Input for the status and activity report module of the Period Output Processor consists of DIVWAG data files 1, 11, 16, 21, 31, 48, and 50. Refer to Section VII, DIVWAG System Utility Package, Chapter 2, DIVWAG Data Files, for a complete description of these data files.

APPENDIX B

STATUS AND ACTIVITY REPORTS PROGRAM DESCRIPTIONS

1. INTRODUCTION. The routines described in this appendix are utilized by the Period Output Processor to print status reports reflecting the current status of every unit and activity reports describing actions performed and losses suffered during the previous game period.

a. Status File Updating. The unit status report consists primarily of a listing of the current contents of all unit status file records describing resolution units and units above the resolution level (nonresolution). To prepare for this report the records of units above resolution level, which generally are not operated upon within the DIVWAG Period Processor, must be updated to reflect summary status of all subordinate units. This task is accomplished by the routine UPEOH and its supporting routines DNCHA1, ZERO, GETUSF, and GET31.

b. Unit Status Reporting. The production of unit status reports is controlled, upon call from REPCTL, by the routine USTAT1. Routines driven by USTAT1 include the major routine PUTDET and its supporting routines EOHLOC, EOHPER, and UACTR. Routines of a utility nature used in the process include GETUSF, HEADER, and ZERO, as well as OVFL and GET31.

2. ROUTINE UPEOH:

a. Purpose. This routine updates unit status file records of high level nonresolution units by computing and placing the total equipment and personnel strengths on the records of all subordinate units. These totals include amounts held in bulk that are obtained within the DIVWAG system from the supply status file on data file 31.

b. Input Variables:

Name	Source	Contents
IUSF	DF1	Entire data file 1 record.
IUID	DF1	Record number of unit on data file 1.
ISUB	DF1	Array containing IUIDs of up to 10 subordinate units.
IUPF	DF1	Flag defining unit type.
XLOC	DF1	X coordinate.
YLOC	DF1	Y coordinate.
EOH	DF1	Equipment on hand at unit, 200 entries.
IPSTR	DF1	Personnel strength of unit.

c. Output Variables:

Name	Destination	Contents
EOHAR1	DF1	Cumulative totals of equipment for units with UPFLAG equal to two.
IIPSTR	DF1	Cumulative totals of personnel for units with UPFLAG equal to two.
IRECNO	Print	Unit status file (data file 1) record number.
IUID	Print	Unit ordinal.

d. Logical Flow (Figure V-3-B-1):

(1) Block 1. Zero out all of the arrays and set IRECNO equal to one for the first execution.

(2) Block L15. Read the current IRECNO record from the unit status file (data file 1) and get unit status record of its superior unit. Continue this process until a unit is read that has no superior.

(3) Blocks L30 and 4. Save this unit's IUID in the first and eleventh entry of the ILARR1 table for level 1. This table contains 10 levels with 11 entries per level. Store the subordinate unit's IUIDs into the first 10 entries of level 2.

(4) Block 5. Call DNCHA1 which returns the IUID of the lowest unit under the first subordinate IUID at the operation level at the time DNCHA1 was called. The current operating level (LEVEL) has thus been increased in value to correspond to the unit found by DNCHA1. Control goes to block 6.

(5) Blocks L40 and 6. Call DNCHA1 (refer to block 5, paragraph d(4) above). If there are no more records at this level, transfer control to block L80.

(6) Block 8. If the unit has no location and UPFLAG equals zero, control goes to block L110.

(7) Blocks 9 and 10. If the unit has a location, go to block L75; otherwise, UPFLAG equals two, so update this record with the totals for equipment on hand for this level.

(8) Blocks 11, 12, and 13. Call ZERO which zeros the current entry in the ILARR1 table, and output the updated unit status file record onto data file 1, and battle data to data file 21. Control then goes to block L40.

(9) Blocks L70, 14 and 15. If the current level is equal to one, transfer control to block L250; otherwise, call ZERO to zero out the current entry in the ILARR1 table, and add the current level EOHAR1 totals to the current level, minus one, EOHAR1 totals. After the preceding addition, zero out the current EOHAR1 totals.

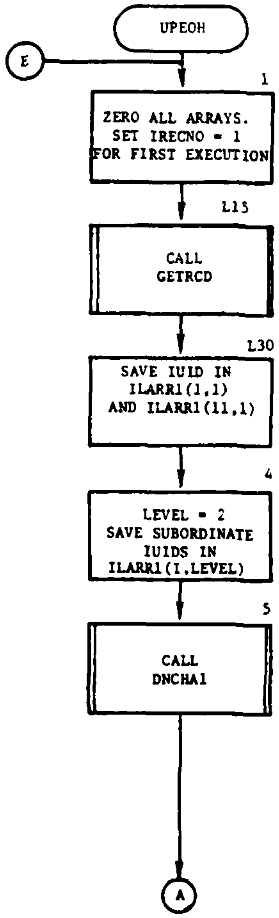


Figure V-3-B-1. Routine UPEOH (Continued on Next Page)

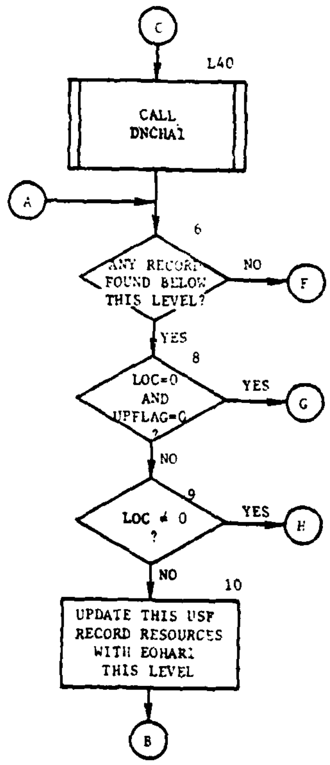


Figure V-3-B-1. Routine UPEOH (Continued)

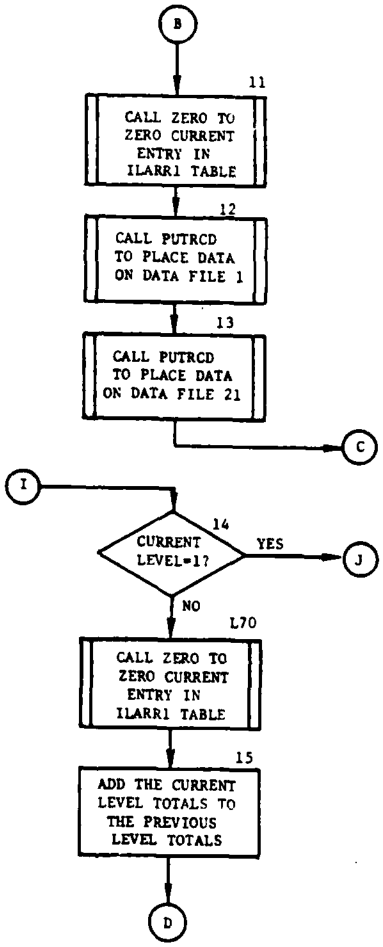


Figure V-3-B-1. Routine UPEOH (Continued)

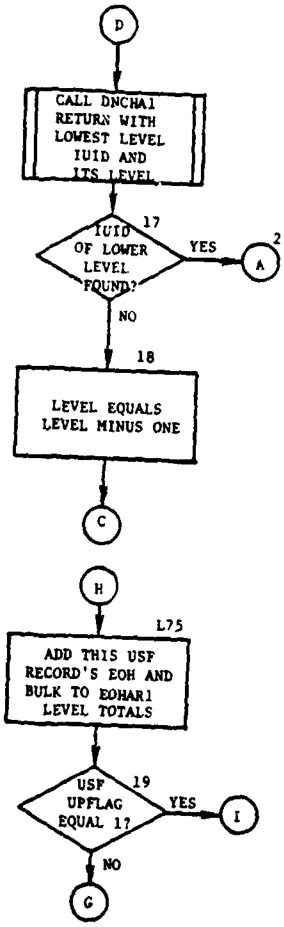


Figure V-3-B-1. Routine UPEOH (Continued)

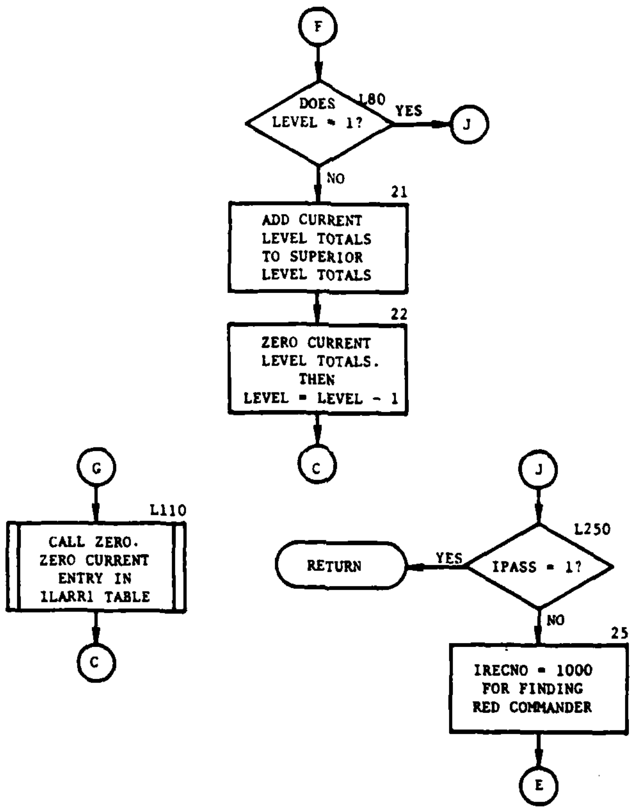


Figure V-3-B-1. Routine UPEOH (Concluded)

(10) Blocks 16, 17, and 18. Call DNCHA1 (refer to block 5, paragraph d(4) above). If no IUID was found below the current level subtract one from current level and control goes to block L40; otherwise, control goes to block 6.

(11) Block L75. Add the current unit status file record resources including bulk from data file 31 to EOHAR1 totals for this level.

(12) Block 19. If UPFLAG is equal to one, control goes to block 14; otherwise, control goes to block L110.

(13) Block L80. If the current level is equal to one, control goes to block L250.

(14) Blocks 21 and 22. Add the current level EOHAR1 totals to the current level, minus one, EOHAR1 totals. Zero the current level EOHAR1 totals after the preceding addition, and decrease the current level by one. Control goes to block L40.

(15) Block L110. Call ZERO which removes the current entry from the ILARR1 table and transfer control to block L40.

(16) Block L250. If IPASS is equal to one, the Red force has been processed; return control to the calling routine.

(17) Block 25. Set IRECNO equal to 1000 and transfer control to block 1 to find Red force most superior unit.

3. ROUTINE DNCHA1:

a. Purpose. DNCHA1 is called by UPEOH to find the unit status file (data file 1) record of the most subordinate unit to the current level of command.

b. Input Variables:

Name	Source	Contents
IUSF	Call	Buffer area to receive the unit status records.
LEVEL	Call	Current level of command where the highest level is 1, and the lowest level is 8.
EOHAR1	Call	Cumulative totals of equipment for command levels (no longer used by DNCHA1).
ILARR1	Call	Table of IUIDs at command levels. The first 10 entries at each level are IUIDs of units at that level. The eleventh entry is the IUID of the last unit processed at that level.
ISUB	Call	Array in the unit status record consisting of up to 10 IUIDs of subordinate units.

Name	Source	Contents
IERR	Call	Reporting flag: 1 = subordinate unit found. 2 = no more records at requested command level.

c. Output Variables. Same as input variables.

d. Logical Flow (Figure V-3-B-2):

(1) Blocks 1 and 2. If there are no IUIDs in the ILARR1 table for the passed command level, return control to the calling routine with an error code of two.

(2) Blocks L20 and 3. Set the error code equal to one, and get the unit status record corresponding to the IUID found in the ILARR1 table for this command level.

(3) Block 4. If this unit has been previously processed as indicated by the IUID in the eleventh entry of the ILARR1 table for the current command level, return control to the calling routine.

(4) Block 5. Store the current level IUID into the ILARR1 array at the eleventh word.

(5) Blocks 6 and 7. Store the IUIDs of the subordinate units into the ILARR1 array at level plus one. If there were no subordinates, return control to the calling routine.

(6) Blocks L40, 8, and 9. Increase the current level by one, and search the ILARR1 table for IUIDs at the new level. If an IUID at the new level is found, transfer control to block L20; otherwise, print an error message and return control to the calling routine.

4. ROUTINE ZERO. This routine clears the first nonzero entry in ILARR1 at the specified level. If no nonzero entry is found, an error message is printed. (ILARR1 is dimensioned (11, 8) with level referring to the second dimension).

5. ROUTINE GETUSF (IND, IUSF). GETUSF generates a call to the routine GETRCD to place record number (INO) of the unit status file into location IUSF. If the operation is abnormal, an error message is printed. The routine consolidates the error checks at one point rather than coding them in the many places that the file is accessed.

6. ROUTINE USTAT1:

a. Purpose. USTAT1 is the control routine for printing the unit status reports. It brings the unit status records into UNITMAIN in a sequence reflecting the echelon organization of the units, and calls routine PUTDET to print the detailed unit status report of each individual unit.

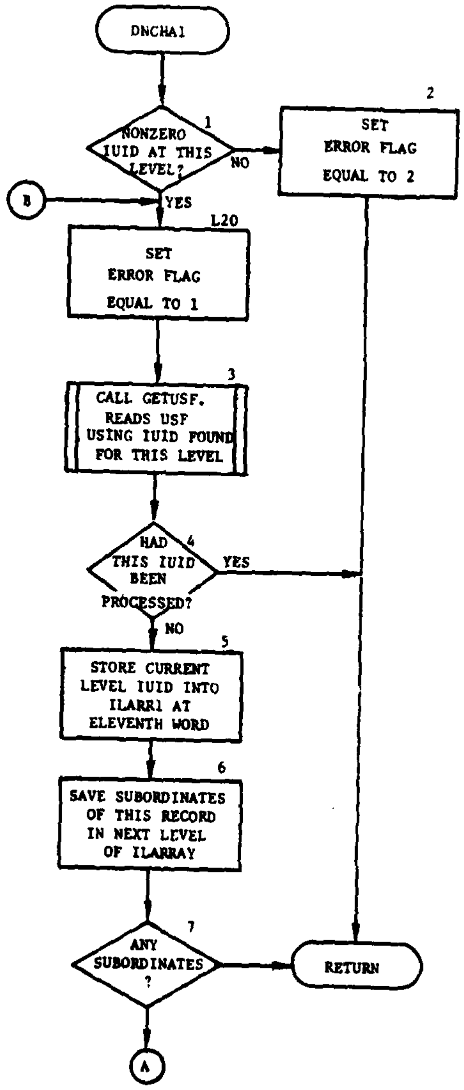


Figure V-3-B-2. Routine DNCHA1 (Continued on Next Page)

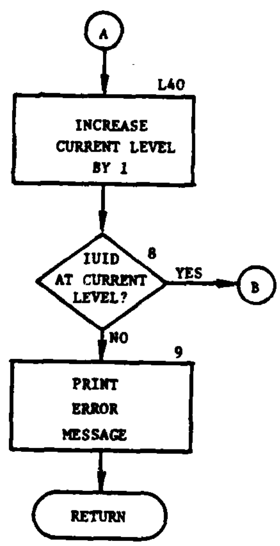


Figure V-3-B-2. Routine DNCHA1 (Concluded)

b. Input Variables:

Name	Source	Contents
IFORCE	Call	Force indicator: 1 for Blue, RPOINT for Red.
UMAIN(500)	DF1	Unit status record.
IUSF(500)		Unit status record.
UID		UMAIN(1). Unit identifier.
IUID		UMAIN(215). Unit index.
XACT		UMAIN(4). X coordinate of unit.
YACT		UMAIN(5). Y coordinate of unit.
EOH(200)		UMAIN(14). Equipment on hand table.
IBOSS		UMAIN(276). Unit index of unit's superior.
UPFLAG		UMAIN(298). Update flag.
PRESTR		UMAIN(11). Present personnel strength.
ISUB(10)		UMAIN(277). List of subordinate units.
UCOOP(500)	DF1	Unit status record buffer.
CIBOSS		UCOOP(276). Unit index of superior unit.
CUID		UCOOP(1). Unit identifier.
RPOINT	ONE	Unit index of first Red unit.
LCTR	TWO	IDUM(50). Line counter.
EOHAR1	TWO	IDUM(100). Table of item amounts.

c. Output Variables:

Name	Destination	Contents
UMAIN(500)	ONE	Unit status record.
EOHAR1(200)	TWO	IDUM(100). Table of item amounts.
ILARR1(11,8)	TWO	IDUM(500). Array containing IUIDs of 10 subordinate units at seven levels.

Name	Destination	Contents
LCTR	TWO	IDUM(50). Line counter.
IPGCTR	TWO	IDUM(51). Page counter.
ICOLOR	TWO	IDUM(52). Force, Blue or Red.
INDEX	DF16	Index to last entry in unit identification/ and page number table.

d. Logical Flow (Figure V-3-B-3):

(1) Block 1. A table of unit identifications and report page numbers will be built on data file 16 for all units referenced in the unit status reports. The index (INDEX) to the last entry in the table is also maintained on data file 16; it is initialized to zero.

(2) Block 2. The page counter (IPGCTR) is used by routine HEADER to print the report page number and is initialized to zero.

(3) Block 3. The force name (ICOLOR) is set equal to Blue or Red according to the force index (IFORCE).

(4) Block 4. Routine OVFL is called to print the first unit status report header.

(5) Block 5. The unit status record number (IRECNO) is initialized to one for Blue or 1000 for Red.

(6) Block L5. The EOHAR1 table is used to compute total equipment on hand, and IIPSTR is used to compute total personnel strength for complex units; therefore, EOHAR1 and IIPSTR are initialized to zero.

(7) Block L10. ILARR1 is used to store IUIDs of subordinate units at different echelon levels and must be initialized to zero.

(8) Blocks L15, 15, L140, and 44. Routine GETUSF returns the unit status record in UMAIN from record number (IRECNO) on data file 1.

(9) Blocks 6 and 7. IBOSS on the unit status record is the IUID of the unit's superior unless the unit is at the highest echelon level. The record number (IRECNO) is set equal to the superior unit's record so that the successively superior units may be located to obtain the highest level unit.

(10) Blocks L30 and 8. The level number (LEVEL) is set to one for the highest level unit, and its IUID is stored in ILARR1 at level 1.

(11) Block L33. A unit is identified as a complex resolution unit if its coordinates (XLOC,YLOC) are nonzero and its update flag (IUPF) equals one.

(12) Block 9. A unit is identified as being a basic nonresolution unit if its coordinates (XLOC,YLOC) are both zero and its update flag (IUPF) equals zero.

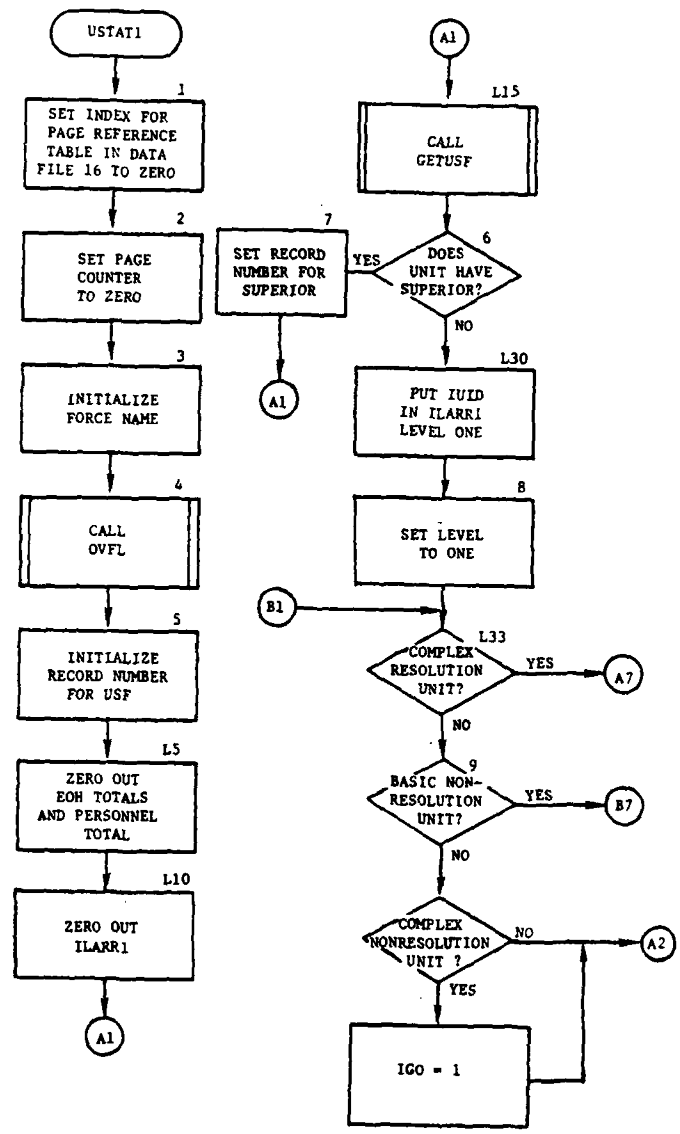


Figure V-3-B-3. Routine USTAT1 (Continued on Next Page)

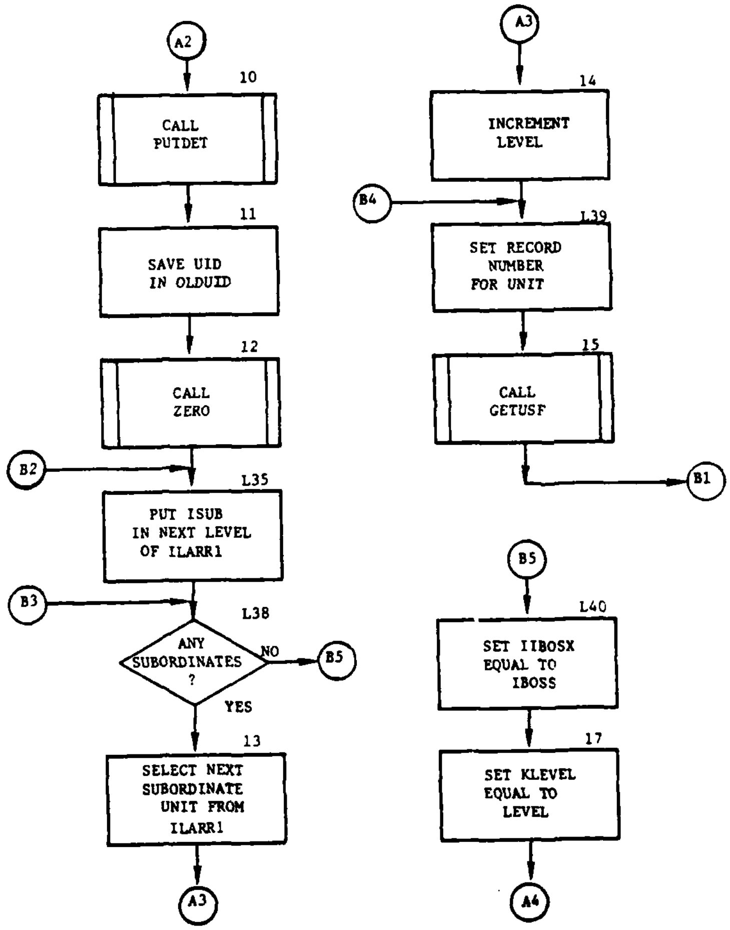


Figure V-3-B-3. Routine USTAT1 (Continued)

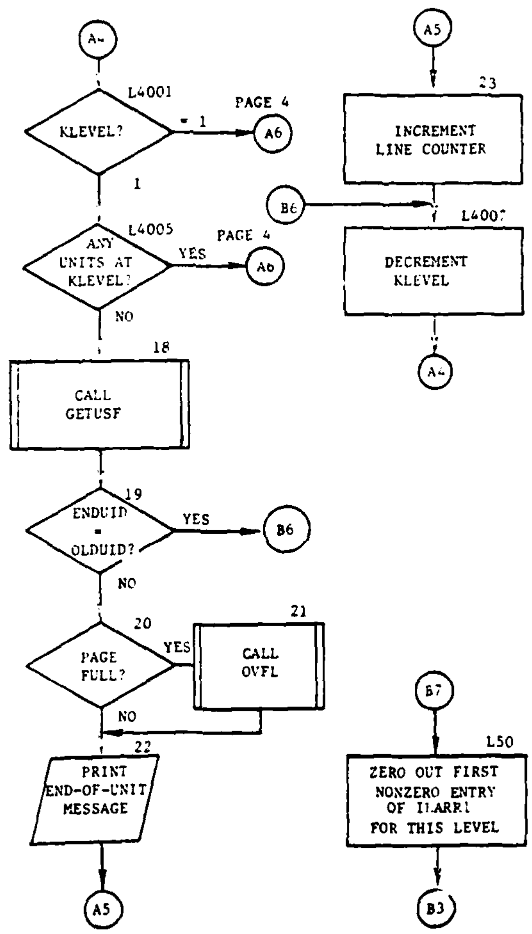


Figure V-3-B-3. Routine USTAT1 (Continued)

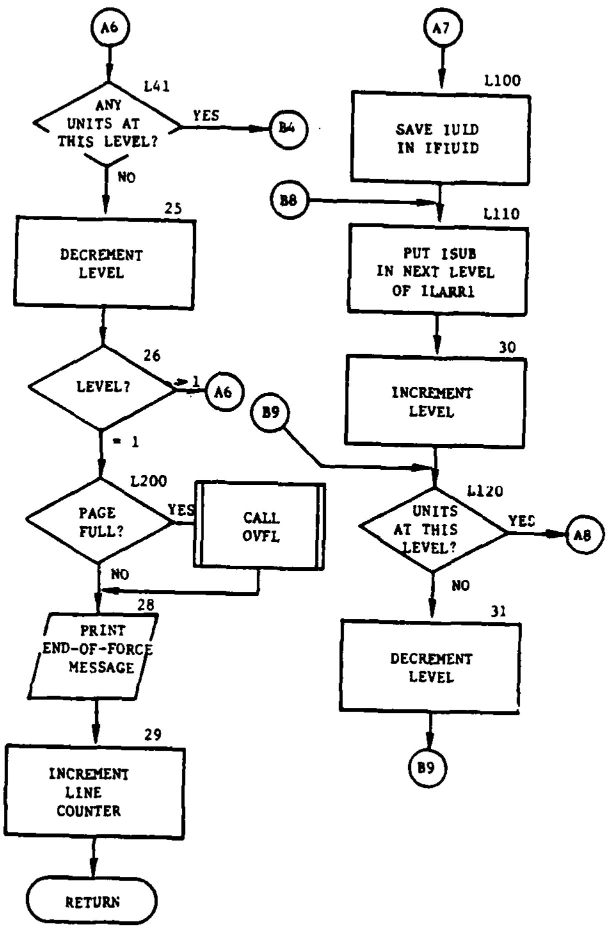


Figure V-3-B-3. Routine USTAT1 (Continued)

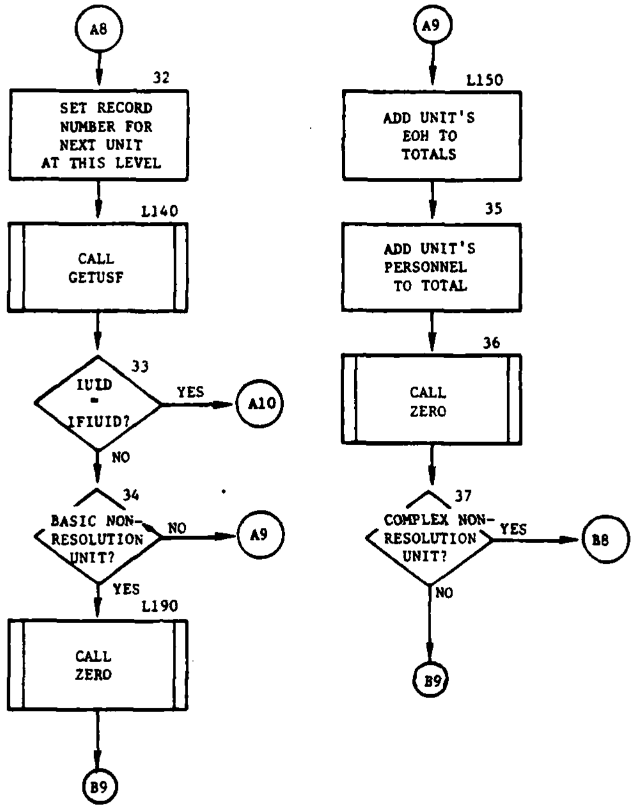


Figure V-3-B-3. Routine USTAT1 (Continued)

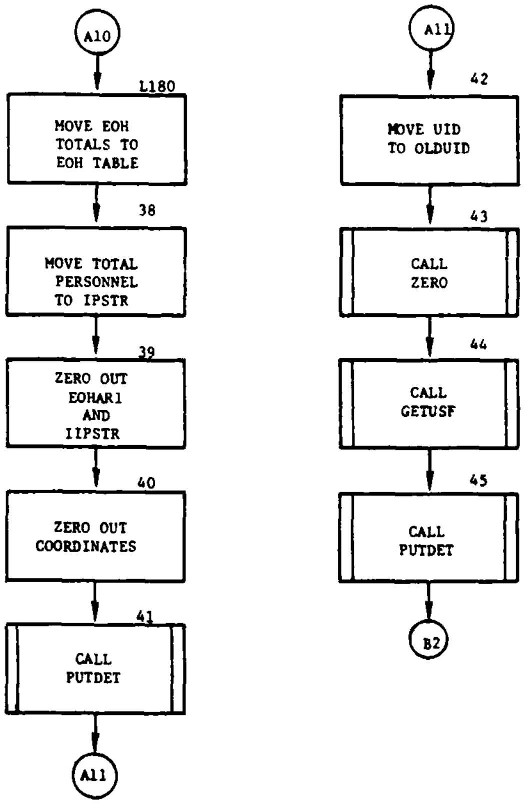


Figure V-3-B-3. Routine USTAT1 (Concluded)

(13) Blocks 10, 41, and 45. Routine PUTDET is called to print the unit status report for the unit whose status record is in UMAIN.

(14) Block 11. OLDUID saves the UID of a unit when the status records are brought in for its subordinate units.

(15) Blocks 12, L190, 36, and 43. Routine ZERO is called to zero out the column of ILARR1 that corresponds to LEVEL.

(16) Blocks L35 and L110. The ISUB table in UMAIN lists the IUIDs of the 10 possible subordinate units of this unit and is printed to the LEVEL-plus-one column of ILARR1.

(17) Blocks L38 and 13. The LEVEL-plus-one column of ILARR1 is scanned for subordinate units. If all entries are zero, the unit is a basic unit; otherwise, the first nonzero entry is the selected IUID.

(18) Blocks 14 and 30. LEVEL is incremented by one to indicate the next lower (subordinate) level has been selected.

(19) Block L39. The record number (IRECNO) is set equal to the IUID just selected from ILARR1.

(20) Blocks L40 and 17. IIBOSX is set equal to IBOSS and KLEVEL is set equal to LEVEL to preserve IBOSS and LEVEL while superior units are located.

(21) Block L4001. KLEVEL is tested to ensure that it is not decremented below one.

(22) Block L4005. There are units at KLEVEL level only if the KLEVEL column of ILARR1 has nonzero entries.

(23) Block 18. The unit index of the next superior unit is given by IIBOSX. The status record of the superior unit is brought into UCOOP.

(24) Block 19. If the unit identification of the superior unit (ENDUID) is equal to the unit identification of the last higher level unit (OLDUID), it indicates that all component units of the superior unit have been reported.

(25) Blocks 20 and L200. The print page is full if the line counter (LCTR) exceeds the line limit (64).

(26) Blocks 21 and 27. Routine OVFL prints the unit status report header on the next page and decrements the line count.

(27) Blocks 22 and 23. A line is printed on the report to indicate that all components/subordinates of the unit have been reported. The line counter is incremented for the number of lines printed.

(28) Block L4007. KLEVEL is decremented by one to indicate the next superior level.

(29) Block L50. The first nonzero entry in the LEVEL column of ILARR1 is set to zero because the unit status report for that unit was just printed.

(30) Blocks L41 and L120. There are units at LEVEL level only if the LEVEL column of ILARR1 contains nonzero entries.

(31) Blocks 25 and 31. LEVEL is decremented by one to select the next superior level.

(32) Block 26. LEVEL is tested to ensure that it is not decremented below 1 (1 is the highest level).

(33) Blocks 28 and 29. The chain of units at superior/subordinate levels has been traced back to level 1, to the highest level unit; therefore, all unit status reports for this force have been printed. A line is printed on the report to indicate the entire force has been reported. The line counter is incremented for the lines printed.

(34) Block L100. The unit index (IUID) of the current unit is saved in IFIUID.

(35) Block 32. The next nonzero entry in the LEVEL column of ILARR1 is the IUID of the next unit to be selected. The record number (IRECNO) is set equal to the selected unit index.

(36) Block 33. If IUID equals IFIUID it indicates that all subordinate units have been found and accounted for.

(37) Block 34. A unit is a basic nonresolution unit if its coordinates (XLOC,YLOC) and update flag (IUPF) are zero.

(38) Blocks L150 and 35. Because this nonresolution unit's equipment and personnel must be accounted for by a superior unit, its equipment on hand table is added to the EOHAR1 table and IPSTR is added to IIPSTR which are the totals for the complex unit.

(39) Block 37. A unit is a complex nonresolution unit if both coordinates (XLOC,YLOC) are zero and its update flag (IUPF) is equal to one.

(40) Blocks L180 and 38. The equipment on hand table is set equal to the EOHAR1 table and IPSTR is set equal to IIPSTR to give the unit the total equipment on hand and total personnel strength belonging to the complex unit as a whole.

(41) Block 39. EOHAR1 and IIPSTR are reset to zero for the next complex unit.

(42) Block 40. The unit's coordinates (XLOC,YLOC) are set to zero.

7. ROUTINE PUTDET:

a. Purpose. In preparation of the unit status reports, PUTDET prints the detailed data about one unit. A single unit status report includes the following data items: unit identification, unit type designator, unit identification of superior unit, location, personnel strength, percent of authorized personnel, orientation, width, depth, and a complete account of quantities of equipment on hand by item code. The activity report portion of the unit status report is printed by a call to routine UACTR.

b. Input Variables:

Name	Source	Contents
UMAIN(500)	ONE	Unit status record of selected unit.
IUID		UMAIN(215). Unit index.
IBOSS		UMAIN(276). Unit index of superior unit.
EOH(200)		UMAIN(14). Equipment on hand table.
IORENT		UMAIN(261). Orientation (centiradians) of the unit.
WIDTH		UMAIN(7). Width of unit.
DEPTH		UMAIN(8). Depth of unit.
ISUB(10)		UMAIN(277). List of IUIDs of subordinate units.
LCTR	TWO	IDUM(50). Line counter.
IPGCTR	TWO	IDUM(51). Page counter
AUTH(202)	DF50	Table of authorized equipment and personnel.
SUID	DF1	Superior unit's UID.
INDEX	DF16	Index to table of units listed.

c. Output Variables:

Name	Destination	
UID	Print	Unit identification.
IUTD	Print	Unit type.
XLOC	Print	X coordinate of unit's location.
YLOC	Print	Y coordinate of unit's location.
IPSTR	Print	Present personnel strength.
INDEX	DF16	Index to unit status report, saved for perparing planning report.
IIEOHS	Print	Equipment item code.
EEOH	Print	Amount of equipment on hand in the unit.

Name	Destination	Contents
IEOHTR	Print	Amount of equipment in trains (bulk).
EOHTOT	Print	Total amount of equipment.
AEOH	Print	Amount of equipment authorized.
EOHPR	Print	Percent of total equipment to authorized.
IDIR(16)	Print	Table of direction labels (E,ENE,NE,etc.)
WIDTH	Print	Width of unit in meters.
DEPTH	Print	Depth of unit in meters.
PERAU1	Print	Percent of personnel strength to personnel authorized.
IMEOHS	Print	Equipment item code.
AIEOH	Print	Amount of equipment on hand in the unit.
AMEOH	Print	Amount of equipment on hand in the unit.
AI	Print	Amount of equipment in trains.
AM	Print	Amount of equipment in trains.
EOHAR1	Print	Table of total equipment amounts.
UIDTA1(10)	Print	List of unit identification of component units.

d. Logical Flow (Figure V-3-B-4):

(1) Block 1. The authorized equipment table from data file 50 provides the authorized amounts of equipment items in positions 1 through 200 and the authorized personnel strength in position 201.

(2) Block 2. The IUID of the unit superior to this unit (in UMAIN is given by the word IBOSS. The unit status record for the IBOSS unit is accessed to obtain that superior unit identification, except in the case that IBOSS equals zero, which indicates that this unit has no superior. In this case the superior unit identification is set equal to blanks for printing.

(3) Blocks L600, 21, and 47. To ensure that each page of the report has a proper header, the lines of print are counted. If the line count (LCTR) is greater than or equal to the line limit (IOVH), a new header is printed by calling routine OVFL.

(4) Blocks 3, 4, 22, and 48. Routine OVFL prints a new page header when an existing page is full (or overflows), in which case it also resets the line counter (LCTR).

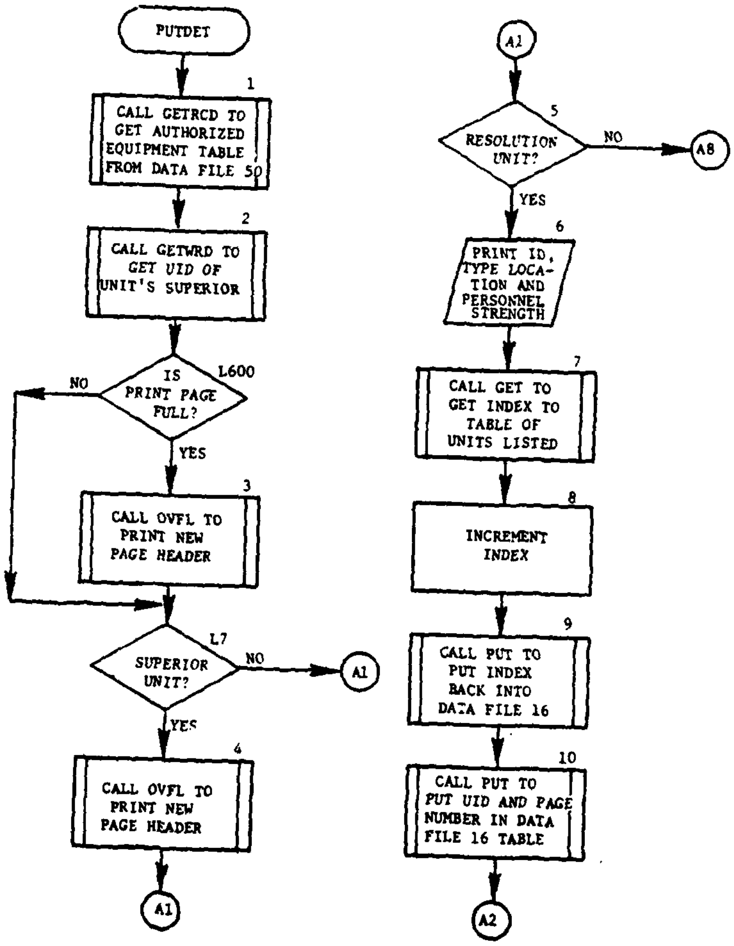


Figure V-3-B-4. Routine PUTDET (Continued on Next Page)

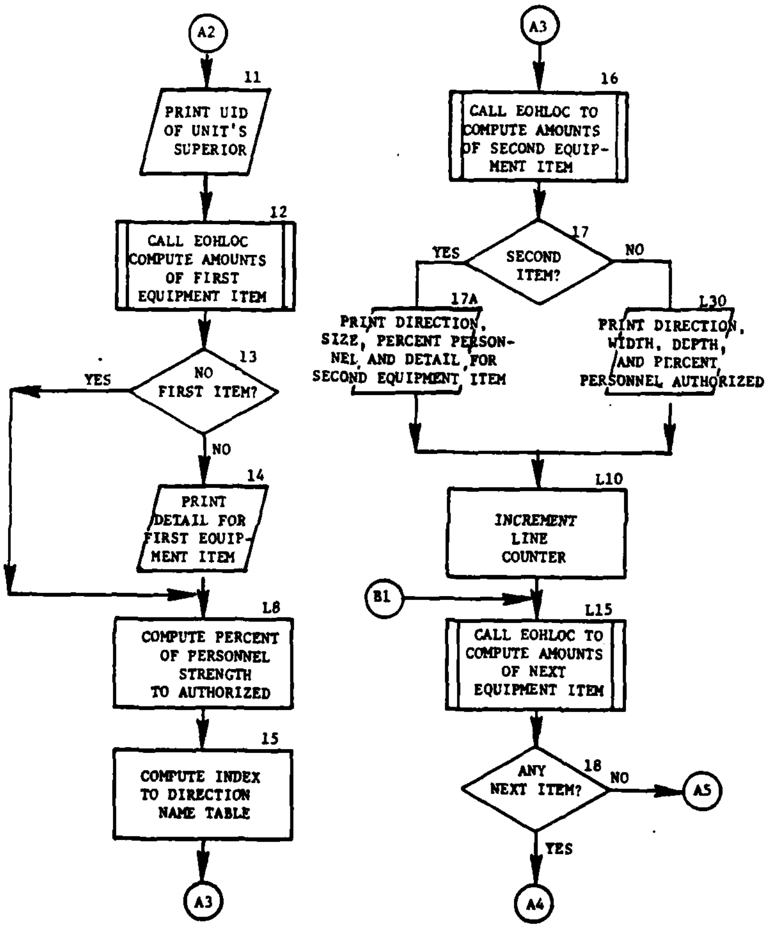


Figure V-3-B-4. Routine PUTDET (Continued)

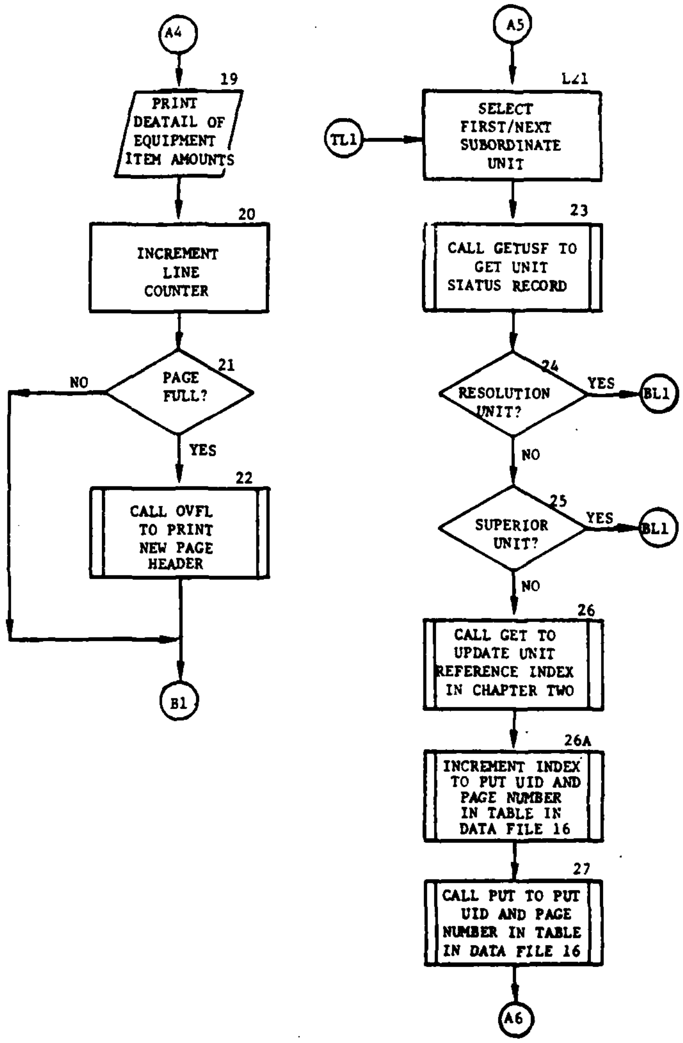


Figure V-3-B-4. Routine PUTDET (Continued)

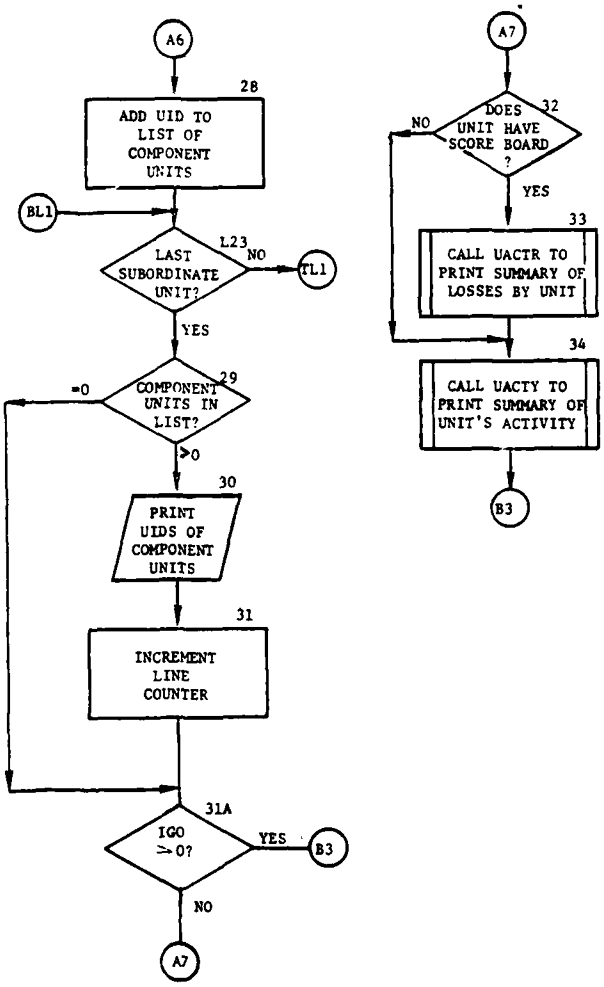


Figure V-3-B-4. Routine PUTDET (Continued)

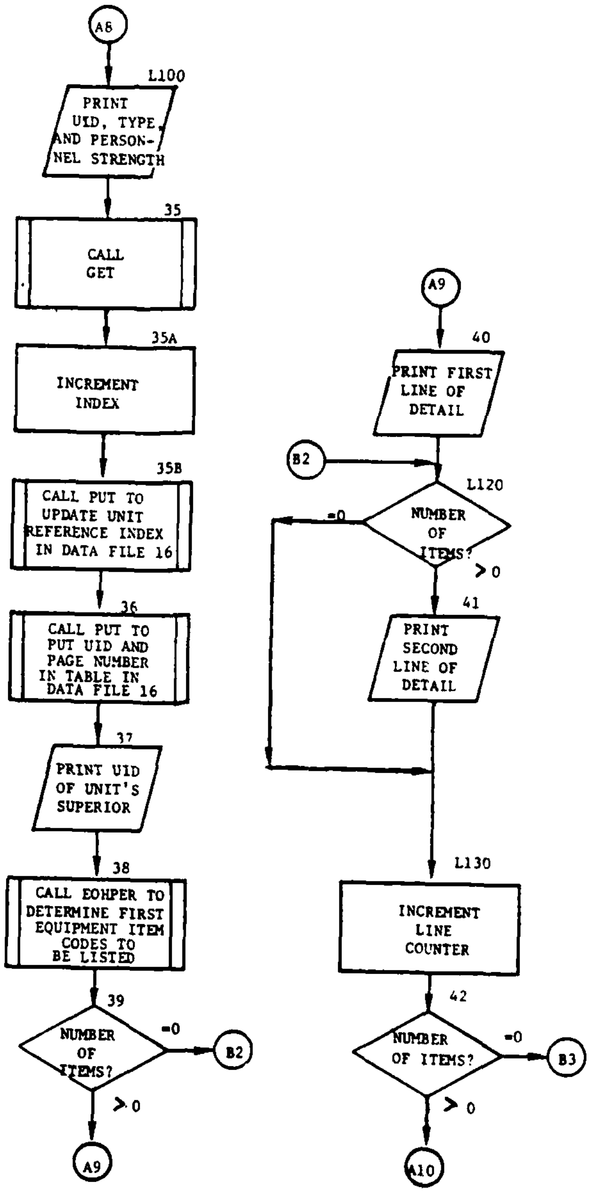


Figure V-3-B-4. Routine PUTDET (Continued)

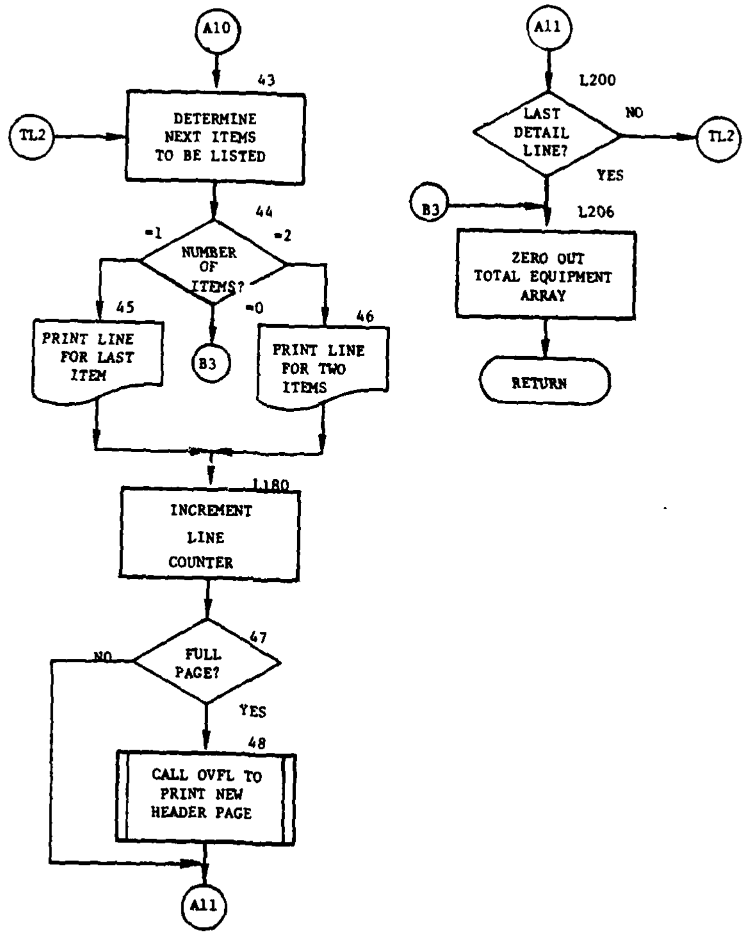


Figure V-3-B-4. Routine PUTDET (Concluded)

(5) Block L7. This unit is assumed to be a superior unit if the first character of the type code (CUTD(1)) is equal to A, B, C, or D.

(6) Block 5. This unit is assumed to be a resolution unit if its coordinates are nonzero. If not a resolution unit, control branches to block L100.

(7) Block 6. The first detail line for a resolution unit gives the unit identification, unit type designator, X,Y coordinates, and personnel strength.

(8) Blocks 7, 8, 9, 26, and 35. An indexing system which keeps track of each unit referenced and the page number of the unit status report is maintained by a table in data file 16. The index of the last unit added to the table is brought in and incremented to give the next table entry. The index is put back in data file 16 to keep the index updated.

(9) Blocks 10, 27, and 36. The table in data file 16 that lists the unit identification and the page number of each unit referenced in the unit status report is updated for each unit by adding the unit identification and page number (IPGCTR) at the location given by INDEX plus one.

(10) Block 11. The unit identification of this unit's superior is printed, and in the case that there is no superior unit, the field appears blank.

(11) Blocks 12, 16, and L15. Routine EOHLOC is called to obtain the equipment on hand breakdowns for the first/next equipment item of this resolution unit. EOHLOC returns the item code, the amount of the item actually on hand, the amount of the item in trains (bulk), the total amount, and the percent of the total amount to the authorized amount.

(12) Blocks 13 and 14. The first call to EOHLOC (block 12) returns the first equipment item (numerically, by item code) that belongs to the unit. The print line for the first item listed includes the item code, the amount on hand, the amount in trains (bulk), the total on hand plus bulk, the amount authorized, and the percent of the total amount to the authorized amount. If the item code is zero, there are no items to be listed.

(13) Block L8. The percent of personnel authorized is computed as the personnel strength over the authorized personnel strength.

(14) Block 15. The orientation (IORENT) of the unit is given in centiradians from the X axis; the direction to be printed is of the form E, ENE, NE, etc.; therefore, the orientation must be correlated to the proper one of the 16 directional sectors.

(15) Block 16. The breakdown of amounts of the second item is obtained by calling EOHLOC again.

(16) Blocks 17, 17A, and L30. The second call to EOHLOC returns the second item that belongs to the unit. If the item code is nonzero, the orientation, width, depth, and percent of personnel strength to authorized strength are printed in the second line along with the breakdown for the item:

item code, amount on hand, amount in trains (bulk), total on hand plus bulk, the amount authorized, and the percent of the total amount to the total authorized. If the item code is returned as zero, only the first part of the line is printed.

(17) Blocks L10, 20, 31, L130, and L180. The number of lines of print just completed is added to the line counter (LCTR) to give the count of lines printed on this page.

(18) Blocks L15, 18, 19, 20, 21, and 22. The logic for printing each item is repeated until all items within the unit have been listed. Line count is incremented and page headers are written as required.

(19) Block L21. The loop to account for this unit's subordinate units is initialized. The IUIDs of the subordinate units are listed in the ISUB table.

(20) Block 23. Routine GETUSF is called to bring the unit status record of the subordinate unit into UCOOP.

(21) Block 24. The subordinate unit is a resolution unit if its coordinates are nonzero. If it is, control goes to block L23.

(22) Block 25. The subordinate unit is superior to other units if the update flag (CUPFLA) is nonzero.

(23) Blocks 25, 26A, and 27. The unit reference index and page number are stored in data file 16.

(24) Block 28. The unit identifications of basic nonresolution units are stored in UIDTA1 to account for this unit's component units that will not be reported in detail.

(25) Block L23. This block completed the subordinate unit loop.

(26) Blocks 29, 30, and 31. If the number of unit identifications of component units in UIDTA1 is greater than zero, a line is printed displaying the unit identifications, and the line counter (LCTR) is incremented.

(27) Block 31A. If the unit is a complex nonresolution unit, control goes to block L206.

(28) Blocks 32, 33, and 34. If this is a resolution unit that has been engaged by the enemy, it has a score board of what has happened to the unit stored on data file 48. The record location is given by IREC48. Routine UACTR is called to print the summary of what happened to the unit. Routine UACTY is called to print the summary of what activities the unit performed. Control then goes to block L206 to return to the calling routine.

(29) Block L100. For a nonresolution unit the first line of the report includes only the unit identification, unit type designator, and personnel strength, which differs from a resolution unit in that the location has been omitted.

(30) Blocks 35, 35A, 35B, and 36. Data file 16 reference and page tables are updated.

(31) Block 37. The unit identification of the superior unit is printed.

(32) Block 38. For nonresolution units, the equipment items are listed in two columns; routine EOHPER determines the item codes to be listed in the first two detail lines. The first two item codes to be listed in column one are returned in IEOH5(2), and MEOH5(2) for column two.

(33) Blocks 39 and 40. If the item codes for the first detail line are nonzero, the line is printed giving the item code, the amount on hand, the amount authorized, and the percent of the amount on hand to the amount authorized for both items.

(34) Blocks L120, 41, and L30. If the item codes for the second detail line are nonzero, the line is printed as for the first line, except that the percent of personnel strength to authorized strength is also included in the line. The line counter increments.

(35) Block 42. If the item codes to be listed are zero, it indicates there are no items, and control goes to block L206 and returns to the calling routine.

(36) Block 43. The loop is initialized to print third and successive lines of equipment item detail. The item codes from line two are incremented until the next items to be listed are found.

(37) Blocks 44, 45, and 46. The number of items to be printed in the next line is either two, one, or zero. If zero, all items are listed; if one, the last line is printed; if two, a full line is to be printed.

(38) Blocks L180, 47, and 48. The line counter is incremented with each print, and a header is put on the top of a page when needed.

(39) Block L200. This block completes the loop to print lines of equipment item detail.

(40) Block L206. The array giving total amounts of equipment items (EOHAR1) is zeroed out before control returns to the calling routine.

8. ROUTINE EOHLOC:

a. Purpose. EOHLOC finds the next item to be listed in the unit status report of a resolution unit and returns the item code, the amount of equipment on hand, the amount of equipment in trains (bulk), the total amount on hand plus bulk, and the percent of the total amount to the authorized amount.

b. Input Variables:

Name	Source	Contents
UMAIN(500)	ONE	Unit status record.

Name	Source	Contents
EOH(200)	ONE	UMAIN(14). Equipment on hand table.
UID		UMAIN(1). Unit identifier.
AUTH(202)	TWO	IDUM(1500). Authorized equipment table.
LASTE1	TWO	IDUM(1000). Last item code selected.

c. Output Variables:

Name	Destination	Contents
IC	Call	Item code.
EOHOH	Call	Total equipment items on hand.
IEOHT	Call	Total number of equipment in trains (bulk).
EOHTOT	Call	Total number of equipment items on hand and bulk.
EOHPER	Call	Ratio of the total equipment number to the authorized equipment number expressed as a percent.
LASTE1	TWO	IDUM(1000). Last item code selected.

d. Logical Flow (Figure V-3-B-5):

(1) Block 1. If the unit in question is a nonresolution, complex unit, call routine SUM to sum the equipment on hand and in trains data of all subordinate units with locations.

(2) Block L1. The last equipment item code (LASTE1) is incremented by one.

(3) Block 3. If the unit has a corresponding battle record, transfer control to block L110.

(4) Block 4, 5, and 6. If the unit identification of the last unit processed (OLDUID) corresponds to the present unit identification, transfer control to block L21; otherwise, set OLDUID to the present unit identification, set the last item code variable (LASTE1) to one, and the data file 31 item code (KEOHND) to zero.

(5) Block L21. If the last item code is greater than 200, transfer control to block L800.

(6) Block L25. If the data file 31 item code is greater than the last item code, transfer control to block L100.

(7) Block 8. If the data file 31 item code is equal to the last item code, transfer control to block L125.

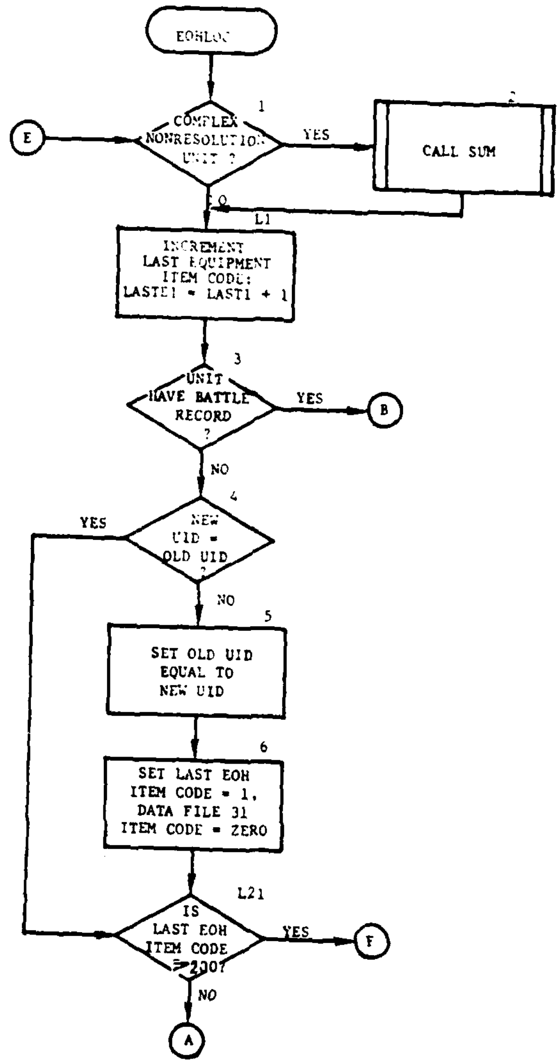


Figure V-3-B-5. Routine EOHLOC (Continued on Next Page)

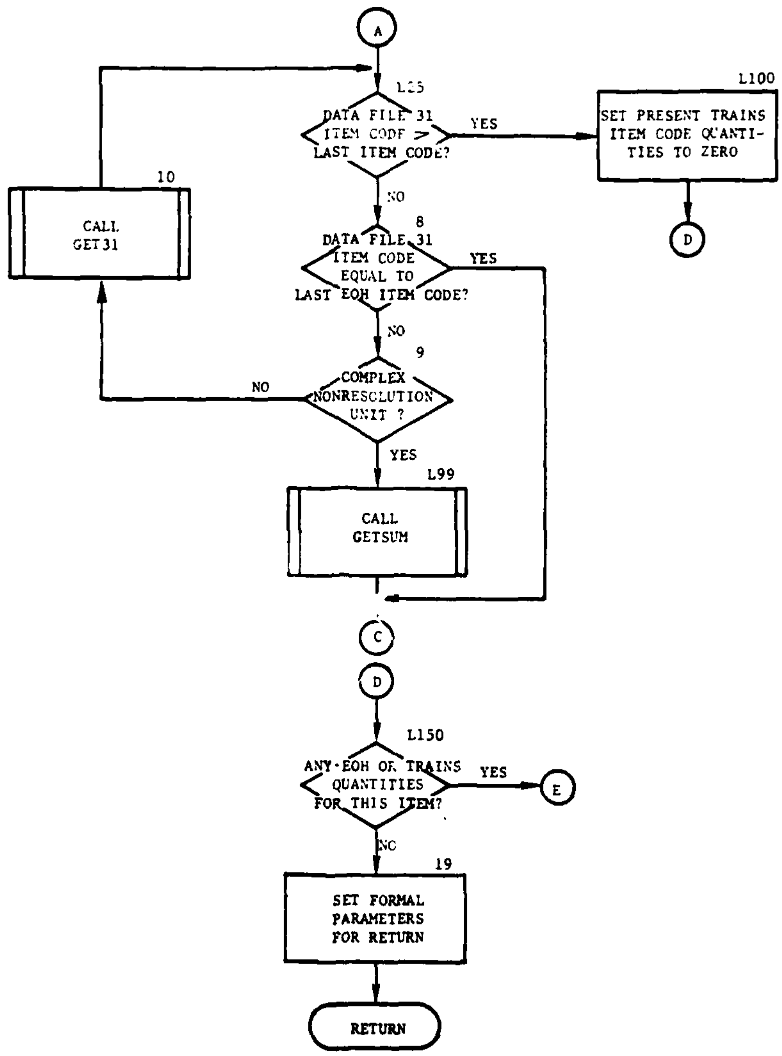


Figure V-3-B-5. Routine EOHLOC (Continued)

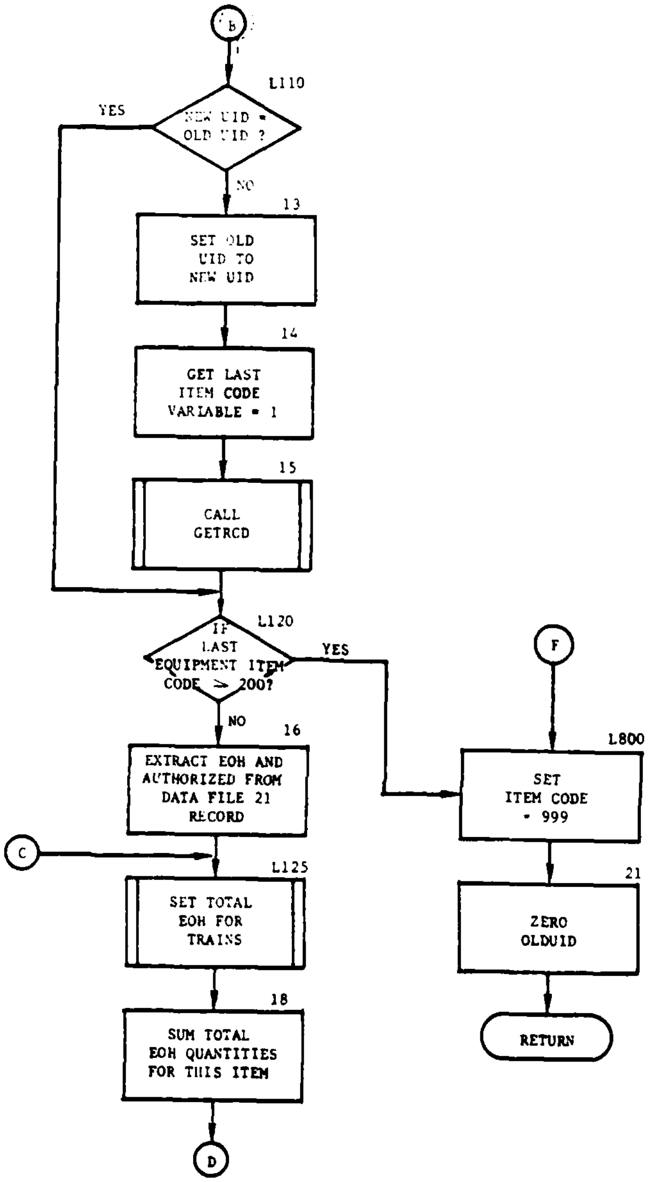


Figure V-3-B-5. Routine EOHLOC (Concluded)

(8) Block 9. If the unit in question is a nonresolution complex unit, transfer control to block L99.

(9) Block 10. Call routine GET31 to retrieve a data file 31 record and transfer control to block L25.

(10) Block L99. Call routine GETSUM to retrieve summed data file 31 data, and transfer control to block L125.

(11) Block L100. The data file 31 item code is greater than the last item code. The amount of this item in trains is set to zero, and control transfers to block L150.

(12) Blocks L110, 13 and 14. If the unit identification of the last unit processed (OLDUID) corresponds to the present unit identification, transfer control to block L120; otherwise, set OLDUID to the present unit identification, and set the last item code variable (LASTE1) to one.

(13) Block 15. Call routine GETRCD to retrieve authorized equipment and current equipment on hand from the battle assessment records (data file 21).

(14) Block L120. If the last equipment item code is greater than 200, transfer control to block L800.

(15) Blocks 16, L125, and 18. Extract equipment on hand and authorized equipment quantities from the data file 21 record, set total equipment on hand for trains variable, and sum for the total authorized equipment quantities for this item.

(16) Block L150. If there is no equipment on hand and authorized equipment quantities for this item, transfer control to block L1.

(17) Block 19. The formal parameters are computed or set for returning control to the calling routine. The item code (IC) is set equal to LASTE1; the amount on hand (EOHOH), the total amount (EOHTOT), the percent of total amount to authorized amount (EOHPER) is computed, and control returns to the calling routine.

(18) Blocks L800 and 21. Set the item code equal to 999, zero the OLDUID, and return control to the calling routine.

9. ROUTINE EOHPER:

a. Purpose. EOHPER determines and returns the item codes of the first two equipment items to be listed in the first item code column and the first two equipment items in the second item code column of the unit status report for a nonresolution unit.

b b. Input Variables:

Name	Source	Contents
UMAIN(500)	ONE	Unit status record of nonresolution unit.

Name	Source	Contents
EOH(200)		UMAIN(14). Equipment on hand table.
AUTH(202)	TWO	IDUM(1500). Authorized equipment table.

c. Output Variables:

Name	Destination	Contents
IEOHS(2)	Call	First two item codes to be listed in the first item code column of the unit status report.
MEOHS(2)	Call	First two item codes to be listed in the second item code column of the unit status report.
EOHAR1(200)	TWO	Table of percentages of amounts of items on hand over authorized amounts.

d. Logical Flow (Figure V-3-B-6):

(1) Block 1. The count of items to be listed, ICNT, is initialized to zero.

(2) Block 2. Initialize/increment loop to select each equipment item to determine if it is to be listed in the report.

(3) Block 3. The percent of authorized equipment that is on hand is computed and saved in EOHAR1.

(4) Block 4. The item is to be listed if any of the following are nonzero: the number of items on hand, the percent of authorized on hand, or the number of items authorized. If not to be listed, control goes to block L10.

(5) Block L3. The count of items to be listed, ICNT, is incremented by one.

(6) Blocks 5 and 6. If the count (ICNT) equals one, the item code (which is the DO loop index I) is saved in IEOHS(1).

(7) Blocks 7 and 8. If the count (ICNT) equals two, the item code is saved in IEOHS(2).

(8) Block L10. If there are more item codes to be selected, transfer control to block 2.

(9) Block 9. If the total count of items to be listed (ICNT) is zero, IEOHS and MEOHS must be returned as zero, and a transfer of control is made to block L30. If ICNT is one, only IEOHS(1) is nonzero, and control is transferred to block L32. If ICNT is greater than one, the MEOHS item codes must be determined as below.

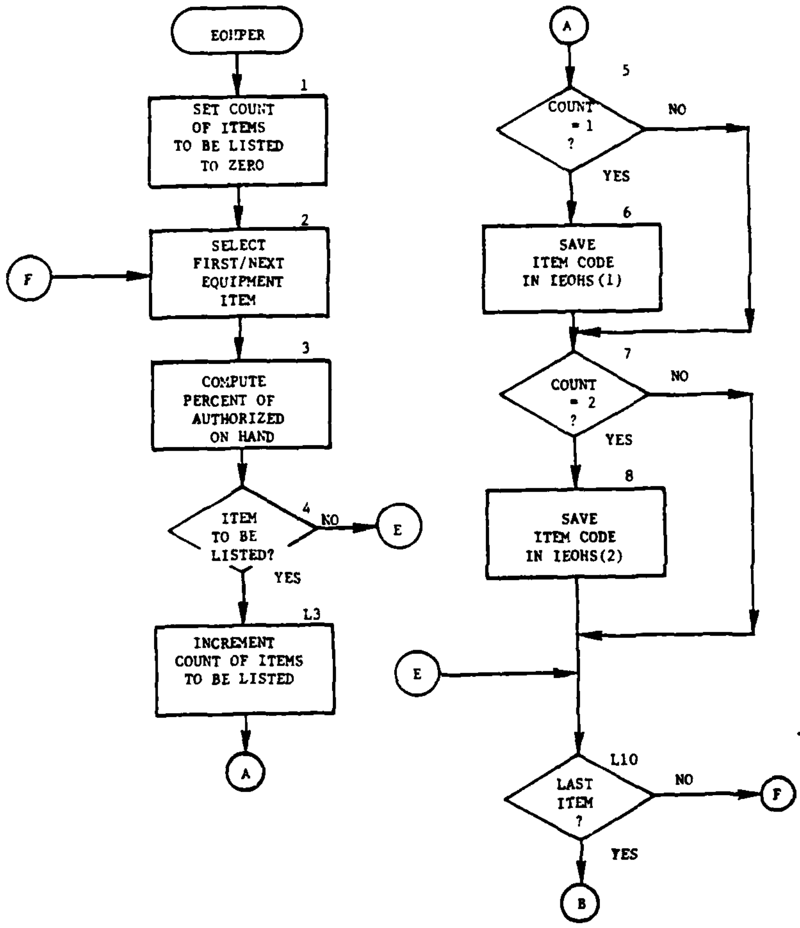


Figure V-3-B-6. Routine EOHPER (Continued on Next Page)

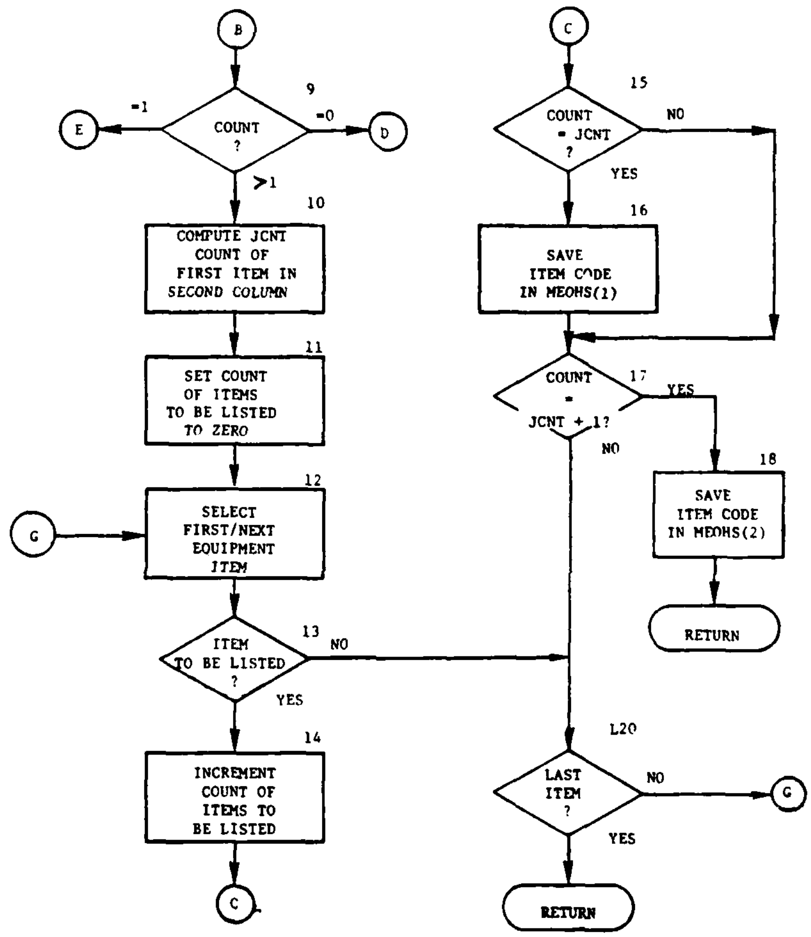


Figure V-3-B-6. Routine EOHPER (Continued)

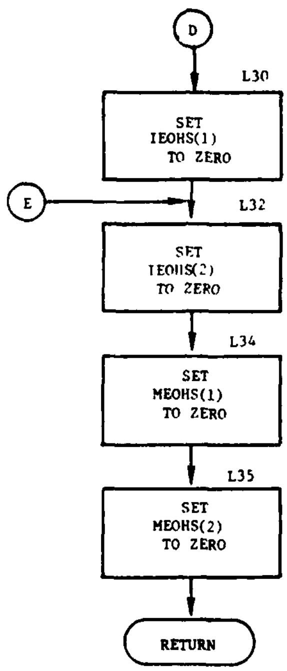


Figure V-3-B-6. Routine EOHPER (Concluded)

(10) Block 10. The count (JCNT) of the first item to be printed in the second column is computed from the total count (ICNT).

(11) Block 11. The count of items to be listed, ILCTR, is initialized to zero.

(12) Block 12. Initialize or increment loop to select each equipment item to find the JCNT item to be listed in the report.

(13) Block 13. The item is to be counted as listed if either the number on hand or the percent of authorized on hand is nonzero. If not, transfer control to block L20.

(14) Block 14. The count of items to be listed, ILCTR, is incremented by one.

(15) Blocks 15 and 16. If the count (ILCTR) equals the item count desired (JCNT), the item code (the DO loop index I) is saved in MEOHS(1).

(16) Blocks 17 and 18. If the count (ILCTR) equals the count of the second item to be listed in column two (JCNT plus one), the item code is saved in MEOHS(2).

(17) Block L20. If each equipment item has not been selected, transfer control to block 12.

(18) Blocks L30, L32, L34, and L35. The item codes to be returned in IEOHS and MEOHS are set to zero.

10. ROUTINE UACTR:

a. Purpose. Routine UACTR prints the counts of major enemy actions, the resulting losses to personnel and major equipment items, and the gains due to resupply.

b. Input Variables:

Name	Source	Contents
IREC48	ONE	UMAIN(306). Record number of unit's data file 48 record.
IREC31	ONE	UMAIN(317). Record number of unit's first data file 31 record.
JREC31	ONE	UMAIN(318). Record number of unit's last data file 31 record.
IDUM(2001-3212)	DF48	Score board from data file 48, table of losses by six major enemy activities: area fire, nuclear fire, air defense fire, ground combat, close air sorties, and attack helicopter fire.

Name	Source	Contents
IDUM(3213-3222)	DF31	Supply status record from data file 31.
IDUM(3223-3734)	DF11	Resupply item table from data file 11.

c. Output Variables:

Name	Destination	Contents
UID	Print	UMAIN(1). Eight-character unit identifier.
IDUM(4102)	Print	See Input Variables.
TEM(8)	Print	Personnel losses due to area fire, nuclear fire, air defense fire, ground combat, close air sorties, attack helicopters; total personnel losses; total personnel gains.
RMIN	Print	Minutes of ground combat.
NEOH	Print	Equipment item code.
ACTVTY(30)	Print	Activity count table.

d. Logical Flow (Figure V-3-B-7):

(1) Block 1. The unit's score board of losses is brought in from data file 48 as one record of 1212 words from location IREC48 into IDUM(2001-3212). See Input Variables (paragraph b above).

(2) Block L5. The six personnel losses from area fire, nuclear fire, air defense fire, ground combat, TACAIR, and direct aerial fire support are stored in TEM(1-6). The total personnel loss is computed and stored in TEM(7).

(3) Block 2. Initialize or increment loop to bring in this unit's supply status records to locate the record for personnel. The record numbers for this unit's first and last supply status records on data file 31 are given by IREC31 and JREC31, respectively.

(4) Blocks 3 and 4. The 10-word supply status record from data file 31 is read into IDUM(3213-3222) (see Input Variables). The first word of the record is the item code; item code 201 indicates personnel.

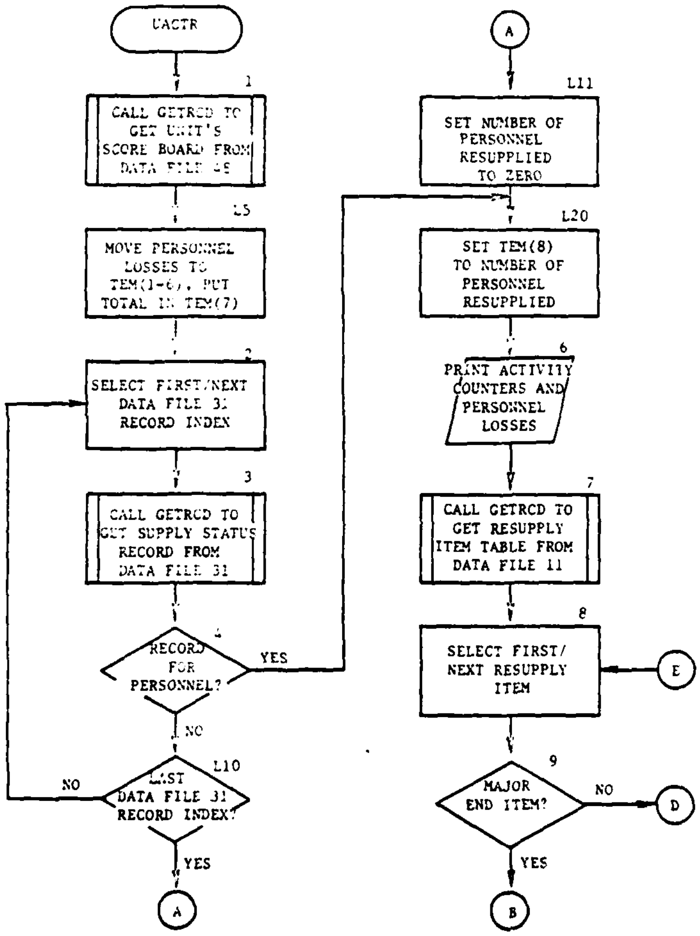


Figure V-3-B-7. Routine UACTR (Continued on Next Page)

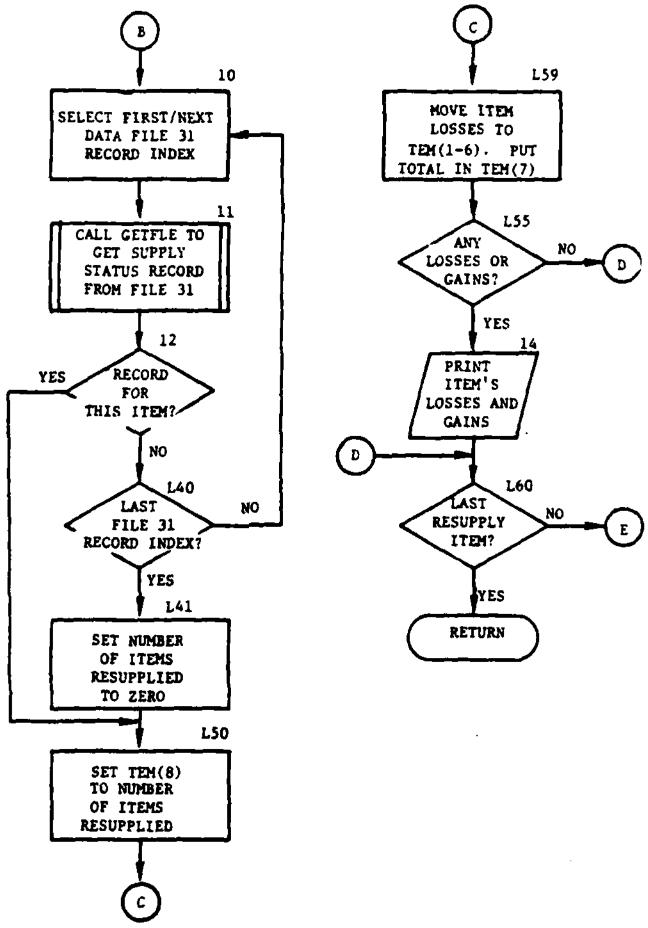


Figure V-3-B-7. Routine UACTR (Concluded)

(5) Block L10. If all of the units' data file 31 records have not been input, transfer control to block 2.

(6) Block L11. No supply status record for personnel indicates that personnel are not resupplied to the unit.

(7) Block L20. The number of personnel resupplied is stored in TEM(8).

(8) Block 6. The counts of enemy actions against this unit are printed under appropriate column headings. Personnel losses are printed from the TEM array for the six enemy activity categories, with total personnel losses, and total personnel gains from resupply.

(9) Block 7. The resupply item table from data file 11 is brought in with one 512-word record into IDUM(3223-3734) (see Input Variables). The table lists the items to be resupplied and the resupply class.

(10) Blocks 8 and 9. Initialize or increment loop to select each resupply item from the table to check for major end items. An item is a major end item if its resupply class code equals seven. If item is not a major end item, transfer control to block L60.

(11) Block 10. Initialize or increment loop to bring in this unit's supply status records to locate the record for the selected major end item. The record numbers for this unit's first and last supply status records on data file 31 are given by IREC31 and JREC31, respectively.

(12) Blocks 11 and 12. The 10-word supply status record from data file 31 is read into IDUM(3213-3222); see Input Variables. The first word of the record is the item code, which is matched against the item code of the selected major end item. If the item codes do not correspond, transfer control to block L50.

(13) Block L40. If the unit has more data file 31 records, transfer control to block 10.

(14) Block L41. No supply status record for the major end item indicates that the item is not resupplied to the unit.

(15) Blocks L50 and L59. The number of items resupplied to the unit is stored in TEM(8). Item losses for the six enemy activity categories are stored in TEM(1-6); the total item loss is stored in TEM(7).

(16) Blocks L55 and 14. If the equipment item has been lost to enemy fire or has been resupplied, the numbers of losses and gains are printed on the report; otherwise, the item is not listed in the report.

(17) Block L60. This block completes the loop on resupply items.

11. ROUTINE UACTY:

a. Purpose. The purpose of routine UACTY is to print and count the major activities performed by a unit.

b. Input Variables:

Name	Source	Contents
ACTVTY(30)	ONE	UMAIN. Activity counts table:

Index	Activity Counted
1	Conventional rounds fired on TACFIRE missions.
2	TACFIRE artillery missions.
3	Conventional rounds fired on DSL ordered fire missions.
4	DSL ordered artillery fire missions.
5	Nuclear rounds fired.
6	Sorties against acquired targets.
7	Acquired targets for sorties.
8	Sorties against DSL-ordered targets.
9	DSL-ordered targets for sorties.
10	Ground movements.
11	Distance (meters) covered in ground movements.
12	Obstacles encountered.
13	Total time (centiminutes) delayed at obstacles.
14	Engineer tasks.
15	Reconnaissance sorties.
16	Enemy aircraft fired on.
17	Lift aircraft provided for airmobile operations.

Index	Activity Counted
18	Escort aircraft provided for airmobile operations.
19	Airmobile operations.
20	Airmobile movements.
21	Distance (meters) covered by airmobile movements.
22	Lift aircraft being readied.
23	Attack helicopters being readied.
24-30	Unused.

c. Output Variables. The activity count (ACTVTY) is listed.

d. Logical Flow. A summary of the activities of the unit is printed according to the contents of the activity count table (ACTVTY).

12. ROUTINE OVFL:

a. Purpose. OVFL prints the unit status report header on the next print page.

b. Input Variables:

Name	Source	Contents
LCTR	TWO	IDUM(50). Line counter.
ICOLOR	TWO	IDUM(52). Force name (Blue or Red).

c. Output Variables:

Name	Destination	Contents
LCTR	TWO	IDUM(50). Line counter.

d. Processing Description. If the line counter (LCTR) equals eight, OVFL exits because it indicates that the header was just printed; otherwise, routine HEADER is called to print the standard report header with date, time, and page number. Then, the unit status report header is printed, and the line counter (LCTR) is set to eight.

13. ROUTINE GET31:

a. Purpose. GET31 is called by routine EOHLOC to get the unit's next supply status record from data file 31.

b. Input Variables:

Name	Source	Contents
UMAIN(500)	ONE	Unit status record.
UID		UMAIN(1). Unit identification.
IREC31		UMAIN(317). Record number of this unit's first record on data file 31.
JREC31		UMAIN(318). Record number of this unit's last record on data file 31.

c. Output Variables:

Name	Destination	Contents
IREC(10)	Call	Supply status record for one equipment item. Word one contains the item code.

d. Logical Flow (Figure V-3-B-8):

(1) Blocks 1 and 2. This unit is the same as the last unit if OLDUID and UID are equal. If they are not the same, the new IREC31 is moved to IIREC1.

(2) Block 3. The unit identification of the unit is saved in OLDUID.

(3) Blocks 4, 5, and L100. If IIREC1 is greater than JREC31 or IREC31 is equal to zero, the item code (IREC(1)) is set to 9999 before returning control to the calling routine.

(4) Block 6. The data file 31 record is brought in from the record location given by IIREC1.

(5) Block L50. IIREC1 is incremented by one prior to returning control to the calling routine.

14. ROUTINE SUM:

a. Purpose. The purpose of routine SUM is to sum the strengths of authorized equipment on hand and in trains of a unit and all of its subordinates.

b. Input Variables:

Name	Source	Contents
IUID	ONE	IUID of unit whose strength is to be calculated.
ISUB(10)	ONE	IUIDs of subordinate units.

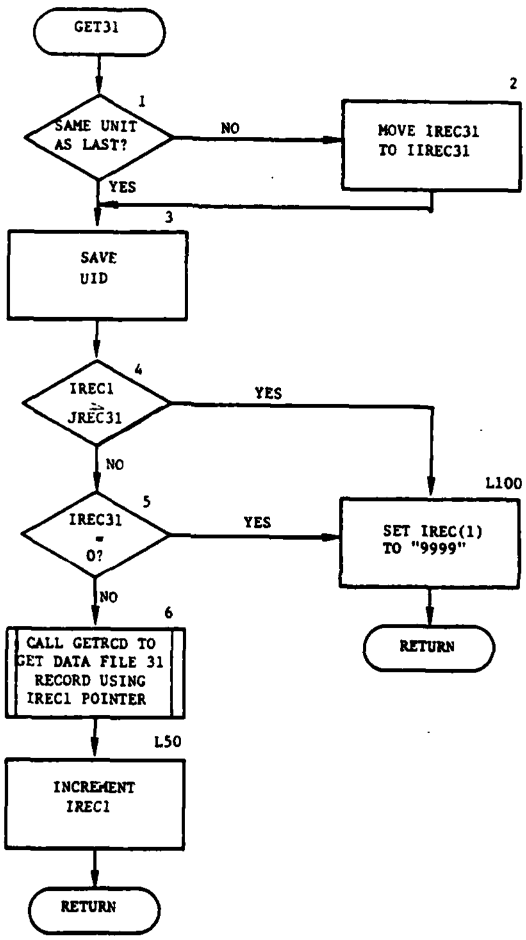


Figure V-3-B-8. Routine GET31

Name	Source	Contents
UMAIN(500)	DF1	Unit status record.
KREC(10)	DF31	Trains record.

c. Output Variables:

Name	Destination	Contents
IARRAY(200,2)	TWO	Summed equipment on hand and trains data.

d. Logical Flow (Figure V-3-B-9):

(1) Block 1. Load IUID of superior unit into first word of subordinate array.

(2) Block 2. Load unit status file record of superior unit into holding array.

(3) Block 3. Load IUIDs of subordinate units into remaining subordinate array.

(4) Block 4. Initialize array for summing equipment on hand and in data.

(5) Block 5. Initialize or increment loop to retrie·e all data file 31 records of unit and its subordinates.

(6) Block 6. If all subordinate unit records have been processed, transfer control to block L301.

(7) Block 7. Call routine GETRCD to retrieve a data file 1 unit status record.

(8) Block 8. If the unit does not have a location, transfer control to block L300.

(9) Block 9. Initialize or increment loop to retrieve all the data file 31 records of the current unit being processed.

(10) Blocks 10 and 11. Call routine GET31 to retrieve the nresent data file 31 record, and sum the equipment on hand and in data by type.

(11) Block L200. If all the data file 31 records of the present unit have not been retrieved, transfer control to block 9.

(12) Block L300. If all of the units have not been processed, transfer control to block 5.

(13) Block L301. Restablish UMAIN array for superior unit, and return control to calling routine.

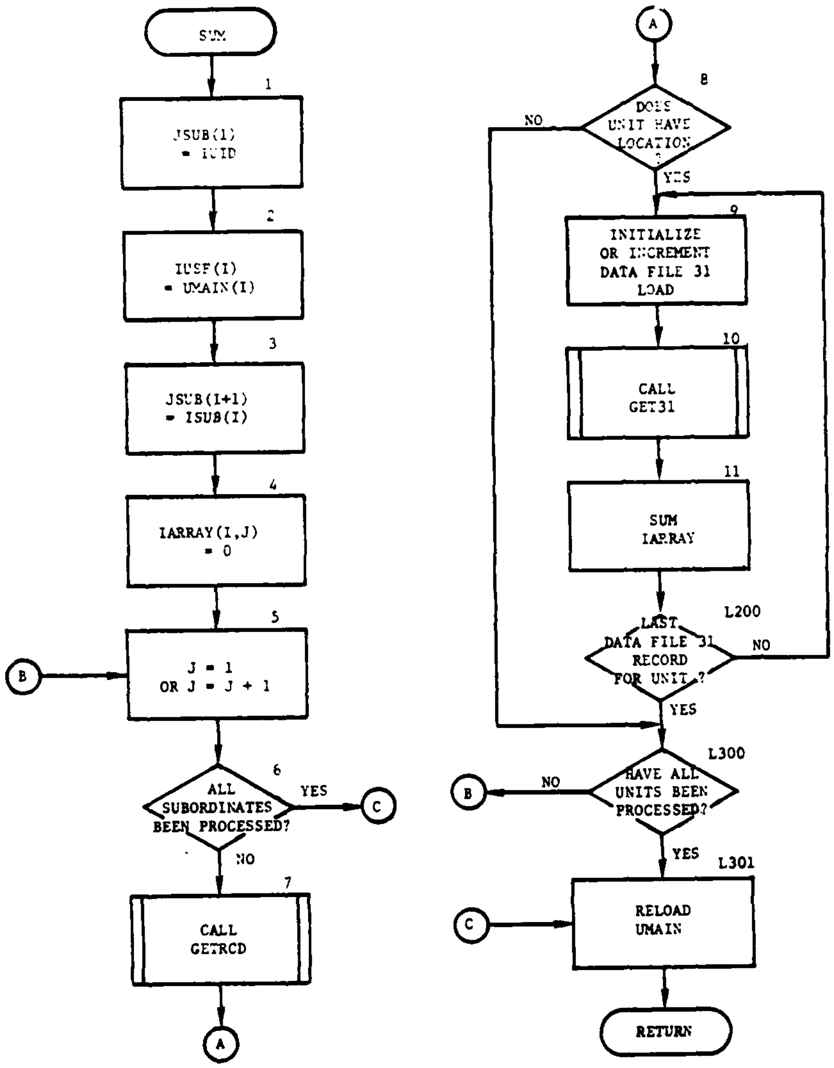


Figure V-3-B-9. Routine SUM

15. ROUTINE GETSUM. This routine retrieves summed equipment on hand and data from the IARRAY array.

APPENDIX C

STATUS AND ACTIVITY REPORTS OUTPUT DESCRIPTIONS

This appendix contains detailed descriptions of the status report and activity report generated by the Period Output Processor. Figure V-3-C-1 depicts the format of the printout. Each appropriate line, group of lines, or column is designated by an alphabetic character (descriptor) in the figure that is explained as follows.

Output Descriptor	Explanation
A	This line is an input card image and reflects any message that the analyst would like to list and, on the right side, the start date and time for this run.
B	These two lines give the beginning and ending times for the period that this report reflects.
C	These four items--UID, UTD, IUID, and LOCATION--give respectively the unit identification (B5025ZGS), the unit type designator (FHFA), the ordinal number of the unit within the force (78), and its location (113700 - 93800) at the end of the period.
D	This column reflects the total personnel strength and the percentage of the total authorized strength at the end of the period.
E	The three items shown here, DIRECTION, FRONTAGE, and DEPTH, give the units orientation (E) width (1500 meters) and depth (2400 meters).
F	The column under ITEM CODE lists all equipment types by equipment item code authorized for this unit. The column under EOH UNIT gives the quantity of that equipment authorized that this unit has on hand, and the next column under EOH BULK lists the amount of equipment this unit has in trains. The column under EOH TOTAL is a sum of equipment quantities by type on hand and in trains, and the next column under EOH AUTHORIZED lists the total equipment by type this unit is authorized. The final column, PERCENT, lists the percent of total equipment by type this unit has in respect to the quantity authorized.

A BENCHMARK PERIOD 1 [illegible]-2730

DATE: 02/15/73 TIME: 11.14.50.

B BEGINNING TIME DAY 1 HR 5 MIN 0
ENDING TIME DAY 1 HR 9 MIN 0

ORGANIZATION AND CURRENT SITUATION

C UID B5025ZGS IUID 78 LOCATION 113700- 93800
UTD FHEA
SUPERIOR UID B1DIV7DA
E DIRECTION E FRONTAGE 1530 DEPTH 2430

D BLUE FORCE STATUS AT END OF PERIOD

PERSONNEL
STRENGTH 489
PERCENT OF AUTHORIZED 91.

MATERIAL STATUS

F ITEM CODE	EOH UNIT	EOH BULK	EOH TOTAL	EOH AUTHORIZED	PER CENT
1	2222.14	3423	5645.14	3766	150.
2	15346.25	5905	21252.25	22561	94.
8	3886.58	0	3886.58	10130	88.
20	16.22	0	16.22	19	85.
22	.87	0	.87	1	87.
56	12.00	0	12.00	12	100.
57	572.00	1032	1704.00	1800	95.
63	3.00	0	3.00	3	100.
70	18.00	33	51.00	54	94.
160	56.60	0	56.60	62	91.
161	50.21	0	50.21	55	91.
166	1.62	0	1.62	2	81.
167	15.23	0	15.23	18	85.
187	12.00	0	12.00	12	100.
188	4.98	0	4.98	5	100.
189	1.00	0	1.00	1	100.

G COMPONENT UNITS% B525HQGS B5025AGS B5025BGS B5025CGS B525TNGS

ACTIVITY REPORT FOR B5025ZGS UNIT

H	ARTILLERY ROUNDS 102	NUCLEAR ROUNDS 0	ADCU ENCOUNTERED 0	GROUND CBT TIME 0.00 MIN	CLOSE AIR SORTIES 0	ATCK HCPT SORTIES 0		
I	LOSSES	LOSSES	LOSSES	LOSSES	LOSSES	LOSSES	TOTAL LOSSES	GAINS
PERSONNEL	48.44	0.00	0.00	0.00	0.00	0.00	48.44	0.00
22	.129	0.000	0.000	0.000	0.000	0.000	.129	0.000
160	5.395	0.000	0.000	0.000	0.000	0.000	5.395	0.000
161	4.786	0.000	0.000	0.000	0.000	0.000	4.786	0.000
166	.380	0.000	0.000	0.000	0.000	0.000	.380	0.000
167	2.774	0.000	0.000	0.000	0.000	0.000	2.774	0.000
188	.022	0.000	0.000	0.000	0.000	0.000	.022	0.000
189	.003	0.000	0.000	0.000	0.000	0.000	.003	0.000

** **

J FIRED 95 CONVENTIONAL ROUNDS ON [illegible] TACFIRE MISSIONS.
END OF ACTIVITY

Figure V-3-C-1. Status and Activity Reports

G	If this unit is a complex unit this line lists its component units.
H	This line reflects the activity directed against this unit; the columnar headings are self explanatory.
I	This group gives the total losses of this unit for equipment and personnel encountered by each activity in group H. The last two columns give the total losses of personnel and equipment by type from all the activities in group H and any personnel and equipment gain for this unit during this period.
J	This line reflects the activity of this unit during this period; other possible messages here are:

FIRED XXXXX CONVENTIONAL ROUNDS ON XXXXX DSL FIRE MISSIONS.

FIRED XXXXX NUCLEAR ROUNDS.

FLEW XXXXX SORTIES AGAINST XXXXX ACQUIRED TARGETS.

CONDUCTED XXXXX GROUND MOVEMENTS OVER XXXXX METERS.

ENCOUNTERED XXXXX OBSTACLES FOR DELAYS OF XXX HRS YYY MINS.

COMPLETED XXXXX ENGINEER TASK.

FLEW XXXXX RECONNAISANCE SORTIES.

FIRED ON XXXXX ENEMY AIRCRAFT.

PROVIDED XXXXX LIFT AND ESCORT AIRCRAFT FOR XXXXX AIRMOBILE OPERATIONS.

CONDUCTED XXXXX AIRMOBILE MOVEMENTS OVER XXXXX METERS.

LAST LIFT NOT COMPLETE.

CONTAIN XXX.XX LIFT AND XXX.XX ATTACK (ESCORT) AIRCRAFT BEING READIED FOR AVAILABILITY.

APPENDIX D

SOURCE LISTINGS FOR PERIOD OUTPUT PROCESSOR STATUS AND ACTIVITY REPORTS

(AVAILABLE UNDER SEPARATE COVER)

CHAPTER 4

PLANNING REPORT

1. INTRODUCTION. The planning report of the Period Output Processor is produced by routine PLREPT and its supporting routines PLOVFL and UIDS01. Appendix B of this chapter provides a detailed describtion of these routines.

2. SYSTEM FLOW. Initially, routine UIDS01 is called to sort the unit identifications of each unit in the unit status file. The original order of units and the sorted order as well as other appropriate data are placed on data file 16 where they will be available for the PLREPT routine. Routine PLREPT retrieves the unit identification data from data file 16 and prints it, calling routine PLOVFL, when appropriate, to print header information.

APPENDIX A

INPUT REQUIREMENTS FOR PLANNING REPORT

Input for the planning report of the Period Output Processor consists of DIVWAG data files 1 and 16. Refer to Section VII, DIVWAG System Utility Package, Chapter 2, DIVWAG Data Files, for a complete description of data file 1. Data file 16, in this processor, is a scratch file in which the unit identifications of the appropriate force are sorted alphabetically and printed with the unsorted list for ease of identification.

APPENDIX B

PLANNING REPORT PROGRAM DESCRIPTIONS

1. INTRODUCTION. The DIVWAG planning report is produced by routine PLREPT and its supporting routine PLOVFL upon call from REPCTL. Prior to calling PLREPT, routine UIDSO1 is called to perform an alphabetical sorting of unit identifiers (UID). The three associated routines are presented below.

2. ROUTINE UIDSO1:

a. Purpose. Routine UIDSO1 sorts the unit identifications in alphabetical/numerical order. Each unit identification has a six-word block on data file 16. Words 1 and 2 are the unit identification, word 3 is a page number, words 4 and 5 are an integer mask of the unit identification (assigned in this routine), and word 6 is an ordinal number (assigned in this routine). Sorting is accomplished on the integer mask.

b. Input Variables:

Name	Source	Contents
INDEX	DF16	Number of entries in unit identification table.
IWORK, IWORK1	DF16	Work tables where unit identification is stored when it is brought in from data file 16.

c. Output Variables:

Name	Destination	Contents
IWORK	DF16	Sorted unit identifications.
IWORK1	DF16	Sorted unit identifications.

d. Logical Flow (Figure V-4-B-1):

(1) Block 1. The index number, which is the number of unit identifications in the table, is brought in from data file 16.

(2) Block 2. Ordinal numbers are assigned to the unit identifications so that the information associated with them can be located after the unit identifications are sorted.

(3) Block 3. A flag is set so that the last half of each unit identification will be looked at first. The unit identifications are sorted by the value of the last half first.

(4) Block 4. The first or last half of each unit identification is packed into one integer so that it can be compared to the others.

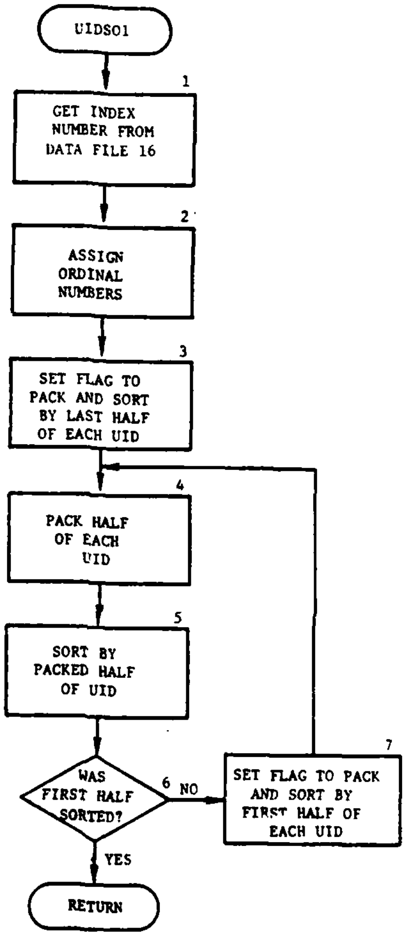


Figure V-4-B-1. Routine UIDS01

(5) Block 5. The unit identification's six-word blocks are sorted according to the value of the first or last half of the unit identification.

(6) Block 6. If the unit identifications have been sorted by both halves, return control to the calling routine.

(7) Block 7. If the first half of the unit identifications was not compared, set the flag so that the first half will be sorted and transfer control to block 4.

3. ROUTINE PLREPT:

a. Purpose. Routine PLREPT prints the data for the period planning reports from data files 16 and 1.

b. Input Variables:

Name	Source	Contents
IFORCE	Call	Force indicator.
INDEX	DF16	Number of entries in unit identification table.
IWORK	DF16	Working array.
JWORK	DF16	Working array.
COUTD	ONE	Unit type identifier.
XXLOC	ONE	X location of unit.
YYLOC	ONE	Y location of unit.
BPOINT	ONE	Total number of Blue units.

c. Output Variables:

Name	Destination	Contents
UID	Print	Unit identifier.
COUTD	Print	Unit type identifier.
XXLOC	Print	X location of unit.
YYLOC	Print	Y location of unit.
IPAGE	Print	Page number where unit identification is found in unit status report.
IIUID	Print	Unit status file record number.

Name	Destination	Contents
JUID	Print	Alphabetized unit identifier.
JPAGE	Print	Page number where unit identification is found in unit status report.

d. Logical Flow (Figure V-4-B-2):

(1) Block 1. IFORCE is compared to BPOINT to determine whether printout is for Red or Blue force.

(2) Block 2. The index number, which is the number of unit identifications in the table, is brought in from data file 16.

(3) Block 3. Routine PLOVFL is called to print the heading on the page.

(4) Block 4. The data to be printed are brought in from data file 16.

(5) Block 5. The data are printed on the line printer.

(6) Block 6. If more data are to be printed, control is returned to block 4; otherwise, control returns to the calling routine.

4. ROUTINE PLOVFL:

a. Purpose. Routine PLOVFL prints the header for the period planning report.

b. Input Variables:

Name	Source	Contents
ICOLOR	Call	Force designator (Red or Blue).

c. Output Variables. None.

d. Logical Flow (Figure V-4-B-3):

(1) Block 1. Routine HEADER is called to print the date, time of day, and beginning and ending time.

(2) Block 2. The period planning report header is printed. This contains the report title and appropriate column headings for the body of the report.

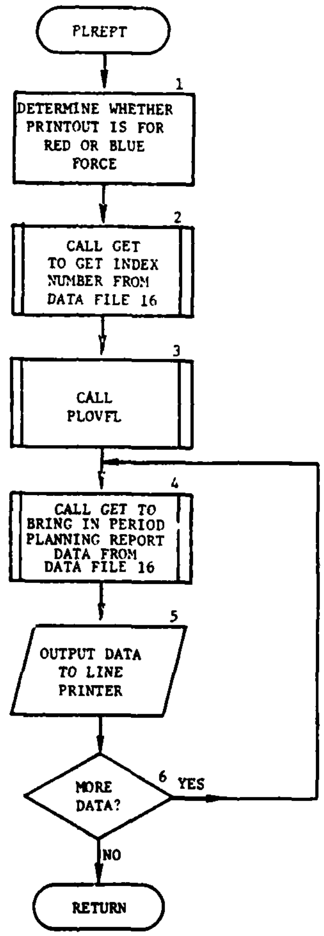


Figure V-4-B-2. Routine PLREPT

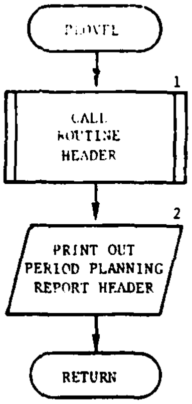


Figure V-4-B-3. Routine PLOVFL

APPENDIX C

PLANNING REPORT OUTPUT DESCRIPTION

The period planning report (Figure V-4-C-1) is a list of the units as they appear in the force. The first four columns of the printout give the UID, UTD, and coordinates of the unit. The next two columns give the page number where the corresponding status and activity report will be found for a particular unit and the unit status file record number for that unit. The last two columns contain an alphabetical sorted listing of the UIDs and the corresponding page number for the unit's status and activity report.

[illegible] DATE: [illegible] TIME: [illegible]

BEGINNING TIME [illegible]
ENDING TIME [illegible]

[illegible] PERIOD PLANNING REPORT

TASK ORGANIZATION						ALPHABETICAL LISTING	
UIC	UTC	X-LOCATION	Y-LOCATION	PAGE NO.	USE SEQ. NO.	UIC	PAGE NO.
B1[illegible]C7FC	AA19	0	0	1	233	[illegible]3297	90
B1[illegible]IV	9AMC	0	0	3	281	B1A[illegible]	77
B1AFRMOR	3CFY	77030	44000	5	282	B1AF[illegible]MOR	6
B10TACCP	7TCC	91130	39130	6	283	B1ASSPTH	62
B10IVZTP	[illegible]	0	0	7	250	B1AT[illegible]SPT	72
B1MAINCP	[illegible]MCC	91130	41130	8	251	B1ATK12F	73
B1[illegible]RPCP	9PLC	95130	19100	9	252	B1ATK22F	74
B130C7EN	EESE	91130	45100	10	44	B1ATK32F	75
B101RPEN	JESE	0	0	10	45	B1AVNSPT	63
B1[illegible]1HOEN	JESE	0	0	10	45	B1CBTSTI	19
B13CC7EN	EESE	91130	45100	11	44	B10IVZOA	26
B1[illegible]1RPEN	JESE	0	0	11	45	B10IVZTP	7
B131HOEN	JESE	0	0	11	45	B1DSSPTI	18
B13ADMEN	2ASE	127030	73000	12	47	B1HODSCM	21
B13227AI	EOMI	97730	45500	13	49	B1HODSCM	20
B122HOAI	IACI	0	0	13	1	B1MAINCP	8
B1C22AAI	IOMI	0	0	13	43	B1SPTAMN	67
B1C22BAI	IOMI	0	0	13	50	B1SPT7MF	71
B1C22CAI	IOMI	0	0	13	51	B1SPT7MC	70
B122CSAI	IESI	0	0	13	52	B1SPT1RP	64
B12007SC	ESSS	0	0	14	53	B1SPT2RP	65
B1215CON	SSCS	90100	98100	15	54	B1JADMEN	12
B1CCC7AD	EASD	0	0	16	55	B1JADMIN	20
B130HQAD	JHCD	89100	94100	17	56	B1JADMIN	21
B13C07TI	STIJ	99630	39990	18	57	B10AMCEN	56
B13CHOTI	IJCJ	0	0	18	58	B1JAMOEN	56
B1DSSPTI	JTIJ	0	0	18	[illegible]	B1CARAEN	40
B1C9TSTI	ISIJ	0	0	18	59	B1JARREN	40
B1SPI7MD	CSCL	80100	101300	20	253	B10AVACC	62
B1HODSCM	JSCL	0	0	20	254	B1JAVBCC	62
B10ADMIN	JLLL	0	0	20	255	B1JAVCCC	62
B101SCSP	JSCS	0	0	20	255	B1JAVDCC	62
B13C07MN	FMLL	0	0	20	63	B1JAVHHQ	62
B135C7MC	FMLL	0	0	20	63	B10AVSPT	63
B1SPI7MD	CSCL	90100	101300	21	253	B1JAVZON	62
B1HODSCM	JSCL	0	0	21	254	B1JMTPST	23
B10ADMIN	JLLL	0	0	21	255	B10MTPST	22
B101SCSP	JSCS	0	0	21	255	B10SPTMN	53
B13C07MN	FMLL	0	0	21	63	B1JTACCP	6
B10CC7MC	FMLL	0	0	21	63	B1J0FATI	27
B10007ST	FSLL	86030	107300	22	64	B1J0HQAD	17
B130HOST	JTCL	0	0	22	65	B1J0HOFA	27
B10MTPST	JTLL	0	0	22	67	B1JJHOST	23
B130C7ST	FSLL	86030	107300	23	64	B1J0HOST	22
B130HOST	JTCL	0	0	23	65	B1J0HOTI	18
B1CMTPST	JTLL	0	0	23	67	B100M7LL	100
B133SSST	JSLL	86030	107000	24	66	B100MZLL	105
B10IVZOA	CAFA	0	0	26	257	B100PZLL	131
B100HOFA	JACA	92200	95800	27	70	B100P7LL	106
B130FATI	UTIJ	0	0	27	71	B100RPCP	9
B5015?GS	ECFA	128200	97800	28	72	B1J0SSST	24

Figure V-4-C-1. Period Planning Report

APPENDIX D

SOURCE LISTINGS FOR PERIOD OUTPUT PROCESSOR PLANNING REPORT

(AVAILABLE UNDER SEPARATE COVER)

CHAPTER 5

INTELLIGENCE REPORT

1. INTRODUCTION. The intelligence report of the Period Output Processor consists of the routine INTLRP. Appendix B of this chapter provides a detailed description of this routine.

2. SYSTEM FLOW. Routine INTLRP retrieves intelligence information from the division intelligence files and prints a report consisting of the estimated location, size, activity, type, and direction of movement of detected enemy units, as well as the time last detected and the attributed number of sightings for each division of a selected force.

APPENDIX A

INPUT REQUIREMENTS FOR INTELLIGENCE REPORT

Input for the intelligence report of the Period Output Processor consists of DIVWAG data file 43. Refer to Section VII, DIVWAG System Utility Packages, Chapter 2, DIVWAG Data Files, for a complete description of this file.

15 APR 1975

APPENDIX B

INTELLIGENCE REPORT PROGRAM DESCRIPTION

1. INTRODUCTION. The intelligence reports for the Period Output Processor are printed by the routine INTLRP, described in this appendix.

2. ROUTINE INTLRP:

a. INTLRP prints the estimated location, size, activity, type, and direction of movement of detected enemy units, as well as the time last detected and the attributed number of sightings for each division of a selected force (Blue or Red).

b. Input Variables:

Name	Source	Contents
IIFORCE	Call	Beginning unit index; i.e., 1 or RPOINT.
JARRAY(34,100)	DF43	Division intelligence record.
BPOINT	ONE	Pointer to last Blue unit.
RPOINT	ONE	Pointer to first Red unit.
ITABLE (20,100)	DF20	Sensor Status Records.

c. Output Variables:

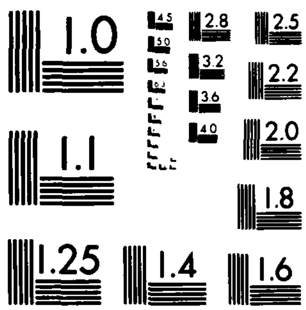
Name	Destination	Contents
JARRAY(34,100)	Print	Division intelligence record.
IFORCE(2)	Print	Force name table.
NUMBER	Print	Blue division number.
MUMBER	Print	Red division number.
RPTNO	Print	Sensing report number.
SIZE(7)	Print	Unit size name table.

Index	Name
1	PLT
2	PLT PLUS
3	CO
4	CO PLUS

AD-A112 654 ARMY COMBINED ARMS COMBAT DEVELOPMENTS ACTIVITY FORT--ETC F/G 15/7
DIVWAG MODEL DOCUMENTATION. VOLUME II. PROGRAMMER/ANALYST MANUA--ETC(U)
JUL 76

UNCLASSIFIED CACDA-TR-8-76-VOL-2-PT-5 NL

2 of 6
AD
A112654



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

Name	Destination	Contents		
			Index	Name
			5	BN
			6	BN PLUS
			7	BDE/REGT
ACT(7)	Print	Unit activity name table:		
		Activity Code	Index	Name
		10	1	STAY
		20	2	MOVING
		30-34	3	FIRING
		40	4	ATTACK
		50	5	UNKNOWN
		42	6	WITHDRAW
		41	7	DEFEND
TYPE(11)	Print	Unit type name table:		
			Index	Name
			1	INFANTRY
			2	ARMOR
			3	MECH INF
			4	REINF TF
			5	ARTYTUBE
			6	ARTY-MSL
			7	ADA-GUNS
			8	ADA-MSL
			9	AERIAL
			10	ENGINEER
			11	CP

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Name	Destination	Contents
IESTD1(16)	Print	Move direction name table:

Index	Name
1	E
2	ENE
3	NE
4	NNE
5	N
6	NNW
7	NW
8	WNW
9	W
10	WSW
11	SW
12	SSW
13	S
14	SSE
15	SE
16	ESE

Name	Destination	Contents
ESTAI1	Print	Number of aircraft message; e.g., 12 A/C.
IDAY	Print	Day of last detection.
IHR	Print	Hour of last detection.
IMIN	Print	Minute of last detection.
JARRAY (22,J)	Print	First unit to receive sensing report.

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Name	Destination	Contents
JARRAY (10-18, J)	Print	Number of targets of each target type:

INDEX	CODE	TYPE
10	PER	Personnel
11	VH	Vehicles
12	TK	Tanks
13	AP	APCs
14	AT	Arty. Tubes
15	AM	Arty. Miss.
16	AG	AD Guns
17	AD	AD Miss.
18	AF	Aircraft

Name	Destination	Contents
NSS (12)	Print	Sensor Type:

INDEX	CODE	TYPE
1	INDI	Individual
2	SMTI	MTI (short)
3	MMTI	MTI (median)
4	LMTI	MTI (long)
5	CMOR	Counter Mortar
6	CBAT	Counter Battery
7	UGSF	UGS Field
8	ADFN	Air Defense
9	SIGN	Signal
10	AIRB	Airborne
11	GRPS	Ground Recon.
	RFRS	Round-Firing

Name	Destination	Contents
NTT (6)	Print	Sensor Status:

INDEX	CODE	TYPE
1	ON	ON
2	TRCK	TRACKING
3	OFF	OFF
4	TDMG	TEMP. DAMAGE
5	DEST	DESTROYED
6	RPTG	REPORTING

Name	Destination	Contents
ITABLE (4, IS)	Print	Sensors last report number.
ITABLE (6-13, IS)	Print	Sensors last location.

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d. Logical Flow (Figure V-5-B-1):

(1) Block 1. The Blue division number (NUMBER) and the Red division number (MUMBER) are both set to zero.

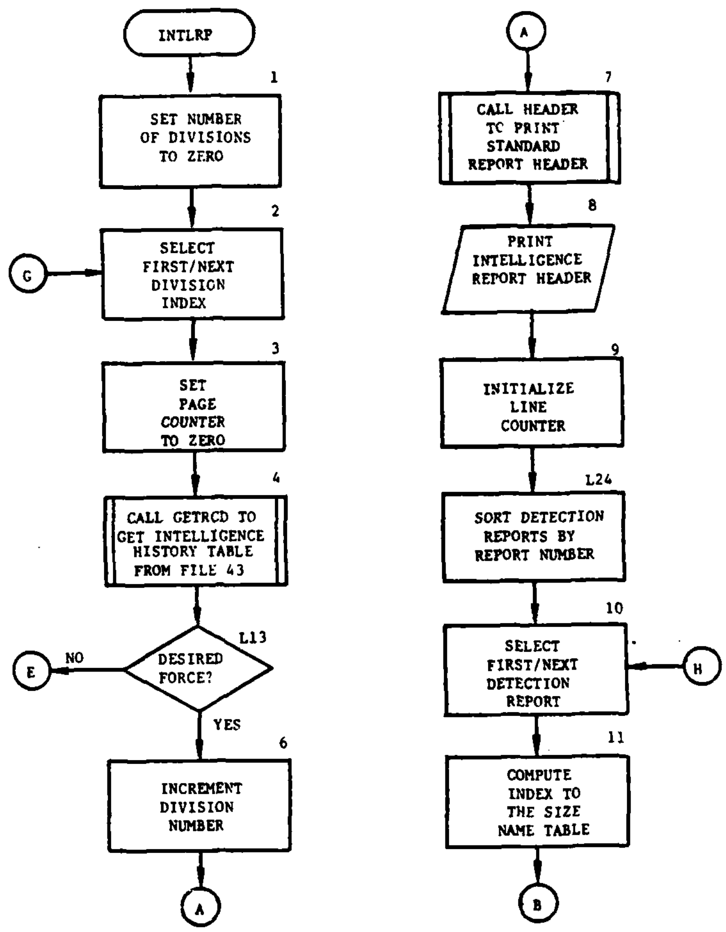

Figure V-5-B-1. Routine INTLRP (Continued on Next Page)

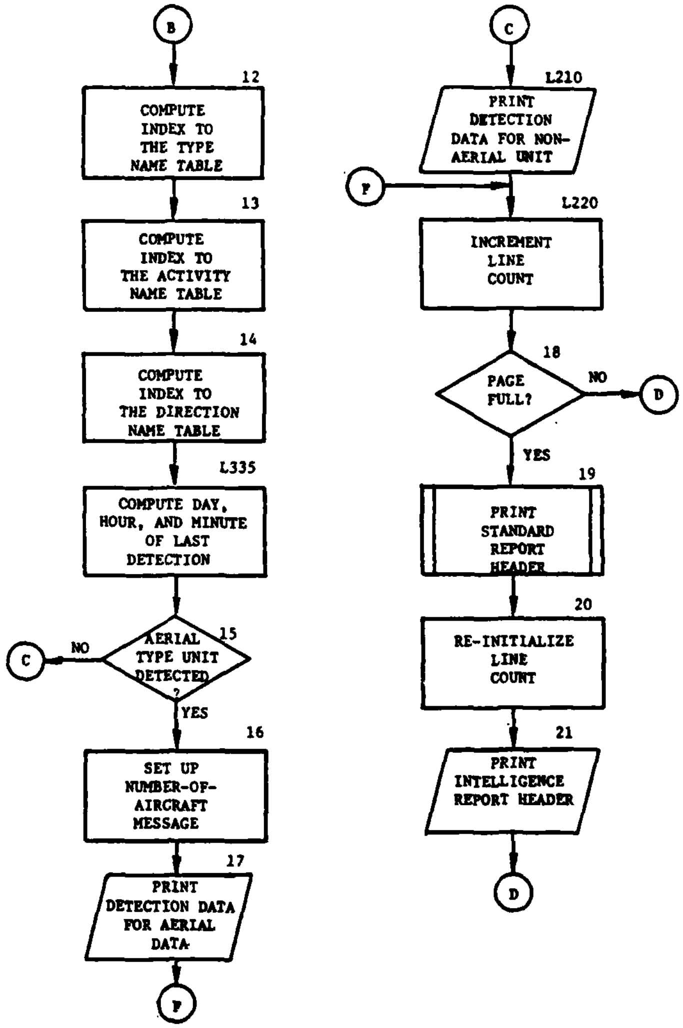

Figure V-5-B-1. Routine INTLRP (Continued)

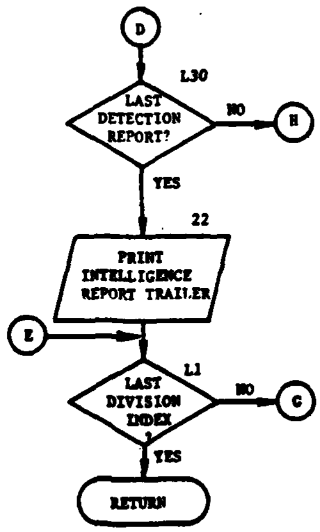

Figure V-5-B-1. Routine INTLRP (Concluded)

(2) Block 2. Initialize or increment loop to select each division record from data file 43, regardless of force.

(3) Block 3. The report page counter [IPGCTR located at IDUM(51)] is set to zero for each division report.

(4) Block 4. The intelligence record (JARRAY) for this division is brought in from data file 43. IER is returned equal to six if a record number beyond the length of the file is referenced.

(5) Blocks L13 and 6. The intelligence record may be for either force; however, IIFORCE indicates the desired force. The force of the units detected can be determined from their IUIDs in the second row. If the record is not for the detecting force desired, transfer control to block L1; otherwise, increment the division number count for the division.

(6) Block 7. Call routine HEADER to print the standard report header consisting of the period report name, the date, the time, the report page number, and the day, hour, and minute of the beginning and end of the period.

(7) Block 8. Print the intelligence report header to identify the new report as an intelligence report. This gives the force and the division number and includes the column headings.

(8) Block 9. The line counter (ILINE) is set equal to the count of lines in the headers prior to printing the detection data.

(9) Block L24. Each column of JARRAY corresponds to a detection summary report if it is nonzero. These detection reports are to be printed in order of the report number, which is the first word of each report; therefore, the columns are rearranged so that the numerical report numbers are in ascending order.

(10) Block 10. Initialize or increment loop to select each detection summary report (one column of JARRAY) to be printed as one line of the intelligence report.

(11) Block 11. The index (INDEX) to the size name table (SIZE) is taken from JARRAY.

(12) Block 12. The index (IINDEX) to the type name table (TYPE) is taken from JARRAY.

(13) Block 13. The index (IIIND1) to the activity name table (ACT) is computed from the activity code which is taken from JARRAY.

(14) Block 14. The index (IRAD) to the direction name table (IESTD1) is computed from the direction of movement which is taken from JARRAY.

(15) Block L335. The day, hour, and minute of the last time of detection of the unit is computed from the time of last detection from JARRAY given in minutes from the start of the game.

(16) Blocks 15, 16, and 17. A detected unit is considered to be an aerial type unit, either an airbase or an aerial mission unit, if the estimated type index equals nine. If not an aerial mission unit, the number of aircraft detected in the aerial unit is printed rather than the estimated type of unit, and control is transferred to block L220.

(17) Block L210. The data items printed about the detected unit are: the sensing report number, the estimated X,Y coordinates, size, activity, type, direction of movement, the time last detected, and the attributed number of sightings.

(18) Blocks L220, 18, 19, 20, and 21. The line counter (ILINE) is incremented by two and compared to the maximum number of lines per page. If the report page is full, the standard report header is printed on the next page by routine HEADER, the intelligence report header is printed [see paragraph d(7) above], and the line counter is decremented to 22.

(19) Block L30. If all detection summary reports have not been printed, transfer control to block 10.

(20) Block 22. A report trailer, or ending message, is printed to indicate that the intelligence report for the specified division is completed.

(21) Block L1. If all division records have not been processed, control is transferred to block 2; otherwise, control returns to the calling routine.

APPENDIX C

INTELLIGENCE REPORT OUTPUT DESCRIPTION

The Intelligence Report of the Period Output Processor, shown in Figure V-5-C-1, gives the results of intelligence activity for each division for the previous period. The first column (INDEX) is a unique reference number assigned to the target when first detected. The index remains unchanged for the duration of the game. All other columns are self-explanatory.

BENCHMARK PERIOD 1 0500-0730   DATE; 02/16/73   TIME; 11.14.50.

BEGINNING TIME DAY 1 HR 5 MIN 0
ENDING TIME   DAY 1 HR 9 MIN 0

************ BLUE 1 INTELLIGENCE REPORT *************

INDEX	EST. LOCATION X	Y	EST. SIZE	EST. ACTIVITY	EST. TYPE	DIRECTION OF MOVEMENT	TIME LAST DETECTED DAY	HOUR	MINUTE	ATTRIBUTED SIGHTINGS
1120002	121895	97897	CO	FIRING	ARTYTUBE		1	5	26	2
1120003	124709	93599	CO	FIRING	ARTYTUBE		1	5	25	1
4600001	121819	94165	CO	ATTACK	REINF TF	W	1	5	0	3
4600002	118468	87875	CO	ATTACK	REINF TF	WSW	1	5	0	3
4600004	114902	86565	CO	DEFEND	REINF TF		1	5	0	1
4600006	127463	94220	CO	MOVING	REINF TF	W	1	5	0	1
4600007	121486	91993	CO	ATTACK	REINF TF	W	1	5	0	1

**** END OF BLUE 1 INTELLIGENCE REPORT ****

Figure V-5-C-1. Period Intelligence Report

APPENDIX D

SOURCE LISTINGS FOR PERIOD OUTPUT PROCESSOR INTELLIGENCE REPORT

(AVAILABLE UNDER SEPARATE COVER)

CHAPTER 6

BARRIER REPORT

1. INTRODUCTION. The barrier report of the Period Output Processor is provided by the routine ENGRE1 and its supporting utility routines DATET1, HEADER, and GET2.

2. SYSTEM FLOW. ENGRE1 calls routine GET2 to retrieve barrier records from the barrier-facility file. It then examines each record for activity during the previous period. If no activity is detected, the record is bypassed and the next record is read. When a record with activity is detected, ENGRE1 calculates the type of activity and the percentage accomplished. It then calls routine DATET1 and HEADER to compute the appropriate data and print an identifying heading. It finally prints the proper record information.

APPENDIX A

INPUT REQUIREMENTS FOR BARRIER REPORT

Input for the barrier report module of the Period Output Processor consists of DIVWAG data files 1, 2, and 28. Refer to Section VII, DIVWAG System Utility Packages, Chapter 2, DIVWAG Data Files, for a complete description of these files.

APPENDIX B

BARRIER REPORT PROGRAM DESCRIPTIONS

1. INTRODUCTION. The DIVWAG barrier report is produced by the routine ENGRE1 upon call from REPCTL. Support is provided by the routines DATET1, HEADER, and GET2; ENGRE1 and GET2 are described in this appendix.

2. ROUTINE ENGRE1:

a. Purpose. Routine ENGRE1 prints the barrier report. It calls routine GET2 to bring in barrier records one-at-a-time, then examines the information on each record to see if any activity has taken place during the period on the barrier represented by the data file 2 record. If the barrier has had no activity, the next record is obtained. When a record with recent activity is found, ENGRE1 calculates the type activity undertaken and the percentage accomplished. It then prints the proper record information with identifying headings.

b. Input Variables:

Name	Source	Contents
IOF	DF2	Barrier data.
IREQU	DF1	Unit identification of unit requesting mobility task on engineering.
MISUID	DF1	Unit identification of mission unit.

c. Output Variables. The formatted report.

d. Logical Flow (Figure V-6-B-1):

(1) Blocks 1 and L1. At the beginning of the routine, the proper heading, date, and time are printed by calling routines DATET1 and HEADER.

(2) Blocks L5, 2, and 3. Increment the record counter and call GET2 to retrieve the barrier record from data file 2. If all barrier file records have been examined, routine GET2 sets the record number to negative one, and a transfer of control is made to block L800.

(3) Block 4. If this is on unbreachable barrier, transfer control to block L5.

(4) Block 5. If X coordinates of barrier line segment are not present, transfer control to block L5.

(5) Blocks 6, 7, and 8. Retrieve physical status of barrier, type of barrier, and compute the percent of completion.

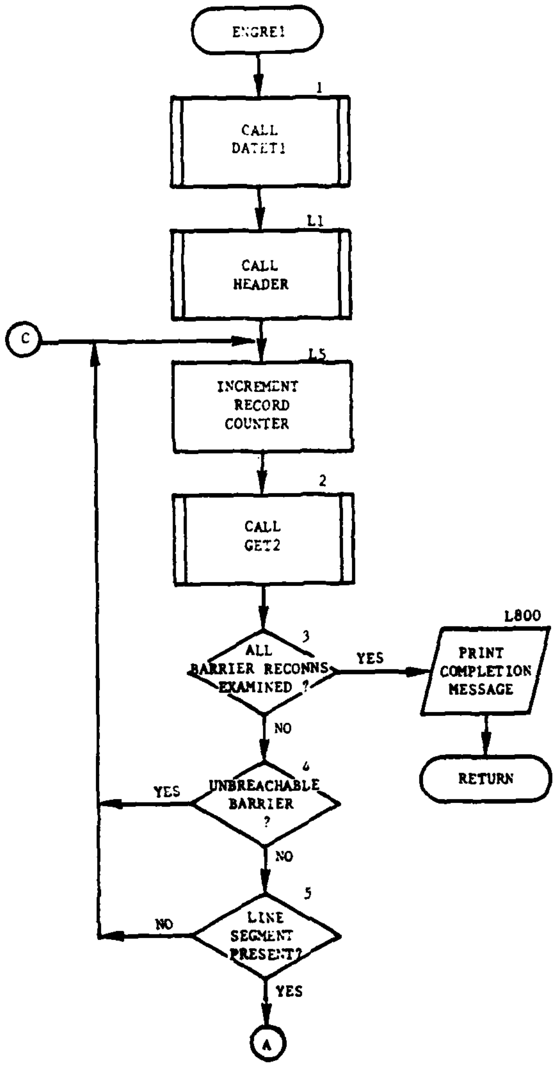

Figure V-6-B-1. Routine ENGRE1 (Continued on Next Page)

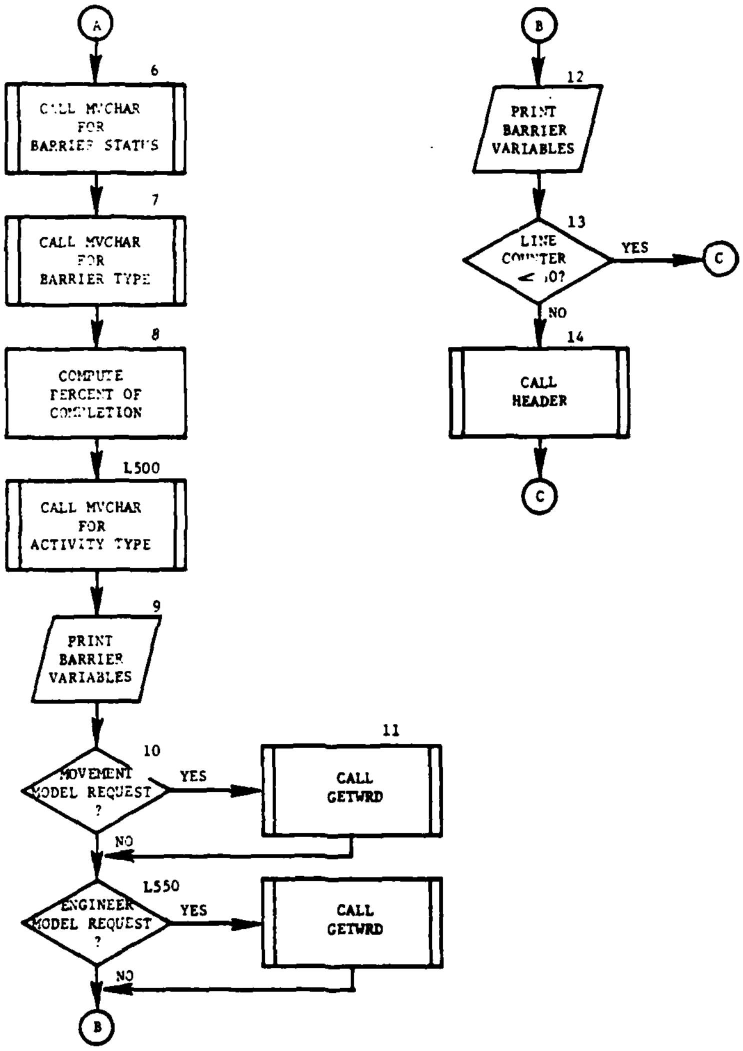

Figure V-6-B-1. Routine ENGRE1 (Concluded)

(6) Block L500. Determine which type of activity (build, breach, or remove) is requested.

(7) Block 9. The barrier segment endpoints, barrier type, activity requested, percent completed, and task starting time variables are printed.

(8) Blocks 10 and 11. If the Movement Model has requested the task, the unit identification of the requesting unit is retrieved from data file 1.

(9) Block L550. If the Engineer Model has begun tasking on this barrier, the unit identification of the mission unit is retrieved from data file 1.

(10) Block 12. The barrier record number, physical status, activity status, unit identification of the requesting unit from the Movement Model, unit identification of mission unit, and intelligence status are printed.

(11) Blocks 13 and 14. If the line counter is less than 60, transfer control to block L5; otherwise, call routine HEADER to print the standard header and then transfer control to block L5.

(12) Block L800. Write completion message and return control to the calling routine.

3. ROUTINE GET2. This routine brings the correct barrier record in from data file 2 and stores it in IOF for return to ENGRE1. When all the barriers have been examined, it returns a negative one as the record number to be checked in ENGRE1 and control returns to the calling routine.

APPENDIX C

BARRIER REPORT OUTPUT DESCRIPTION

The barrier report (Figure V-6-C-1) reflects only barrier activity by the Engineer Model prior to this report. After the header line there are two basic lines for each barrier activity. The first line gives the barrier identification, its end points, type, size indicator, the type of barrier activity requested, the percent complete, and the time the activity started. The second line gives the record number on the barrier facility data file where the barrier was found. This line also gives the game status indicating whether the barrier existed prior to this activity request, the status of the requested activity, the UID of the requesting unit, and the UID of the unit assigned the task. This line also indicates the intelligence status of the barrier; i.e., which force had knowledge of the barrier.

```
BENCHMARK PERIOD 1 0500-0730                                    DATE:  02/16/77     TIME:  11.14.50.

BEGINNING TIME  DAY  1 HR  5 MIN  0
ENDING TIME     DAY  1 HR  9 MIN  0

                              BARRIER AND FACILITY REPORT

     ID          END POINTS        TYPE     SIZE    ACTIVITY   PERCENT    TIME
   MNA 005   123500-  105000        3        1      BREACH    COMPLETE   STARTED
             123500-   94000                                    0.00      10612

   REC. NO.   GAME STATUS  ACTIVITY STATUS     REQUESTOR  ASSIGNED    INTEL.

    2330      EXISTS       WORK IN PROGRESS   B5441AAD   3B390291    BOTH

     ID          END POINTS        TYPE     SIZE    ACTIVITY   PERCENT    TIME
   MNA 006   125000-  150000        2        1      BUILD     COMPLETE   STARTED
             125000-  100100                                    0.00      10503

   REC. NO.   GAME STATUS  ACTIVITY STATUS     REQUESTOR  ASSIGNED    INTEL.

    2331      EXISTS       NONE                                       RED
END OF BARRIER AND FACILITY REPORT
```

Figure V-6-C-1. Period Barrier Report

APPENDIX D

SOURCE LISTINGS FOR PERIOD OUTPUT PROCESSOR BARRIER REPORT

(AVAILABLE UNDER SEPARATE COVER)

SECTION VI

ANALYSIS OUTPUT PROCESSOR

CHAPTER 1

GENERAL DESCRIPTION OF ANALYSIS OUTPUT PROCESSOR

1. INTRODUCTION. This chapter presents an overview of the Analysis Output Processor describing the purpose, basic flow and processing sequence required within one period of game activity. The Analysis Output Processor is designed to evaluate the relative performance of types of units in a simulated war game. These evaluations are useful in developing a secondary measure of firepower effectiveness for the divisions under consideration.

2. OVERVIEW. The Analysis Output Processor routines extract, array, and analyze data from files of period history records that are generated by the Period Processor. These files of period history records are referred to in this section as period history tape(s). Descriptions of the period history records and the format of the records is appended to this chapter as Appendix A. In addition, the Period Processor dump or restart tapes are used as input to the Analysis Output Processor, from which Analysis Output Processor routines generate a cross reference table of unit identifications. The routines of the Analysis Output Processor are divided into four categories:

- preprocessor routines
- history tape listing routines
- matrix formulation routines
- statistical analysis routines.

Each of these categories is described in a chapter of this section. Figure VI-1-1 shows the principal routines of the Analysis Output Processor and each function. UTILLD is a utility routine used throughout the DIVWAG system.

3. LOGICAL FLOW. Figure VI-1-2 shows the system flow of the Analysis Output Processor. Routines UXR, PTAPE, and PHIST are not essential to the Analysis Output Processor and do not appear in the flow diagram. The Analysis Output Processor includes four phases. Three are performed by routines of the Analysis Output Processor, and one is performed by the game analyst. The utility routine UTILLD and the Analysis Output Processor preprocessing and matrix formulation routines perform the data extraction phase of the process. The inputs to routines PREP and ANCARD define effectiveness indicators in the form of data matrices from which analysis is performed. Routine MTXUP executes the display of data phase. The third phase of processing is performed by the game analyst who examines, interprets, and evaluates the validity of the data extracted, introduces corrections utilizing routine MTXUP, and structures the input to routine ANALYS avoiding effectiveness indicators for which insufficient data were extracted. The statistical analysis is performed in the fourth phase of the process by routines MTXUP and ANALYS. For a complete discussion of the philosophy of war gaming, war game analysis, and analysis techniques used in the Analysis Output Processor, see Development of a Division War Game Model (DIVWAG), Volume II, Analytical Methodologies; USACDC Combat Systems Group Study; December 1971.

Routine	Function
UTILLD	Loads DIVWAG data file on disk
UXR	Generates unit cross reference table
PTAPE	Alternative preprocessor
PHIST	Lists contents of period history tape(s)
PREP	Preprocesses period history tapes
ANCARD	Processes input for extractors
AFM	Area Fire Model Extractor
AGM	Air Ground Engagement Model Extractor
GCMOD	Ground Combat Model Extractor
MTXMRG	Displays extracted data
MTXUP	Corrects extracted data
ANALYS	Performs statistical analysis

Figure VI-1-1. Analysis Output Routine

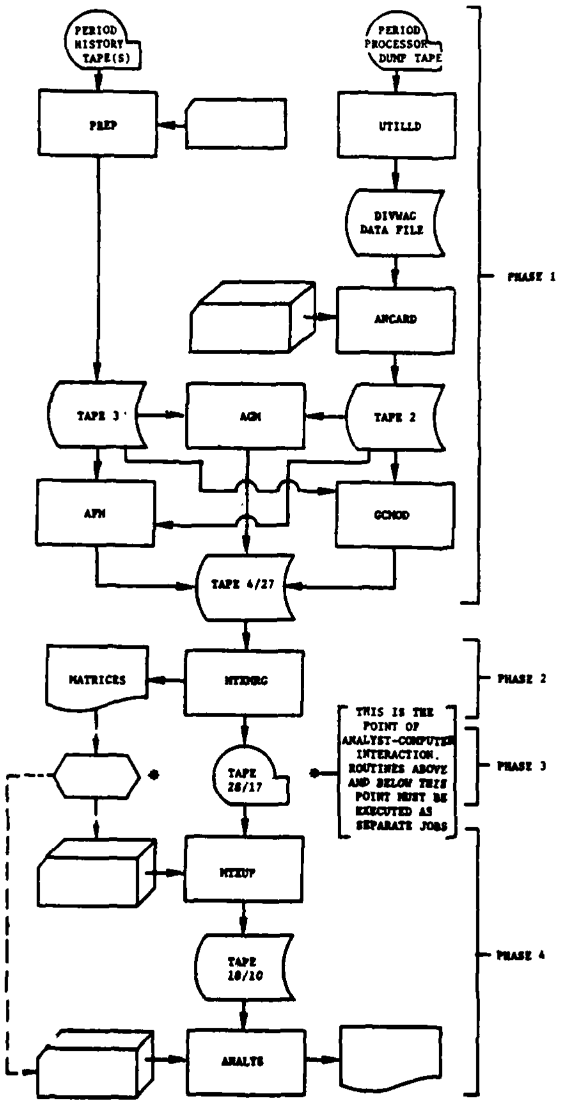

Figure VI-1-2. Analysis Output Processor Macroflow

APPENDIX A

HISTORY TAPE FORMATS

1. INTRODUCTION. This appendix contains descriptions of the contents and formats of the history tapes in the Analysis Output Processor.

2. HISTORY TAPE RECORDS. Records are of fixed length, with 128 usable words per record. The first two words of each output record have a specified purpose; the remaining 126 words are defined as necessary within each of the various models. The first two words are time and record type, respectively.

a. Time. The first word is the game time, represented by a single integer value in the form ddhhmm, where dd is the day, hh is the hour, and mm the minute. It is completed as:

TIME = DAY*10000+100+MINUTE.

b. Record Type. The second word is an assigned integer value in the form sslp where ss is the model code, l the logical record number, and p the physical record number. A l is used to distinguish logical records produced in different portions of a model. A p is significant when more than one physical record is necessary to complete a logical record. The value ss is used to identify records by model. The following model codes have been assigned:

Code	Model
01	Area Fire
02	Air Ground Engagement
03	Ground Combat
04	Intelligence and Control
05	Combat Service Support
06	Movement
07	Engineer

In addition, record types 888, 899, and 999 are used for control purposes.

c. Record Formats:

(1) Record Type 111. One record is written for each unit which is assessed within the Area Fire Model.

Field Description	Number of Words	Word Number
Time, ddhhmm (completion of fire event)	1	1
Record type = 111	1	2
IUID of unit being assessed	1	3
Event code	1	4
Order code	1	5
DELT, total length of time of unit's event (centiminutes)	1	6
Time event in progress (centiminutes)	1	7
IUID of fire unit	1	8
Weapon/munition index (A4 format)	1	9
X coordinate of unit being assessed	1	10
Y coordinate of unit being assessed	1	11
X coordinate of ground zero	1	12
Y coordinate of ground zero	1	13
Range from ground zero to center of unit being assessed.	1	14
Terrain code, RFS (A4 format)	1	15
Equipment losses (items 1-100)(floating point)	100	28-127
Total	115	

(2) Record Type 112. One record is written for each unit which is assessed by the Area Fire Model. It immediately follows a record type 111 and is a logical continuation.

Field Description	Number of Words	Word Number
Time, ddhhmm (completion of fire event)	1	1
Record type = 112	1	2
Equipment losses (items 101-200) (floating point)	100	3-102
Number of personnel alive initially (*1000)	1	103
Number of tanks alive initially (*1000)	1	104
Number of APCs alive initially (*1000)	1	105
Number of vehicles alive initially (*1000)	1	106
Number of aircraft alive initially (*1000)	1	107
Number of air defense weapons alive initially (*1000)	1	108
Number of personnel lost (*1000)	1	109
Number of tanks lost (*1000)	1	110
Number of APCs lost (*1000)	1	111
Number of vehicles (*1000)	1	112
Number of aircraft (*1000)	1	113
Number of air defense weapons lost (*1000)	1	114
Total	114	

(3) Record Type 121. One record is written for each unit initiating area fire.

Field Description	Number of Words	Word Number
Time, ddhhmm (completion of fire event)	1	1
Record type = 121	1	2
IUID of fire unit	1	3

Field Description	Number of Words	Word Number
Event code	1	4
Order code	1	5
DELT, total length of time of fire event (centiminutes)	1	6
X coordinate of firing unit	1	7
Y coordinate of firing unit	1	8
X coordinate of ground zero	1	9
Y coordinate of ground zero	1	10
Range from ground zero to firing unit	1	11
Weapon/munition index (A4 format)	1	12
Number of rounds fired	1	13
Food consumed (centipounds)	1	14
Total	14	

(4) Record Type 211. One record is written for each mission request received by the Air Ground Engagement Model.

Field Description	Number of Words	Word Number
Time, ddhhmm (mission request received)	1	1
Record type = 211	1	2
IUID of mission unit if assigned	1	3
Event code	1	4
Order code	1	5
Time until takeoff (centiminutes)	1	6
IUID of target unit	1	7

Field Description	Number of Words	Word Number
Mission type: 1=DAFS; 2=CAS	1	8
Estimated X coordinate of target	1	9
Estimated Y coordinate of target	1	10
Reject code: 0=mission unit available; 4HREJ1=weather reject; 4HREJ2=resources reject	1	11
IUID of airbase	1	12
X coordinate of airbase	1	13
Y coordinate of airbase	1	14
Aircraft item code	1	15
Number of aircraft	1	16
Munition item code (6)	6	18-23
Number of munitions by type (6)	6	24-29
Number of personnel	1	30
Visibility - day/night indicator: 0=good,day; 1=bad,day; 2=good,night; 3=bad, night	1	31
Time until arrival at point A (centiminutes)	1	34
Fuel loaded (centigallons)	1	35
Estimated target type	1	36
Estimated target size	1	37
Unique mission identifier	1	115

(5) Record Types 221, 251. These two record types are identical in content and describe that portion of the flight segment between the airbase and the target area in which the aircraft are vulnerable to enemy air-defense fires. Record type 221 describes the flight from the airbase to the target area, and record type 251 describes the return flight from the target area back to the airbase.

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Field Description	Number of Words	Word Number
Time, ddhhmm (beginning flight leg)	1	1
Record type = 221/251	1	2
IUID of mission unit	1	3
Event code	1	4
Order code	1	5
Time length of flight leg (centiminutes)	1	6
IUID of target unit	1	7
Mission type: 1=DAFS; 2=CAS	1	8
Abort indicator: 0=no abort: 1=abort	1	9
X coordinate at start of flight leg	1	10
Y coordinate at start of flight leg	1	11
X coordinate at end of flight leg	1	12
Y coordinate at end of flight leg	1	13
AD weapon item code (9)	9	14-22
AD weapon fired by item code (9)	9	23-31
Number personnel casualties (*100)	1	32
Aircraft item code	1	33
Resulting aircraft kills (*100)	4	34-37
Unique mission identifier	1	115

(6) Record Type 231. One record is written for each mission unit engaging a target in the Air Ground Engagement Model.

Field Description	Number of Words	Word Number
Time, ddhhmm (beginning of engagement)	1	1
Record type = 231	1	2
IUID of mission unit	1	3
Event code	1	4
Order code	1	5
Time length of engagement (centiminutes)	1	6
IUID of target unit	1	7
Mission type: 1=DAFS; 2=CAS	1	8
Abort indicator: 0=no abort; 1=abort	1	9
X coordinate of target	1	10
Y coordinate of target	1	11
Aircraft munitions item code	6	12-17
Aircraft munitions fired by item code (*100)	6	18-23
AD munitions item code	9	24-32
AD munitions fired by item code (*100)	9	33-41
Aircraft item code	1	42
Number personnel casualties (*100)	1	43
Aircraft kill Type A by < 23mm AD weapon (*100)	1	44
Aircraft kill Type B by < 23mm AD weapon (*100)	1	45
Aircraft kill Type C by < 23mm AD weapon (*100)	1	46
Aircraft kill Type D by < 23mm AD weapon (*100)	1	47
Aircraft kill Type A by = 23mm AD weapon (*100)	1	48
Aircraft kill Type B by = 23mm AD weapon (*100)	1	49
Aircraft kill Type C by = 23mm AD weapon (*100)	1	50
Aircraft kill Type D by = 23mm AD weapon (*100)	1	51

Field Description	Number of Words	Word Number
Aircraft kill Type A by > 23mm AD weapon (*100)	1	52
Aircraft kill Type B by > 23mm AD weapon (*100)	1	53
Aircraft kill Type C by > 23mm AD weapon (*100)	1	54
Aircraft kill Type D by > 23mm AD weapon (*100)	1	55
Aircraft kill Type A by SAM AD weapon (*100)	1	56
Aircraft kill Type B by SAM AD weapon (*100)	1	57
Aircraft kill Type C by SAM AD weapon (*100)	1	58
Aircraft kill Type D by SAM AD weapon (*100)	1	59
Tanks killed by TOW (*100)	1	60
APC killed by TOW (*100)	1	61
APC killed by other (*100)	1	62
Vehicles killed by TOW (*100)	1	63
Vehicles killed by other (*100)	1	64
Personnel killed (*100)	1	65
AD item codes (1 to 9)	9	66-74
Number AD killed (1 to 9) (*100)	9	75-83
Unique mission identifier	1	115

(7) Record Type 241. One record is written for the assessment of the target unit engaged by a mission unit simulated by the Air Ground Engagement Model.

Field Description	Number of Words	Word Number
Time, ddhhmm (beginning of engagement)	1	1
Record type = 241	1	2
IUID of unit being assessed	1	3
Event code	1	4
Order code	1	5
DELT, total length of time of unit's event (centiminutes)	1	6
IUID of mission unit	1	7
Mission type: 1=DAFS; 2=CAS	1	8
Time event in progress (centiminutes)	1	9
X coordinate of unit being assessed	1	10
Y coordinate of unit being assessed	1	11
Number personnel initially	1	12
Number personnel casualties (*100)	1	13
Unique mission identifier	1	15
Equipment losses (items 1-100) (floating point)	100	28-127

(8) Record Type 242. One record is written for the assessment of the target unit engaged by a mission unit. This record type follows and logically completes record type 241.

Field Description	Number of Words	Word Number
Time, ddhhmm (beginning of engagement)	1	1
Record type = 242	1	2
Equipment losses (items 101-200) (floating point)	100	3-102

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Field Description	Number of Words	Word Number
Number of personnel alive initially (*1000)	1	103
Number of tanks alive initially (*1000)	1	104
Number of APCs alive initially (*1000)	1	105
Number of vehicles alive initially (*1000)	1	106
Number of aircraft alive initially (*1000)	1	107
Number of AD weapons alive initially (*1000)	1	108
Number of personnel lost (*1000)	1	109
Number of tanks lost (*1000)	1	110
Number of APCs lost (*1000)	1	111
Number of vehicles lost (*1000)	1	112
Number of aircraft lost (*1000)	1	113
Number of AD weapons lost (*1000)	1	114
Unique mission identifier		115

(9) Record Type 311. One record is written for each unit of each attacker-defender pair modeled in Ground Combat. This is the first of three physical records used to describe each unit. The three records for the attacking unit (311, 312, 313) are written first and are followed by the three records for the defender.

Field Description	Number of Words	Word Number
Time, ddhhmm (end of battle increment)	1	1
Record type = 311	1	2
IUID	1	3
Event code	1	4
Order code	1	5
Time length of battle increment (centiminutes)	1	6

Field Description	Number of Words	Word Number
Number of personnel casualties (*100)	1	7
Opposing unit IUID	1	8
Battle ID (2A4 format)	2	9-10
Visible range	1	11
Sky ground ratio (*100)	1	12
Number of iterations	1	13
Number mortar rounds fired	1	14
Number personnel initially	1	15
Weapon system/transport item codes	8	16-23
Weapon system/transport $\bar{r}$	8	24-31
Weapon system/transport initial quantity (*1000)	8	32-39
Ammunition item code	16	40-55
Number of rounds fired	16	56-71
Matrix of rounds fired, first seven combat unit ammunition types at eight target weapon system/transport types (*100)	56	72-127
	Total 127	

(10) Record Type 312. One record is written for each unit of each Ground Combat attacker-defender pair. This record follows record type 311.

Field Description	Number of Words	Word Number
Time, ddhhmm (end of battle increment)	1	1
Record type = 312	1	2
Matrix of rounds fired, last nine combat unit ammunition types at eight target weapon system/transport types (*100)	72	3-74
Matrix of weapon system/transport losses, first six ammunition types to eight combat unit weapon (*1000)	48	75-122
	Total 122	

(11) Record Type 313. One record is written for each unit of each attacker-defender pair. This record follows record type 312.

Field Description	Number of Words	Word Number
Time,ddhhmm (end of battle increment)	1	1
Record type = 313	1	2
Matrix of weapon system/transport losses, last ten ammunition types to eight combat unit weapon system/transport type (*1000)	80	3-82
Number personnel casualties due to ammunition types *(1000)	16	83-98
Total losses by combat unit weapon system/ trnasport type (*1000)	8	99-106
Engagement frontage	1	107
Front-to-front separation	1	108
Total	108	

(12) Record Type 321. One record is written for each battle unit involved in each battle increment modeled by the Ground Combat Model.

Field Description	Number of Words	Word Number
Time, ddhhmm (end of battle increment)	1	1
Record type = 321	1	2
IUID	1	3
Event code	1	4
Order code	1	5
DELT, total length of time of unit's event (centiminutes)	1	6

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Field Description	Number of Words	Word Number
Time event in progress (centiminutes)	1	7
Battle ID (2A4 format)	2	8-9
Attacker/defender indicator: 1 = attacker; 2 = defender	1	10
Reinforcement indicator: 0 = no reinforcement; 1 = reinforcement	1	11
Day/night indicator: 1 = day; 2 = night	1	12
X-coordinate at beginning of increment	1	13
Y-coordinate at beginning of increment	1	14
X-coordinate at end of increment	1	15
Y-coordinate at end of increment	1	16
Average RV (roughness and vegetation) index (*100)	1	17
Average FT (forestation) index (*100)	1	18
Average VC (vegetation) index (*100)	1	19
Food consumed (centipounds)	1	20
Fuel expended (centigallons)	1	21
Equipment losses (item 1-100) (floating point)	100	28-127
Total	121	

(12a) Record Type 333. (See page VI-1-A-18).

(13) Record Type 322. One record is written for each battle unit involved in each Ground Combat battle increment. This physical record follows and logically completes physical record type 321.

Field Description	Number of Words	Word Number
Time, ddhhmm (end of battle increment)	1	1
Record type = 322	1	2
Equipment losses (items 101-200) (floating point)	100	3-102
Number of personnel alive initially (*1000)	1	103
Number of tanks alive initially (*1000)	1	104
Number of APCs alive initially (*1000)	1	105
Number of vehicles alive initially (*1000)	1	106
Number of aircraft alive initially (*1000)	1	107
Number of AD weapons alive initially (*1000)	1	108
Number of personnel lost (*1000)	1	109
Number of tanks lost (*1000)	1	110
Number of APCs lost (*1000)	1	111
Number of vehicles lost (*1000)	1	112
Number of aircraft lost (*1000)	1	113
Number of AD weapons lost (*1000)	1	114
Total	114	

(14) Record Type 511. One record is written each time an attempt is made to satisfy a supply request received by the Combat Service Support Model.

Field Description	Number of Words	Word Number
Time, ddhhmm (attempted to satisfy back orders)	1	1
Record type = 511	1	2
IUID of requesting unit	1	3
Order filled flag: 0 = filled; 1 = no transportation; 2 = no supplies	1	4
Equipment item code of supplies requested	1	5
Quantity of supplies requested	1	6
Quantity of supplies back ordered	1	7
IUID of supply point	1	8
Total	8	

(15) Record Type 521. One record is written for each supply action taken by the CSS Model.

Field Description	Number of Words	Word Number
Report time, ddhhmm	1	1
Record type = 521	1	2
IUID of receiving unit	1	3
IUID of supply point	1	4
Supply action code	1	5

1 = unit distribution - arrival of transports and/or consumables at receiving unit

-2 = resupply of supply point

2 = supply point distribution

3 = unit distribution - return transports to supply point

Field Distribution	Number of Words	Word Number
4 = supply point distribution - return transports to receiving unit		
5 = arrival of major end item or personnel at receiving unit		
EIC of supplies; if negative of transports	1	6
Quantity of supplies delivered	1	7
Time of supply action	1	8
In/out flag: 1 = in, 2 = out	1	10
Total	9	

(16) Record Type 611. One record is written for each model segment traversed by a moving unit in the Movement Model.

Field Description	Number of Words	Word Number
Time, ddhhmm (beginning of move segment)	1	1
Record type = 611	1	2
IUID of moving unit	1	3
Event code	1	4
Order code	1	5
DELT, total move time length (centiminutes)	1	6
Speed (meters/minutes) output as kilometers/hour	1	7
Mobility code - travel mode mnemonic (format A4)	1	8
X coordinate at segment starting	1	9
Y coordinate at segment starting	1	10
X coordinate at segment ending	1	11
Y coordinate at segment ending	1	12

Field Description	Number of Words	Word Number
Precipitation index: 0 = no rain; 1 = light rain; 2 = heavy rain	1	13
Fog index: 0 = no fog; 1 = foggy	1	14
RVSS - terrain code (format A4)	1	15
Total	15	

(17) Record Type 888. This record signals that the Period Processor generated a restart tape at this point. All entries except the record type are null.

(18) Record Type 899. This record signals the end of a physical tape, but not the end of a simulation period. All entries except the record type are null.

(19) Record Type 999. This record signals the end of a simulation period. All entries except the record type are null.

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(13a) Record Type 333. One record is written for each attacker-defender battle unit pair involved in each Ground Combat battle increment.

Field Description	Number of Words	Word Number
Time, ddhhmm (end of battle increment)	1	1
Record Type = 333	1	2
Attacking unit's IUID	1	3
Defending unit's IUID	1	4
Battle Identification	1	5
Average roughness and forestation index for attacker and defender (packed)	1	6
Mine encounter Flag (Attacker)	1	7
Mine encounter Flag (Defender)	1	8
Attacker's velocity (*100)	1	9
Defender's velocity (*100)	1	10
Front-to-front separation distance (*100)	1	11
% of defender engaged (*10)	1	12
% of attacker engaged (*10)	1	13
Attacker's starting location X-coord	1	14
Attacker's starting location Y-coord	1	15
Attacker's objective location X-coord	1	16
Attacker's objective location Y-coord	1	17
Defender's starting location X-coord	1	18
Defender's starting location Y-coord	1	19

Defender's objective location X-coord	1	20
Defender's objective location Y-coord	1	21
Attacker's weapon system's item codes	8	22-29
Defender's weapon system's item codes	8	30-37
Attacker's weapon system's losses (*1000)	8	38-45
Defender's weapon system's losses (*1000)	8	46-53

CHAPTER 2

TAPE PREPROCESSORS

1. INTRODUCTION. The preprocessor routines of the Analysis Output Processor are designed to create, from one or more multiple period history tapes, a single file abbreviated period history tape that contains only those records from which the extractor routines can extract data. The Analysis Output Processor contains two preprocessor routines, PREP and PTAPE; either one may be used. If routine PTAPE is chosen, routine UXR must be executed to create a unit cross reference table as required input for routine PTAPE.

2. ROUTINE PREP. Routine PREP selects records to be transferred to the abbreviated period history tape according to two criteria, game time and record type. Only one abbreviated period history tape can be created by PREP.

3. ROUTINE PTAPE. Routine PTAPE selects records according to four record criteria: game time and record class (i.e., the model that generated the record), and the identification (UID), or type designator (UTD) of the unit to which the record pertains. PTAPE has the capability of creating more than one abbreviated period history tape. Care must be exercised in using the UID and UTD selection criteria to avoid suppressing significant data by eliminating records that should have been transferred. For example, when an analysis of the effects of certain Blue force artillery units is performed, data are extracted from Area Fire Assessment records pertaining to Red force units that were targets of Blue force artillery fire. If the UIDs or UTDs of the Blue force artillery units are used as selection criteria, and records pertaining to all Red force units are eliminated, the results of the analysis will show all Blue force artillery units equally ineffectual.

4. ROUTINE UXR. Routine UXR compiles a unit cross reference table from information stored on the unit status file for use by routine PTAPE. This table is not used elsewhere in the processor. Before executing routine UXR, the DIVWAG data file must be loaded to a mass storage device using the utility routine UTILLD.

APPENDIX A

INPUT REQUIREMENTS FOR TAPE PREPROCESSERS

1. INTRODUCTION. This appendix contains descriptions of card and tape inputs required to execute the tape preprocessing routines PREP, UXR, and PTAPE.

2. ROUTINE PREP:

a. Card Input. A single card is input to routine PREP. An example of the card format is illustrated in Figure VI-2-A-1 and contains 4 to 18 input values.

(1) Columns 1-2. The number of period history tapes from which records are to be selected is entered, right-justified in columns 1-2. In the figure, record types 111, 112, 241, 242, 311, 312, and 313 are selected from two tapes.

(2) Columns 3-16. The minimum and maximum times for records to be selected are entered, right-justified, in columns 4-9 and 11-16 respectively. Columns 3 and 10 are separator columns. The minimum and maximum times are packed in the form ddhhmm, where dd is day, hh is hour, mm is minute. See Figure VI-2-A-1.

(3) Columns 18-80. The 1 to 16 record types to be selected are entered in columns 18-20, 22-24, 26-28, and so forth through 78-80. Columns 17, 21, 25, 29, and so forth to 77 are ignored. Blanks, commas, dashes, or any other characters may be used as separators in these columns.

b. Tape Input. One or more period history tapes generated by the DIVWAG Period Processor are input to routine PREP. The period history tape format is described in Appendix A to Chapter 1 of this section.

3. ROUTINE UXR:

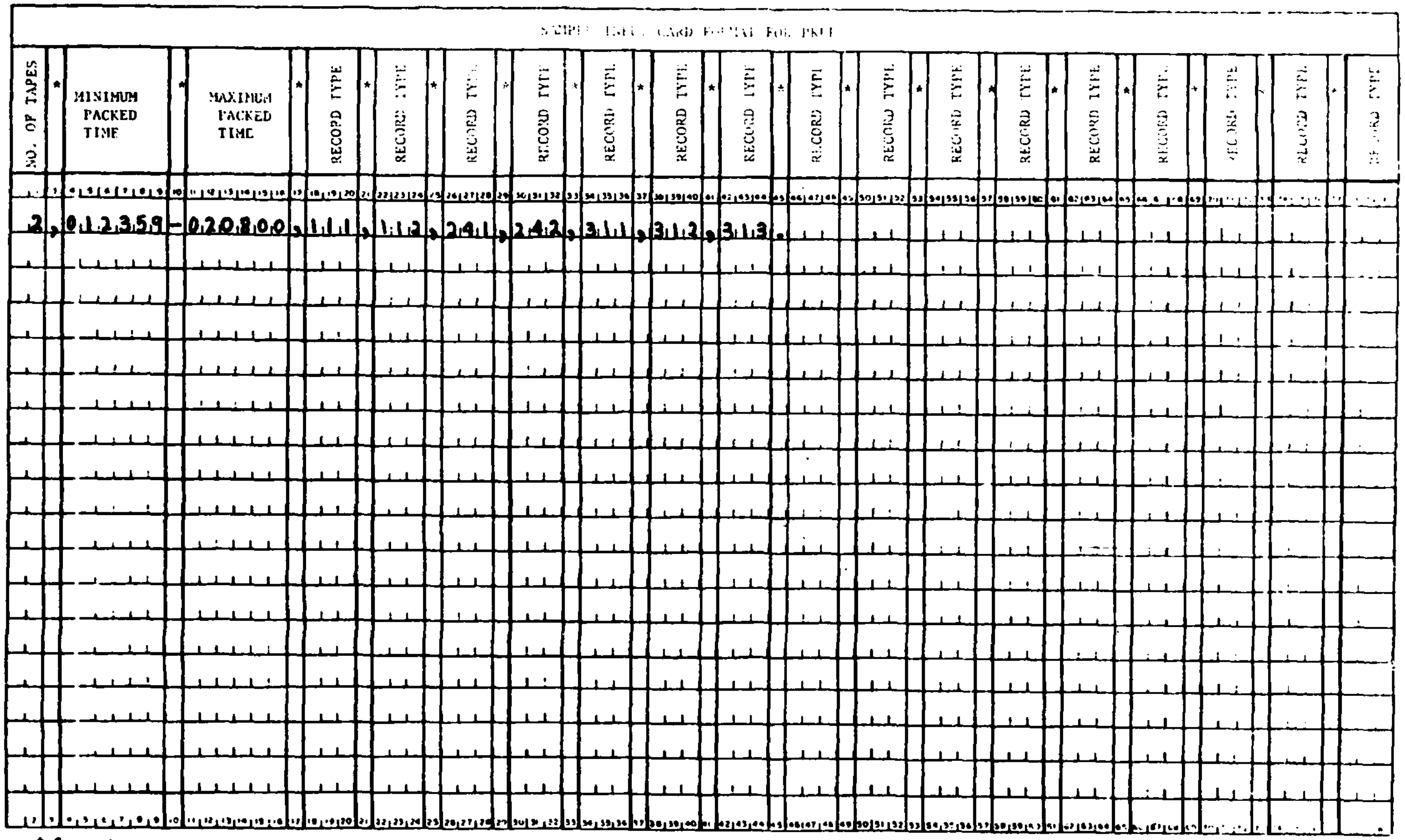
a. Card Input. No card input is required.

b. Tape Input. A period dump tape generated by the DIVWAG Period Processor is input to routine UXR.

4. ROUTINE PTAPE:

a. Card Input. An input tapes data card, 1 to 50 sets of selection criteria cards, and an end selection criteria card are required.

(1) Input Tapes Data Card. The first input card contains two integer values. The first value, right-justified in column 10, is the number of period history tapes from which records are to be selected. The second value, right-justified in column 20, is 1 for normal executions or 2 if duplicate sets of period history tapes are to be input.



* Separator

Figure VI-2-A-1. Input Card Format for PREP

(2) Selection Criteria Sets. Each set contains at least two cards; any number (including zero) of selection criteria cards, a device card, and a end card. All cards are free form; blanks are ignored. Four types of selection criteria cards are allowed, and are described in the following paragraphs.

(a) Unit Identification (UID) Criteria Card. The UID criteria card allows the user to select event records of a single unit or a set of units by specifying the appropriate UIDs. The format of the card requires the key characters "UID =" followed by the unit identifications which must be separated by commas. The card size limits the number of eight-character UIDs on one card to seven; however, any number of UID cards may be included in a set, and one to seven UIDs may be on any card. The maximum number of units is 100. If it is desired to select all of the units in either the Blue force or Red force, the form of the card is UID = ALLB for Blue or UID = ALLR for Red. If no UID card is included in a criteria set, all units are acceptable dependent on the other criteria.

(b) Unit Type Designator (UTD) Criteria Card. The UTD criteria card allows the selection of a single unit type or a set of unit types by listing appropriate UTDs. The format of the UTD card requires the key characters "UTD =" followed by the UTDs which must be separated by commas. UTDs may be either actual four-character UTDs or partial UTDs, in which one to three of the UTD characters are masked with asterisks (*) to indicate that only the unmasked characters are significant. The card size limits the number of UTDs on one card to 15; however, any number of UTD cards may be included in a set, and any number of UTDs may be on any one card. The limiting constraint is that the number of units should not exceed 100. If no UTD card is included in a criteria set, all unit types are acceptable dependent on the other criteria.

(c) Time (TIM) Criteria Card. Game time may be applied as a criterion for the selection of event records by use of the TIM criteria card. The format of the TIM criteria card requires the key characters "TIM =" followed by time intervals with separating commas. The time intervals must be in the form ddhhmm-ddhhmm, where ddhhmm indicates the day/hour/minute form of game time, and the earlier time must be on the left. The number of time intervals on one card is limited to six by card size; however, multiple cards may be used. The maximum number of time intervals allowable per set is 15. If no TIM criteria card is included in a criteria set, time is not a criterion for selection.

(d) Class (CLS) Criteria Card. The CLS criteria card may be used to select event records according to class; i.e., DIVWAG model source. The format of the CLS card requires the key characters "CLS =" followed by a list of class codes separated by commas. Desired classes should be expressable on one card. The following is a list of valid class codes pertaining to the model that is the source.

Class Code	Model
1	Area Fire
2	Air Ground Engagement
3	Ground Combat
4	Intelligence and Control
5	Combat Service Support
6	Movement
7	Engineer

(e) Device (DEV) Card. The user specifies the device number (also termed data set identifier (DSI)) to which the selected records will be written for the criteria set by using the DEV card. Allowable device numbers are 1, 2, 3, 4, and 5. The format requires the key characters "DEV =" followed by the device number(s) separated by commas, if more than one.

(f) End of Set Card. Only the key characters "END" are required.

(3) End of Selection Criteria Card. This card is identical in format to the end of set card.

(4) Card Format Example. Figure VI-2-A-2 shows a data card set example. In this figure, records are selected from two period history tapes. The duplicate input option is not used. There are four sets of selection criteria, and four output tapes are generated. The first set of selection criteria causes all records of three Blue units and all Red units to be written on DSI 1. The second set causes all records of unit types EAMT, EBMI, and those units with UTD beginning with C and ending with T, as well as all Red units to be written on DSI 2. The third set causes all records for Day 1 to be written on DSI 3. The last set causes all records from the Area Fire, Air Ground Engagement, and Ground Combat Models to be written on DSI 4.

b. Tape Input. One or more period history tapes generated by the DIVWAG Period Processor are input to routine PTAPE. Optionally, duplicate history tapes may be input. The format of the Period History tapes is presented in Appendix A to Chapter 1 of this section. In addition, the unit cross reference tape generated by routine UXR must be input.

INPUT CARD FORMAT FOR PTAPE

```

         2         1

MID = BA0011RZ, BA0021RZ, BT0000QI, ALLR
DEV = 1
END

MTD = FAMT, ERMI, CRRT
MID = ALLR
DEN = 2
END

TIM = 010000-012359

CLS = 1, 2, 3

END
```

Figure VI-2-A-2. Input Card Format for PTAPE

APPENDIX B

HISTORY TAPE PREPROCESSORS PROGRAM DESCRIPTIONS

1. INTRODUCTION:

a. The Period History tapes written by the DIVWAG Period Processor contain records for events simulated within the models. Selection criteria are input to the history tape preprocesser routines, which, in turn, write abbreviated Period History tapes containing only data records to be extracted for analysis. Either routine PREP or PTAPE may be used to perform this function; but, if PTAPE is chosen, routine UXR must first be executed to create a unit cross-reference-table tape required for PTAPE.

b. Routines described in this appendix in order of appearance are:

(1) PREP, preprocesser routine.

(2) UXR, routines to build cross-reference tape.

(3) PTAPE, preprocesser controlling routine.

(4) INITAL, PTAPE initialization routine.

(5) UIDCD, UTDCD, TIMCD, DEVCD, ENDCD, SQUEZ, and UIDGEN, routines used by PTAPE to process input cards.

(6) DRSPLT, routine used by PTAPE to control selection of records from Period History tapes.

(7) READR, SAVDSI, and WRTDOR, utility routines called by DRSPLT.

2. ROUTINE PREP:

a. Purpose. Routine PREP selects Period History records which may be analyzed by the Analysis Output Processor according to criteria of game time and record type and writes these records to an abbreviated Period History tape.

b. Input Variables:

Name	Source	Description
TAPES	Card	Total of number of Period History tapes from which records are to be selected.
MIN	Card	Minimum time for records of interest.
MAX	Card	Maximum time for records of interest.
WANTED(16)	Card	Record types of interest.

Name	Source	Description
RECORD(128)	TAPE1	Period History record.
TIME		RECORD(1). Time.
TYPE		RECORD(2). Type.

c. Output Variables:

Name	Destination	Description
RECORD(128)	TAPE2	Period History record.
NR	Printer	Total number of records read from TAPE1.
N	Printer	Total number of records written to TAPE2.
NULL	Printer	Number of null records found on TAPE1.
WANTED(15)	Printer	Record types of interest.
NF(15)	Printer	Quantity of each WANTED record type found and written to TAPE2.

d. Logical Flow (Figure VI-2-B-1):

(1) Block 1. Read the input values from a card image. If there is no card input, stop.

(2) Block 2. Zero NF and count the nonzero record types wanted.

(3) Block L4. Read a Period History record from TAPE1.

(4) Block 3. Check for end of file on TAPE1. If found, increment IEOF, the end-of-file flag. If none, control branches to block L5. Check IEOF; if this is the first end of file, branches to block L4.

(5) Blocks 4 and 5. Double end of files have been read. Compare the quantity of tapes read, NT, to number of tapes to be read, TAPES. If there is at least one more input tape, pause. When the operator mounts the next tape and restarts execution, increment NT, and control branches to block L4. If there are no more input tapes, control branches to L8 to enter the normal termination sequence.

(6) Block L5. Set IEOF equal to zero, increment the records-read counter; and, if TYPE equals zero, increment the null record counter. Compare TYPE to WANTED and TIME to MIN and MAX. If the record does not meet the selection criteria, control branches to block L4.

(7) Block L7. Increment the LF(I) corresponding to this record type and write the record to TAPE2. Control branches to block L4.

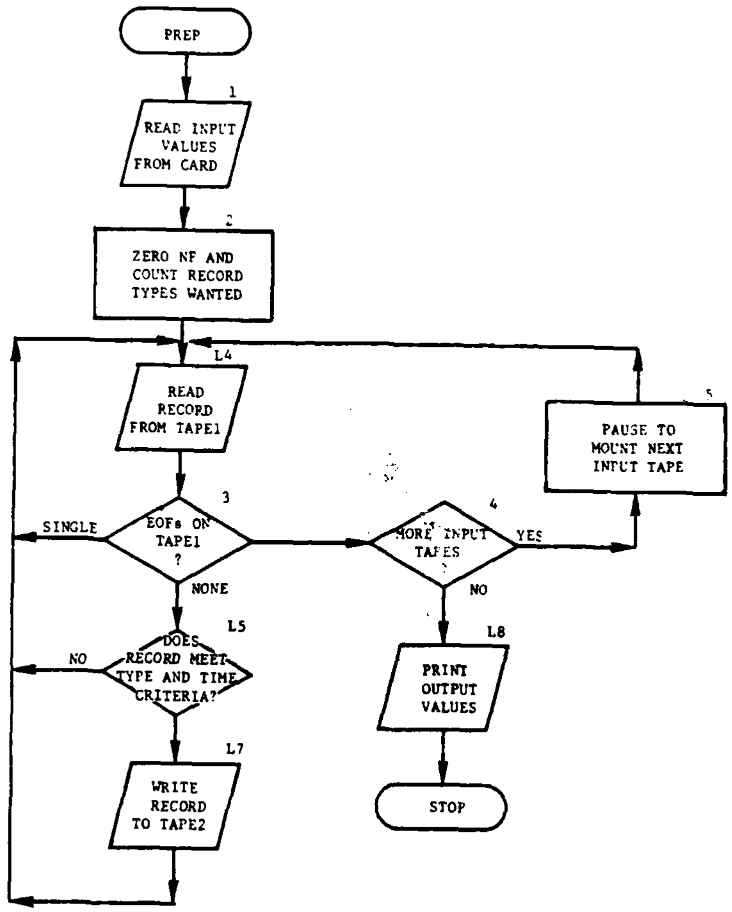


Figure VI-2-B-1. Routine PREP

(8) Block L8. Write the counters on the line printer, and terminate execution.

3. ROUTINE UXR:

a. Purpose. Routine UXR creates a unit cross reference table of the unit identification and unit type designator of all units from the unit status file. The table is printed and written to tape for input to routine PTAPE.

b. Input Variables:

Name	Source	Description
NAME(3)	DF1	Unit identification (UID) and unit type designator (UTD) of a unit.

c. Output Variables:

Name	Destination	Description
IOUT(3002)	Printer and TAPE32	UIDs and UTDs of all units and IUIDs of last Blue and first Red units.

d. Processing Description. The unit identification and the unit type designator of each of the possible 1000 units are read using the DIVWAG Input/Output Package routines, transferred to the output buffer, IOUT, and printed. When the first zero unit identification is encountered the Blue point flag [IOUT(3001)] is set. When the next nonzero unit identification is encountered the Red point flag [IOUT(3002)] is set. The Red and Blue point flags are printed and the entire output buffer is written as one record to TAPE32.

4. ROUTINE PTAPE:

a. Purpose. PTAPE is the controlling routine for the alternative tape preprocesser. It reads and identifies the input card types and calls the appropriate routine to interpret, reformat, and store the contents of each card in common storage for use by the routine DRSPLT. When all input cards have been processed, DRSPLT is called to process the Period History tapes.

b. COMMON Definition. The routine PTAPE and its associated subroutines use large areas of blank and labeled common storage to exchange information.

(1) Common /ONE/. The routine PTAPE allows up to 50 sets of selection criteria to be used. Definitions of each set are stored in the area labeled common ONE. Variables in this area are listed below in sequence.

Variable	Contents
IUIDS(50,100)	Up to 100 IUIDs of units to be selected.
ITIME(50,15,2)	Up to 15 sets of begin-and end-time increments (game time).

Variable	Contents
ICLASS(50,20)	Up to 20 submodel codes.
IDEVO(50,5)	Up to five output device numbers for output devices (1-20).
IDALLB(50)	Flag to select all Blue units.
IDALLR(50)	Flag to select all Red units.
NUIDS(50)	Number of UIDs for selection criteria (0-100).
NTIME(50)	Number of time sets for selection criteria (0-15).
NCLASS(50)	Total number of submodel codes (0-20).
NDEVO(50)	Total number of output devices (0-5).
NSETS	Total number of input tape sets (0-99).
NPRSET	Total number of input tapes per set (1-2).
NQSET	Total number of selection criteria sets.
IBPNT	Maximum IUID for Blue units.
IRPNT	Minimum IUID for Red units.

(2) Common CARD. This labeled common area is used to input card images.

Variable	Contents
ICARD(80)	Card image.
ICTYP(6)	Array containing possible card types.
NCOL	Number of nonblank columns.
NCOMS	Number of commas.

(3) Common /NAMES/. This labeled common area is used for the reference table.

Variable	Contents
NUID(2000)	Unit identification codes (two words each).
NUTD(1000)	Unit type designators.
NMQUL(1000)	List of IUIDs corresponding to unit type designator selection set.

(4) Common /CONST/. This area exists to assist in the preparation of data tapes.

Variable	Contents
IBLK	A Hollerith blank.
IAST	A Hollerith asterisk.
NSERR	Number of serious errors.
IEND	Last card flag.
ICOM	A Hollerith comma.
IDASH	A Hollerith dash.
IEQL	A Hollerith equals symbol.

(5) Unlabeled Common. This is an area used in reading the history tapes.

Variable	Contents
IREC(128)	Buffer for a history tape record from TAPE21.
IDUM	IREC(1). Game time of a record.
IRTYPE	IREC(2). Submodel code of record.
IUID	IREC(3). IUID of unit on record.
IDUM(128)	Buffer for record from TAPE22.
ISVDSI(20)	Array holding output device numbers where a card is to be written (0-20).
ITODSI	Number of entries in ISVDSI.
IRCDSI(20,2)	Output device and total number of records on each output device.
NRCDSI	Number of entries in IRCDSI.

c. Input Variables:

Name	Source	Contents
ICARD	Card	PTAPE selection criteria cards.

d. Output Variables. Card images of the selection criteria cards are passed to appropriate routines in the common card area.

e. Logical Flow (Figure VI-2-B-2):

(1) Block 1. Call INITAL to read the number of input tapes and sets to be processed, and set variables to initial values.

(2) Block L1. Set IEND to false.

(3) Block L2. Read and print the next input card.

(4) Block 2. Call SQUEZ to compress the card contents removing heading and imbedded blanks.

(5) Blocks 3 and 4. If the card type is legal, control goes to block L8; otherwise, print an error message. Control goes to block L2.

(6) Block L8. If this is the second consecutive END card, control goes to block L15.

(7) Block 5. Call the appropriate routine to process the new card type. After the routine is returned, control goes to block L2 if it was an end card. Control goes to block L1 for other cards.

(8) Blocks L15 and 6. If there were any serious errors on the input cards, the routine terminates; otherwise, call the DRSPLT routine to print the selected Period History records from the input tapes.

5. ROUTINE INITAL. This routine initializes common areas for the processor in the following sequence.

a. The card type array in common CARDS is set as:

ICTYP(1) = 4H_UID
ICTYP(2) = 4H_UTD
ICTYP(3) = 4H_CLS
ICTYP(4) = 4H_TIM
ICTYP(5) = 4H_DEV
ICTYP(6) = 4H_END

b. Constant data in common CONST are set.

c. The total number of input tapes per set and number of sets are read from a card into common ONE.

d. The remainder of common ONE is set.

e. The unit cross reference tables are read from TAPE23 into common NAMES and are listed.

6. ROUTINE UIDCD:

a. Purpose. UIDCD examines the unit identifications specified on the unit identification card and places the corresponding IUIDs into the NMQUL

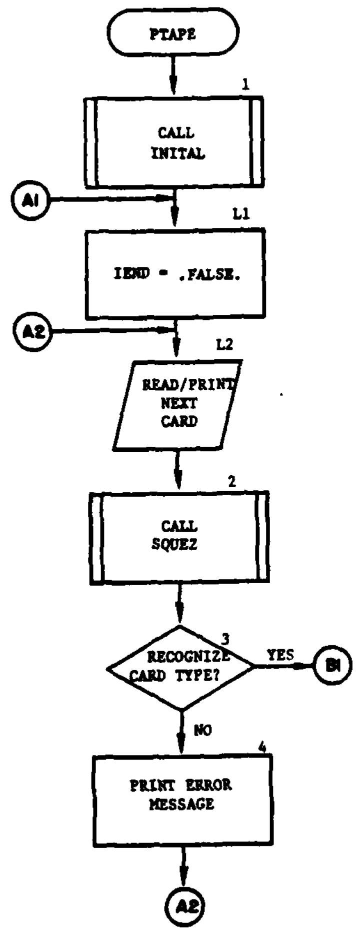


Figure VI-2-B-2. Routine PTAPE (Continued on Next Page)

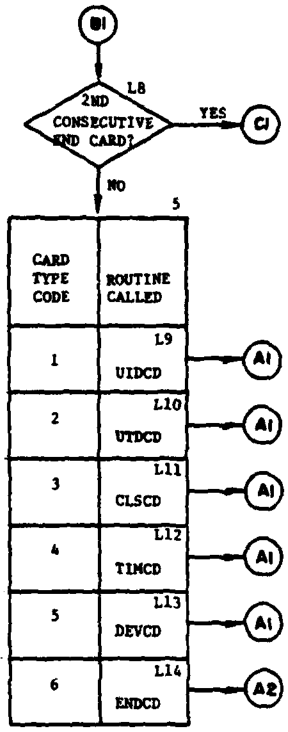


Figure VI-2-B-2. Routine PTAPE (Continued)

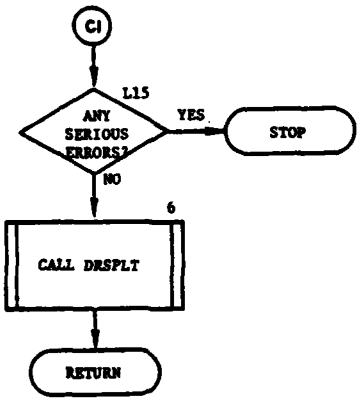


Figure VI-2-B-2. Routine PTAPE (Concluded) table for inclusion into the current selection set criteria. The all-Red and all-Blue indicators are also read by this routine when requested on the unit identification card.

b. Input Variables:

Name	Source	Contents
ICARD	CARD	Unit identification card.
NCOL	CARD	Total number of card columns used.
NUID	NAMES	Unit cross reference table.

c. Output Variables:

Name	Destination	Contents
NMQUL	NAMES	IUIDs selected by this set of cards.
IDALLB	ONE	All-Blue selected indicators.
IDALLR	ONE	All-Red selected indicators.

d. Logical Flow (Figure VI-2-B-3):

(1) Block 1. Set the column pointer (ICOL) to 4.

(2) Block L1. Increment the column pointer by one.

(3) Block 2. If the ICOL column of the card image, in ICARD array is blank, there are no more UIDs on this card to be processed. In this case, return control to the calling routine. If the column contains A, control branches to block L6.

(4) Block 3. If the unit identification does not begin with B or R, or if it is not eight characters, it cannot be a valid unit identification. In this case, control branches to block L8.

(5) Block 4. Transfer the unit identification from ICARD, where it is stored as eight individual characters, to NAMEs where it is stored as two four-character words, and search the unit cross reference table for the unit identification. Increment ICOL by eight.

(6) Blocks 5, 6, and 7. If the unit identification was not found in the cross reference table, print an error message and transfer control to block L1. If it was found, set the appropriate qualifier flag and transfer control to block L1.

(7) Blocks L6 and 8. The unit identification begins with an A; therefore, if it is not ALLB or ALLR, it is invalid. In this case control branches to block L8. If it is valid, set the all-Blue or all-Red flag, increment ICOL by four, and control branches to block L1.

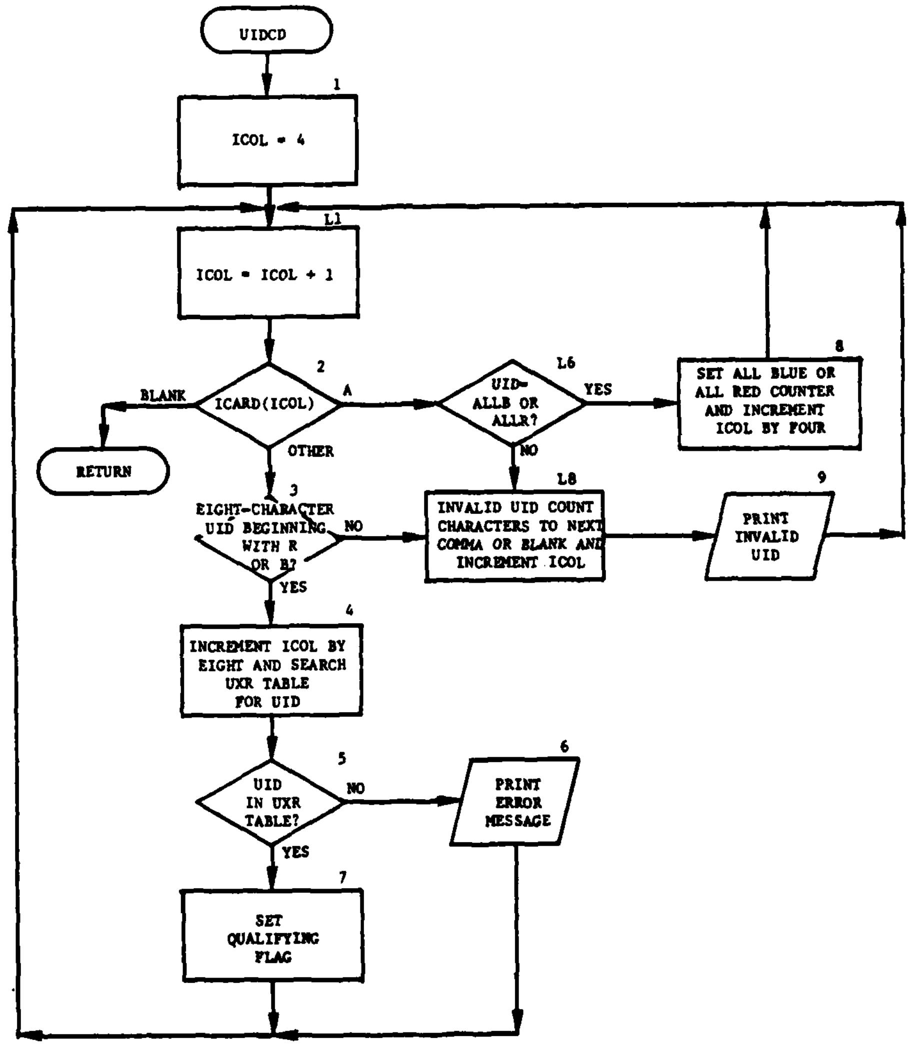


Figure VI-2-B-3. Routine UIDCD

(8) Block L8 and 9. The unit identification is not valid; therefore, count the characters to the next comma or blank, increment ICOL by this number of characters, and print the invalid unit identification. Control is then transferred to block L1.

7. ROUTINE UTDCD:

a. Purpose. This routine examines a selection criteria card and sets the entries in the NMQUL table for all units that have corresponding unit type designators.

b. Input Variables:

Name	Source	Contents
ICARD	CARD	Compressed card to be examined.
NUTD	NAMES	Table of up to 1000 unit type designator entries corresponding to records on the unit status file (data file 1).

c. Output Variables:

Name	Destination	Contents
NMQUL	NAMES	Table of 1000 entries corresponding to the unit status records.

d. Logical Flow (Figure VI-2-B-4):

(1) Block 1. Transfer the unit type designators from ICARD, the card image array, to NAMES.

(2) Block 2. Transfer a unit type designator from the cross reference table to the IUID array. Set flag to zero and compare each character of a unit type designator in NAMES to the unit type designator from the cross reference table. If the characters do not match and the character from NAMES is not an asterik, set the flag to one. If all four characters have been compared and the flag is still zero, the unit type designator qualifies and the qualification flag is set. Repeat the comparison for each unit type designator in NAMES and each unit type designator in the cross reference table.

8. ROUTINE CLSCD:

a. Purpose. CLSCD stores the requested model numbers into the ICLASS table for the selection set currently being processed.

b. Input Variables:

Name	Source	Contents
ICARD	CARD	Card to be processed.

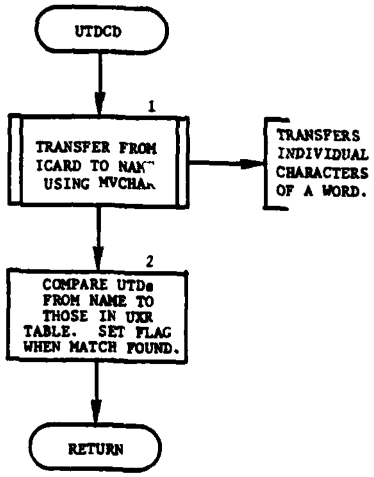


Figure VI-2-B-4. Routine UTDCD

Name	Source	Contents
NSQL	ONE	Number of current selection set.
NCLASS	ONE	Number of classes selected per selection set.
NCOMS	CARD	Number of commas on card.

c. Output Variables:

Name	Destination	Contents
ICLASS	ONE	Model numbers to be selected from the input tape.

d. Logical Flow (Figure VI-2-B-5):

(1) Block 1. Determine the number of models requested on the class card.

(2) Block 2. Set the model number into the ICLASS array for this selection set.

(3) Block L2. If all of the model numbers requested have not been stored, control goes to block 2.

(3) Block 3. Update the NCLASS entry for this selection set to reflect the number of classes requested to this time.

9. ROUTINE TIMCD:

a. Purpose. TIMCD examines a TIME card and stores the requested time intervals into the ITIME array for use by the routine DRSPLT.

b. Input Variables:

Name	Source	Contents
ICARD	CARD	Card to be processed.
NTIME	ONE	Number of times for each selection set.
NSQL	ONE	The selection set number now being processed.
NCOMS	CARD	Total number of commas on card.

c. Output Variables:

Name	Destination	Contents
ITIME	ONE	Array of time intervals selected.

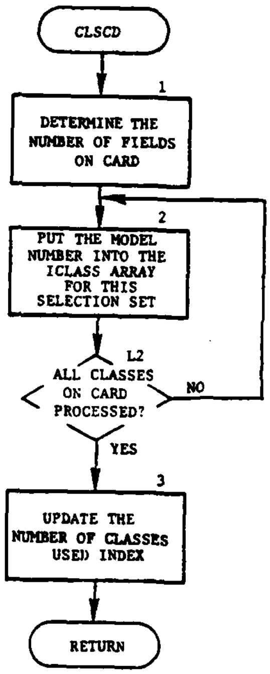


Figure VI-2-B-5. Routine CLSCD

d. Logical Flow (Figure VI-2-B-6):

(1) Block 1. Determine the number of time intervals specified on the card.

(2) Block L2. If this column contains a dash, control goes to block L3.

(3) Block 2. Store the number contained in the current column into the time array.

(4) Block 3. Increment the column pointer by one to process the next card column; control goes to block L2.

(5) Block L3. Increment the column pointer by one to process the next card column.

(6) Blocks 4 and L4. If the column does not contain a comma or is not beyond the last column used on the card, control goes to block 5; otherwise, if all entries are processed control returns to the calling routine. If all entries are not processed, control goes to block L2.

(7) Block 5. Store the number in the card column into the ITIME array for the current selection set; control goes to block L3.

10. ROUTINE DEVCD:

a. Purpose. DEVCD processes the DEVICE card and stores the specified output device logical unit numbers into the IDEVNO array.

b. Input Variables:

Name	Source	Contents
NCOL	CARD	Total number of nonblank columns in card.
ICARD	CARD	Card to be processed.
NCOMS	CARD	Total number of commas on card.
NDEVO	ONE	Total number of devices requested for each selection set.

c. Output Variables:

Name	Destination	Contents
IDEVO	ONE	Device numbers for output tapes by selection set.

d. Logical Flow (Figure VI-2-B-7):

(1) Block 1. Determine the number of devices on this card.

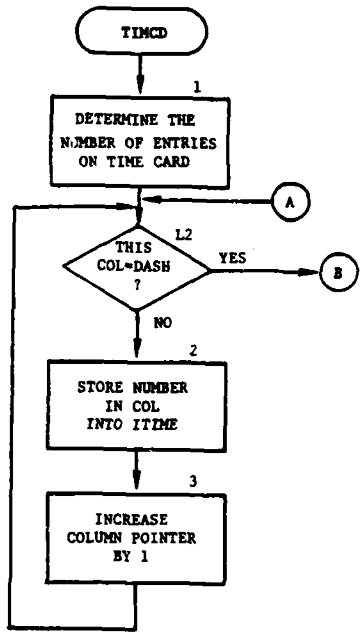


Figure VI-2-B-6. Routine TIMCD (Continued on Next Page)

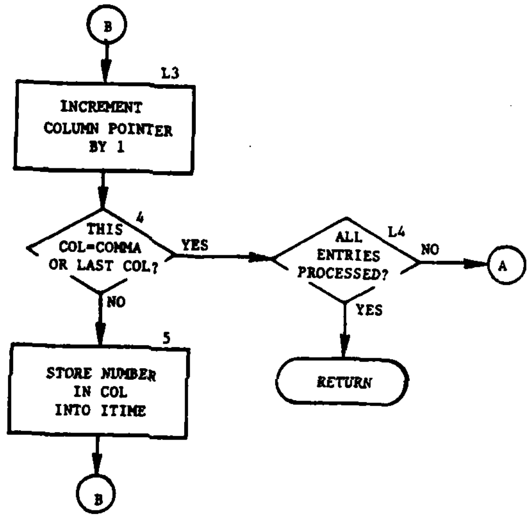


Figure VI-2-B-6. Routine TIMCD (Concluded)

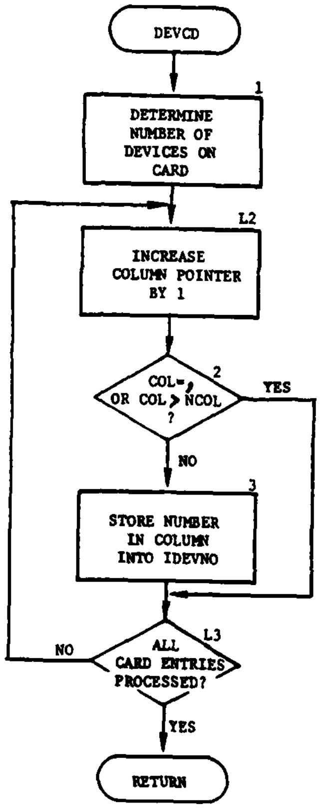


Figure VI-2-B-7. Routine DEVCD

(2) Block L2. Increment the column pointer by one.

(3) Block 2. If this column contains a comma or if this column (ICOL) is greater than the number of columns used (NCOL) control goes to block L3.

(4) Block 3. Store the number in this column in the next available IDEVO entry for this selection set.

(5) Block L3. If all card entries have not been processed, control goes to block L2; otherwise, return control to the calling routine.

11. ROUTINE ENDCD:

a. Purpose. ENDCD is called when an END card has been detected. Its function is to store the selected IUIDs into common for DRSPLT and to print the criteria composing a selection set.

b. Input Variables. Standard common block areas: ONE and NAMES.

c. Output Variables:

Name	Destination	Contents
IUIDS	ONE	IUIDs of units selected.

d. Logical Flow (Figure VI-2-B-8):

(1) Block 1. Call UIDGEN to place the IUIDs for the selection set just defined into the permanent IUID array.

(2) Block L2. Set the temporary IUID logical storage area (NMQUL) to all .FALSE..

(3) Blocks 2 and 3. If there were no specific IUIDs selected, control goes to block L4; otherwise, print the IUIDs selected and control goes to block L4.

(4) Block L4. If time intervals were not specified, control goes to block L6.

(5) Block 4. Print the times specified for the selection set.

(6) Block L6. If there were no classes specified, control goes to block L8.

(7) Block 5. Print the classes specified for this selection set.

(8) Block L8. If there were no device numbers specified, control goes to block L10.

(9) Block 6. Print the device numbers specified for this criteria set.

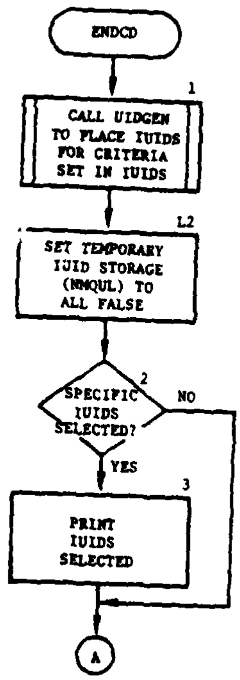


Figure VI-2-B-8. Routine ENDCD (Continued on Next Page)

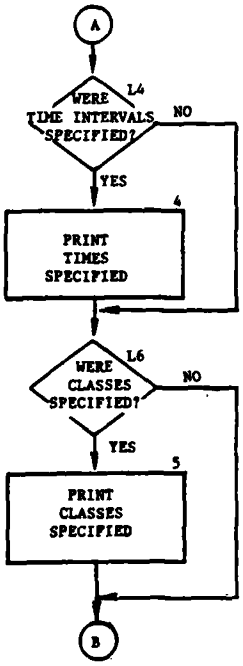


Figure VI-2-B-8. Routine ENDCD (Continued)

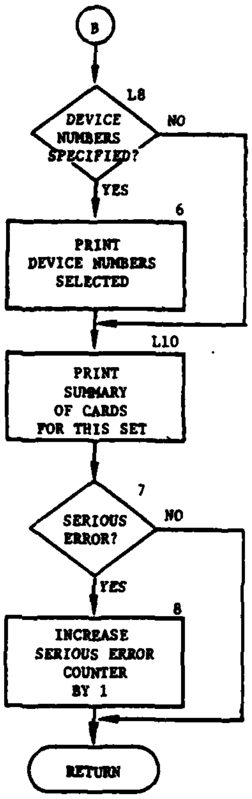


Figure VI-2-B-8. Routine ENDCD (Concluded)

(10) Block L10. Print a summary of the selection criteria for this selection set.

(11) Blocks 7 and 8. If there were serious errors, such as no output devices specified; no unit identification, class, time, or unit type designators specified; or no unit identifications specified and no ALLB or ALLR specifications, add one to the serious error counter and return control to the calling routine.

12. ROUTINE UIDGEN:

a. Purpose. UIDGEN examines the NMQUL table for true conditions and then sets the ordinal of the true entry into the next available IUIDS tabl entry.

b. Input Variables:

Name	Source	Contents
NMQUL	NAMES	1000 entries with those corresponding to selected IUIDs set to .TRUE..

c. Output Variables:

Name	Destination	Contents
IUIDS	ONE	IUIDS to be used for selection of records.

13. ROUTINE SQUEZ:

a. Purpose. This routine compresses all nonblank characters on a card image read under an alphanumeric format by removing the imbedded blanks. It also shifts the characters contained in the word from bits 23-18 to bits 5-0.

b. Input Variables:

Name	Source	Contents
LARY	Call	Beginning of array to be compressed.
N	Call	Number of words in array.

c. Output Variables:

Name	Destination	Contents
IKT	Call	The number of nonblank columns on card.
IERR	Call	Error flag: 0 = normal return, 1 = error.

14. ROUTINE DRSPLT:

a. Purpose. This routine, in conjunction with the routines READR, SAUDSI, and WRTDOR, is used to select records from a Period History tape and write those records selected on designated output tapes.

b. Input Variables:

Name	Source	Contents
NQSET	ONE	Total number of sets of selection criteria.
NSETS	ONE	Total number of input tape sets, 0-99.
NPRSET	ONE	Total number of tapes for input set, 1-2.
IBPNT	ONE	Pointer to last Blue force unit in unit identification table.
IRPT	ONE	Pointer to first Red force unit in unit identification table.
NUID(2000)	NAMES	Unit identification list.
NUTD(1000)	NAMES	Unit type designator list.
NUIDS(50)	ONE	Total number of IUIDs in each selection criterion.
IUIDS(50,100)	ONE	List of IUIDs in each selection criterion.
NTIME(50)	ONE	Total number of time intervals in each selection criterion.
ITIME(50,15,2)	ONE	List of time intervals in each selection criterion.
NCLASS(50)	ONE	Total number of submodel codes for each selection criterion.
ICLASS(50,20)	ONE	List of submodel codes for each selection criterion.
NDEVO(50)	ONE	Total number of output devices for each selection criterion.
IDEVO(50,5)	ONE	List of output devices for each selection criterion.
IDALLB(50)	ONE	Flag to select all Blue units for each selection criterion.
IDALLR(50)	ONE	Flag to select all Red units for each selection criterion.

c. Output Variables. None.

d. Logical Flow (Figure VI-2-B-9):

(1) Block 1. The output device list and record counter array (IRCDSI) are set to zero. This array is used to keep track of the number of records written on each device. The arrays describing the various criteria are printed with appropriate headers.

(2) Block 2. The routine READR is called to read the next record into core.

(3) Block 3. The contents of this record are checked against each set of criteria. If it meets all criteria for a particular set, SAVDSI is called so that the output devices may be added to the output device list. The criteria are checked in the following order: Time, submodel code, IUID, and the all-Blue or all-Red selection flag. The criteria must also designate at least one output device.

(4) Block 4. The routine SAVDSI is called to add the output device number associated with each criterion into the list it compiles.

(5) Block 5. If more criteria are to be processed, control is returned to block 3.

(6) Block 6. The routine WRTDOR is called to write each record on the indicated output devices.

15. ROUTINE READR:

a. Purpose: This routine is called to read a record from a Period History tape. A check for errors occurring during the read is made, and appropriate action is taken. If two tapes are being input, a record is read from each and a comparison is made.

b. Input Variables:

Name	Source	Contents
IREC(128)	TAPE21	Period History record from TAPE21.
IDUM(128)	TAPE22	Period History record from TAPE22.
NRCDSI	ONE	Total number of output devices being written on.
IRCDSI(20,2)	ONE	List of all output devices being written on.

c. Output Variables:

Name	Destination	Contents
IREC(128)	ONE	Period History record from TAPE21.

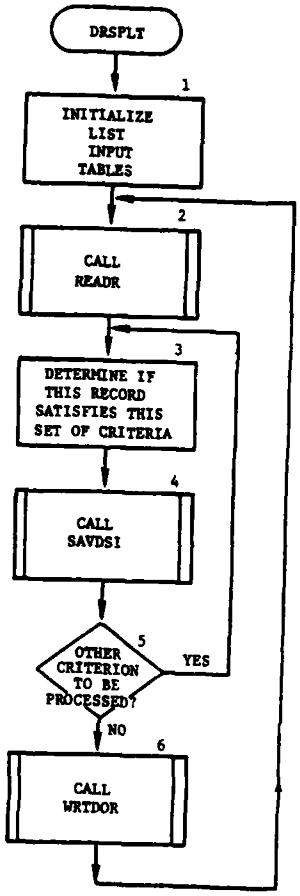


Figure VI-2-B-9. Routine DRSPLT

Name	Destination	Contents
IDUM(128)	ONE	Period History record from TAPE22.

d. Logical Flow. One or two Period History tapes may be used as input (indicated by NPRSET). The read from each tape may be successful, or an end-of-file error may occurr. If two tapes are input, the records are compared for another possible error condition. The action taken for each combination of events is described in the following paragraphs.

(1) If only one tape is input and no errors occur on the read, the number of valid records read counter, INGOOD, is incremented and control is returned to the calling routine.

(2) If only one tape is input and an end of file, end of area, or end of device was discovered, the end of file count variable, IEOFF, is checked. If IEOFF indicates it is a single end of file, it is skipped and the next record is read. If it is a double end of file, processing of this tape is completed. If other tapes are to be processed, the operator is instructed to mount the next set; otherwise, a double end file is written on all output devices and the run is terminated.

(3) If two tapes are input and no errors occur on the read and the records read are identical, INGOOD and IGOOD2 are incremented and control is returned to the calling routine.

(4) If two tapes are input and no read errors are detected, but the records do not correspond, an error message is written and the run is aborted.

(5) If two tapes are input and an end of file is detected on only one tape, an error message is written and the run is aborted.

(6) If two tapes are input and an end of file is detected on both tapes, IEOFF is checked to determine if it is a single or double end of file. If single end of files have been encountered, they are skipped and the next record is read. If they are double end of files, processing of these tapes is completed. If other sets of tapes are to be processed, the operator is instructed to mount the next set; otherwise, a double end file is written on all output tapes (IRCDSI) and the run is terminated.

16. ROUTINE SAVDSI:

a. Purpose. This routine builds the list of output devices to where this Period History record is to be written.

b. Input Variables:

Name	Source	Contents
N	Call	Index of criterion being considered.

Name	Source	Contents
NDEVO(50)	ONE	Total number of output devices for this criterion.
IDEVO(50,5)	ONE	List of output devices for this criterion.

c. Output Variables:

Name	Destination	Contents
ITODSI	ONE	Number of entries in ISVDSI array.
ISVDSI(20)	ONE	List of output devices this record is to be written to.

d. Logical Flow. If the output device list (ISVDSI) has no entries, the list associated with the criterion being processed [IDEVO(N,X)] is placed in ISVDSI, and ITODSI is set equal to NDEVO(N); otherwise, each output device number in IDEVO is compared with those in the ISVDSI list. If it is not in the list, it is added to the list and the counter, ITODSI, is incremented.

17. ROUTINE WRTDOR:

a. Purpose. This routine writes the Period History record on the indicated tapes. It also checks for errors occurring during the write, and appropriate action is taken if an error is discovered.

b. Input Variables:

Name	Source	Contents
ITODSI	ONE	Number of entries in ISVDSI array.
ISVDSI(20)	ONE	List of output devices this record is to be written to.

c. Output Variables:

Name	Destination	Contents
IREC(128)	Tape	Period History record written to the appropriate output devices.
IRCDSI(20,2)	ONE	List of all output devices being written on and a count of the number of records written on each.
NRCDSI	ONE	Total number of output devices being written.

d. Logical Flow (Figure VI-2-B-10):

(1) Block L1. The Period History record residing in IREC is written to each of the output devices listed in ISVDSI.

(2) Block 2. The number of records-written list (IRCDSI) is updated. If this is the first time WRTDOR has been entered, the output device list (ISVDSI) is stored in IRCDSI. Subsequent entries cause elements of the ISVDSI list to be compared to elements of the IRCDSI list and added to it if they are not present. The record count for each output device in ISVDSI is incremented.

(3) Block L4. Period History record types 111, 241, 311, 312, and 321 are incomplete logical records. If the Period History record just processed is one of those types, control is transferred to block L9 where another physical record is read to complete them.

(4) Block L9. READ is called to read another physical record from the Period History tape, and control is transferred to block L1.

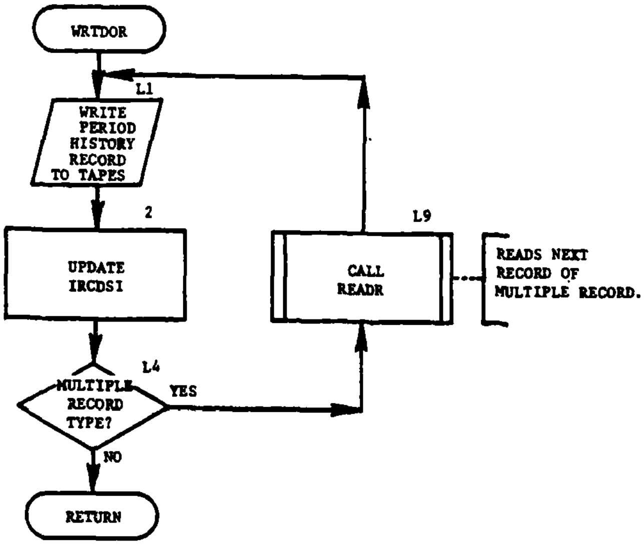


Figure VI-2-B-10. Routine WRTDOR

APPENDIX C

OUTPUT DESCRIPTIONS OF TAPE PREPROCESSOR ROUTINES

1. INTRODUCTION. The preprocessor routine PREP selects records from one or more period history tapes. Selection criteria are game time and record type. The selected records are written to an abbreviated period history tape from which data are extracted for analysis. Routine PTAPE performs a similar function. Selection criteria for PTAPE are game time, class (i.e., model that generated the record), and unit identification (UID) or unit type designator (UTD) of the unit to which the records pertain. The selected records are written on one to five abbreviated history tapes. Routine UXR generates a unit cross reference table that is a required input for routine PTAPE.

2. OUTPUT DESCRIPTIONS. The formats of these printed outputs of each routine are presented in figures which contain an alphabetical descriptor designating an appropriate line, group of lines, or columns. Each routine printout is described in the following paragraphs.

3. ROUTINE PREP. The printout of the period history tape preparation is shown in Figure VI-2-C-1.

Output Descriptor	Explanation
A	A page heading and a brief paragraph giving the number of period history records read from the period history tape(s), the number of records selected, the number of null records encountered, and the minimum and maximum game times of records selected are printed.
B	A table showing the numbers of records selected per record type is printed.

4. ROUTINE UXR. The cross reference table is shown in Figure VI-2-C-2. This routine prints the 20-page table containing each unit's identification (UID) and type designator (UTD) in numerical sequence by the unit's identification record number (IUID). When no unit is assigned an IUID, the UID and UTD columns of the table are blank. The last page also shows the last IUID assigned to the Blue force (BPOINT) and the first IUID assigned to the Red force (RPOINT).

Output Descriptor	Explanation
A	A page heading and column headings are printed at the top of each page.

A

P E R I O D   H I S T O R Y   T A P E   P R E P A R A T I O N

2491 RECORDS WERE READ FROM THE PERIOD HISTORY TAPES, AND 954 OF THESE WERE WRITTEN TO THE PREP TAPE. 1 NULL RECORDS WERE IGNORED. THE TIME PERIOD OF THIS PREP TAPE IS 10503- 10729. THE FOLLOWING TABLE SHOWS THE NUMBER OF RECORDS OF EACH RECORD TYPE TRANSFERED TO THE PREP TAPE.

B

RECORD TYPE	NUMBER OF RECORDS
111	346
112	346
241	5
242	5
311	84
312	84
313	84

Figure VI-2-C-1. Printed Output Sample of Routine PREP

A

UNIT CROSS-REFERENCE TABLE

B

IUID	UID	UTD
951	R2600ZAD	DRFD
952	R25000FA	NHCA
953	R2500ZFA	DGFA
954	R20330RL	NLFA
955	R20320RL	NLFA
956	R20310RL	NLFA
957	R20300RL	NLCA
958	R2030ZRL	GLFA
959	RA1X2FEN	MCSE
960	RA1X2DEN	MDSE
961	RA1X2CEN	MASE
962	RA1X2BEN	MASE
963	RA1X2AEN	MASE
964	RA1X20EN	GFCE
965	RA1X27EN	MASE
966	R14310MB	MBFA
967	R13020AD	NEFD
968	R13010AD	NFFD
969	R13001EN	SCSE
970	R1301RCN	LIMC
971	R13000TK	LBCT
972	R14210MB	MBFA
973	R12020AD	NEFD
974	R12010AD	NFFD
975	R12001EN	SCSE
976	R1201RCN	LIMC
977	R12000TK	LBCT
978	R14110MB	MBFA
979	R11020AD	NEFD
980	R11010AD	NFFD
981	R11001EN	SCSE
982	R1101RCN	LIMC
983	R11000TK	LBCT
984	R16040AD	NDFD
985	R16000AD	NACD
986	R1600ZAD	DRFD
987	R15000FA	NHCA
988	R1500ZFA	DGFA
989	R10330RL	NLFA
990	R10320RL	NLFA
991	P10310RL	NLFA
992	R10300RL	NLCA
993	P10307RL	GLFA
994	RA1X1EEN	MCSF
995	RA1X1DEN	MDSE
996	RA1X1CEN	MASE
997	RA1X1BEN	MASE
998	RA1X1AEN	MASE
999	RA1X10EN	GFCE
1000	RA1X17EN	MASF

C

PECINT = 303 RPOINT = 645

Figure VI-2-C-2. Printed Output Sample of Routine UXR

Output Descriptor	Explanation
B	Fifty entries of the table are printed on each page.
C	The BPOINT and RPOINT are printed at the bottom of the last page.

5. ROUTINE PTAPE. The printed output for PTAPE is presented in Figure VI-2-C-3.

Output Descriptor	Explanation
A	Images of the input cards defining the selection criteria for each qualifier set are printed, followed by a message indicating which routine (SUBROUTINE) processed the input card.
B	When the END (selection criteria force qualifier set) input card (descriptor A) has been processed, a table is printed showing the IUIDs of units meeting the UID and UTD criteria for this qualifier set, the time intervals satisfying the time criteria, the classes satisfying the class criterion, and the device numbers on which the records associated with this qualifier set will be written.
C	These print statements show the all Blue or all Red flags on the first line, the numbers of UIDs and time intervals on line two, classes and devices on the third line, and input tape sets and tapes per set.
D	After the image of the END input card is printed, a message indicating that control has been transferred to routine DRSPLT, the driving routine of the record selection process, is printed.
E	The numbers of qualifier sets, input tape sets, reels per input tape set, BPOINT and RPOINT (see paragraph 4) are printed.
F	For each record on the period history tapes that satisfies the selection criteria of one or more of the qualifier sets, the number of the qualifier set is printed, followed by the game time, record type, and IUID of the unit to which the record pertains, and finally the device number of the tape to which the record was written.

```
CARD IMMAGE: UID=R131GZTK,B8012ZMI
     SUBROUTINE UIDCD  WAS ENTERED

CARD IMMAGE: UTD=ZAMH
     SUBROUTINE UTDCD  WAS ENTERED

CARD IMMAGE: CLS=01,02
     SUBROUTINE CLSCD  WAS ENTERED

CARD IMMAGE: TIM=010500-010730
     SUBROUTINE TIMCD  WAS ENTERED

CARD IMMAGE: DEV=1
     SUBROUTINE DEVCD  WAS ENTERED

CARD IMMAGE: END
     SUBROUTINE UIDGEN WAS ENTERED
     SUBROUTINE CHECKR WAS ENTERED
```

A

```
               * * * Q U A L I F I E R   S E T  1 * * *

  IUIDS

1 213       2 300       3 301       4 302       5 303       6 837

  ITIME

 1     10500     10730

  ICLASS

 1          1
 2          2

  NDEVO

 1          1
```

B

Figure VI-2-C-3. Printed Output Sample of Routine PTAPE
(Continued on Next Page)

```
(C) IDALLB= F          IDALLR= F
    NUIOS=  6          NTIME=  1
    NCLASS= 2          NDEVO=  1
    NIPTS=  1          NIPTS=  1

(D) CARD IMMAGE: END
        SUBROUTINE DRSPLT WAS ENTERED

(E) THERE ARE  1 SETS OF SELECTION CRITERIA   1 SET(S) OF INPUT TAPES   1 REEL(S) PER SET  IBPNT =   303 IRPNT =   644

(F) RECORD MATCHES SET  1
    IDHM =   10505 IRTYPE =     111 IUID =     213
    RECORD IS ON     1 DSI(S)
    RECORD MATCHES SET  1
    IDHM =   10505 IRTYPE =     111 IUID =     213
    RECORD IS ON     1 DSI(S)
    RECORD MATCHES SET  1
    IDHM =   10505 IRTYPE =     111 IUID =     213
    RECORD IS ON     1 DSI(S)

(G) EOF ON INPUT TAPES         DSI   GOOD     BAD      TOTAL
                                     RECORDS  RECORDS  RECORDS
                                21   2491       0      2491
                                22      0       0         0

(H) 2491 GOOD RECORDS WERE READ FROM INPUT TAPES

(I) 118 RECORDS ARE ON DSI    1
```

Figure VI-2-C-3. Printed Output Sample of Routine PTAPE (Concluded)

Output Descriptor	Explanation
G	For each input tape, a summary of the number of records read and examined is printed. The number of bad records will always be zero if the computer system does not continue execution when an unrecoverable parity error is read. The device number 22 is assigned to the optional second reel of the input tape set.
H	After each set of input tapes has been processed, a count of the total number of records read is printed.
I	A table showing the number of records transferred to each output device is printed.

APPENDIX D

SOURCE LISTINGS FOR ANALYSIS OUTPUT PROCESSOR TAPE PREPROCESSORS

(AVAILABLE UNDER SEPARATE COVER)

CHAPTER 3

HISTORY TAPE LISTING ROUTINES

The purpose of the period history tape listing routine PHIST, of the Analysis Output Processor is to list the records from a period history tape that is created by the Period Processor or from an abbreviated period history tape that is created by one of the preprocessor routines. The routine also performs calculations required to translate coded binary values to values that are printed and calculations to compare the game time of the period history records to the input time interval. The printed period history records are the only output; no records are selected to be printed. Records generated by the Combat Service Support Model are stored, and these records are printed last.

APPENDIX A

INPUT REQUIREMENTS FOR HISTORY TAPE LISTING PROGRAM

1. INTRODUCTION. This appendix contains a description of card and tape inputs required to execute the history tape listing program PHIST. The routines of the Analysis Output Processor are stored, in object (binary) form, on a disk file named ANALYSIS.

2. ROUTINE PHIST:

a. Card Input. (Figure VI-3-A-1). A single card is input to routine PHIST. The card contains three values, the minimum and maximum times for records to be listed and the number of period history tapes to be input. The times are packed times; i.e., in the form ddhhmm, where dd is day, hh is hour, and mm is minute.

(1) Columns 1-21. The minimum time is entered, right justified in columns 1-6. The maximum time is entered, right justified in columns 10-15. Columns 20-21 contain the number of tapes, right justified.

(2) Columns 7-9, 16-19, and 22-80. These columns are ignored; however, charactors may be entered as separators or comments in these columns.

b. Tape Input. One or more period history tapes generated by the DIVWAG Period Processor are input to routine PHIST. Alternatively, tapes created by either of the tape preprocessors may be input.

INPUT CARD FOR PHIST

MINIMUM TIME	SEPARATOR	MAXIMUM TIME	SEPARATOR	NO. OF TAPES	COMMENTS
010001	-	132359	-	02	INPUT CARD FOR PHIST

Figure VI-3-A-1. Input Card for PHIST

APPENDIX B

HISTORY TAPE LISTING PROGRAM DESCRIPTIONS

1. INTRODUCTION. This appendix contains the program description for PHIST, the controlling routine that presents an event-sequenced listing of the DIVWAG History tapes.

2. ROUTINE PHIST:

a. Purpose. Routine PHIST produces a printed output record of the events simulated within the DIVWAG Model Period Processor. These event history records are stored in a time-ordered sequence on the Period's History Tapes (PHT). Routine PHIST lists this tape or a tape produced by one of the History Tape Preprocessors.

b. Input/Output Variables. The input variables to the program consist primarily of the event history record data stored in each tape record. These variables are described for the different records in the preceding appendix. In addition to the input data variables on the history tapes, program PHIST requires a data card specifying the game time interval of interest, ISTART to ISTOP, and the number of tape reels containing the output records. Times are explained in Chapter 3 narration.

c. Logical Flow (Figure VI-3-B-1):

(1) Block 1. The start and stop times for this listing and the number of Period History tapes to be listed are read.

(2) Block 2. If the stop time is greater than the start time and the number of tapes is a positive integer, control goes to block 4; otherwise, control branches to block 3.

(3) Block 3. A diagnostic error message is printed and execution is terminated.

(4) Block 4. The record and tape counters, the previous record type and time, and the end-of-job flag are initialized.

(5) Block L5. A record is read from the Period History tape.

(6) Block 5. The Period History tape is checked to verify that the time of the record read is between the start and stop times for this listing and a double end of file was not sensed. If all conditions are not satisfied, control branches to block L34; otherwise, processing continues to block 6.

(7) Blocks 6 and 7. The record type is identified and the appropriate routine is called to process the record. Generally, the routine is named by the record type, prefixed by the letters SR (e.g., records type 311 are processed by SR311), and the routines print the record and return control. There are two exceptions. SR64 is called for types 411 and 611 records. In the

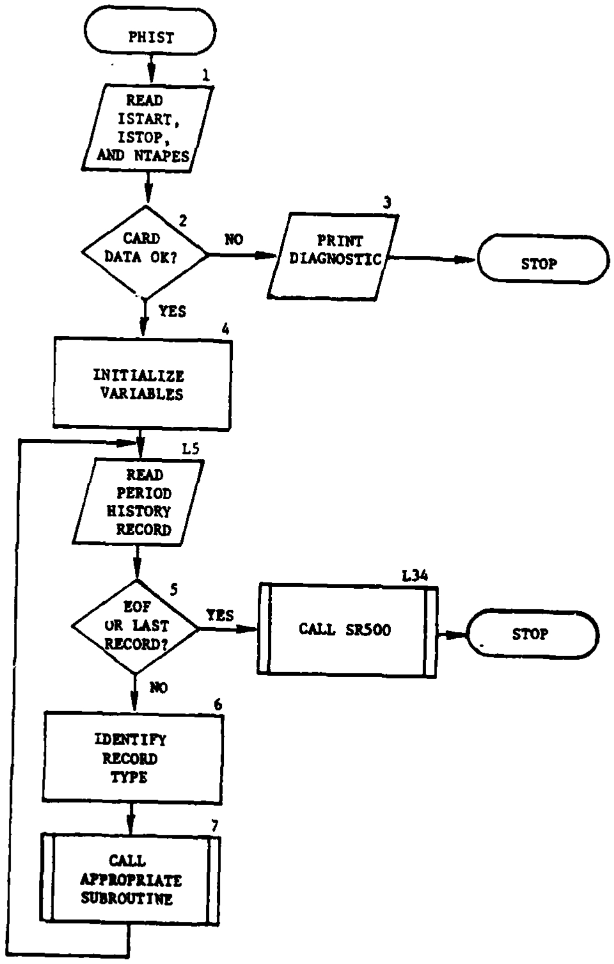


Figure VI-3-B-1. Routine PHIST

case of type 411 records, SR64 calls SR411 to print the record. SR64 prints type 611 records. The other exception is that SR5OUT is called to write types 511 and 521 records to scratch tapes. After control is returned to block 7 from the record's processing routine, control goes to block L5.

(8) Block L34. If all records of interest have been printed except types 511 and 521 records, the scratch tapes on which these records have been stored are rewound and SR500 is called to print them.

3. HISTORY RECORD PRINT ROUTINES:

a. Purpose. Routine PHIST calls one of 17 special purpose print routines to prin. a formatted report describing each history record as it is read. Routines of the types of records printed are listed in Figure VI-3-B-2.

b. Logical Flow:

(1) Routine SR5OUT places the Combat Service Support Model's history records on a temporary scratch file to be read and printed by routine SR500.

(2) The other print routines format and print the data read by routine PHIST and return.

AD-A112 654   ARMY COMBINED ARMS COMBAT DEVELOPMENTS ACTIVITY FORT--ETC F/G 15/7
DIVWAG MODEL DOCUMENTATION. VOLUME II. PROGRAMMER/ANALYST MANUA--ETC(U)
JUL 76

UNCLASSIFIED CACDA-TR-8-76-VOL-2-PT-5 NL

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12654

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

MODEL	Routines	History Record Type
AREA FIRE	SR111	111
	SR112	112
	SR121	121
AIR GROUND ENGAGEMENT	SR211	211
	SR222	221
	SR231	231
	SR241	241
	SR242	242
GROUND COMBAT	SR311	311
	SR312	312
	SR313	313
	SR321	321
	SR322	322
INTELLIGENCE AND CONTROL	SR411	411
COMBAT SERVICE SUPPORT	SR5OUT	511,512
	SR500	511,512
MOVEMENT	SR64	611

Figure VI-3-B-2. History Record Print Routines

APPENDIX C

OUTPUT DESCRIPTIONS OF HISTORY TAPE LISTING ROUTINES

1. INTRODUCTION. Program PHIST reads records from a period history tape and calls one of 17 routines to print each record. Since some records are continuations of a previous record, there are only 11 possible one-page formats in which a record or combination of records may appear. Each of the sample formats, described in the following paragraphs, is presented by a figure containing an alphabetical descriptor which is described in the following paragraphs.

2. AREA FIRE ASSESSMENT RECORD. This report, Figure VI-3-C-1, is printed by routines SR111 and SR112. A pair of records is placed on the period history tapes describing the assessment of each unit suffering personnel casualties as a result of area fire (artillery, missile, rocket launcher, mortars, or nuclear). Each group of entries in the report are described below.

Output Descriptor	Explanation
A	Report heading. The heading of this report includes the report title, record type, and game time of the assessment event.
B	Assessed unit description. The assessed unit's identification number and location at the time of assessment are presented. A description of the unit's current activity (event code, order code, scheduled duration of event, and time elapsed since the current event was initiated) is also provided. The event times for units engaged in ground combat are not meaningful.
C	Firing unit description. The firing unit's identification and the weapon/munition index of the munition and weapon types fired are identified.
D	Ground zero. This table includes the X and Y coordinates of the volley center; distance from volley center to assessed unit center; and roughness, forestation and soil code for terrain at assessed unit center.
E	Equipment losses. The quantity of each of the 200 equipment types destroyed is presented in this table. The leftmost column indicates the equipment item code corresponding to the first entry in each row.
F	Summary assessment. The quantity of personnel and each major item type destroyed during this event is listed along with the quantity present in the unit prior to the assessment.

3. AREA FIRE EVENT RECORD. This report, presented in Figure VI-3-C-2, is printed by routine SR121. A record is placed on the period history tape each time an artillery unit fires a volley. Each group of entries in the report is described below.

AREA FIRE ASSESSMENT

(A) DAY 1 HOUR 7 MIN 32 RECORD TYPE 111

ASSESSED UNIT

(B) IUID 842 EVENT CODE 1 ORDER CODE 10 X-COORD 121000 Y-COORD 99500

LENGTH OF TIME OF EVENT (CENTIMINUTES) 1530 TIME EVENT IN PROGRESS (CENTIMINUTES) 200

FIRING UNIT

(C) IUID 84 WEAPON/MUNITION INDEX A006

DESIGNATED GROUND ZERO

(D) X-COORD 121100 Y-COORD 89503 RANGE FROM ASSESSED UNIT CENTER 100 TERRAIN CODE, RFS 5009

EQUIPMENT LOSSES

(E)										
1	0.000	102.376	0.000	0.000	0.000	2.177	3.635	0.000	0.000	0.000
11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
21	.720	.013	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
31	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
41	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
51	.024	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.001
51	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
71	0.000	[illegible]	0.000	0.000	0.000	0.000	0.000	.109	0.000	0.000
81	0.000	[illegible]	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
91	0.000	[illegible]	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
101	0.000	[illegible]	1.300	0.000	0.000	0.000	0.003	0.000	0.000	0.000
111	0.000	[illegible]	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
121	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
131	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
141	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
151	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.013
161	0.000	0.000	.023	0.000	0.000	.820	.165	.066	0.000	0.000
171	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
181	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
191	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

SUMMARY ASSESSMENT TABLE

(F)	PERSONNEL	TANKS	APC	VEHICLES	AIRCRAFT	AIR DEFENSE WEAPONS
NUMBER ALIVE INITIALLY	151.397	6.000	2.752	45.608	0.000	0.000
NUMBER LOST	7.077	0.000	.012	1.055	0.000	0.000

Figure VI-3-C-1. Area Fire Assessment Record, History Tape Listing

```
A   AREA FIRE EVENT
    DAY  HOUR  MIN      RECORD TYPE
     1     7   32           121

B   FIRING UNIT
    IUID     EVENT CODE     ORDER CODE     X-COORD     Y-COORD
     78          3              9          113700       93800
    LENGTH OF TIME OF EVENT (CENTIMINUTES)      WEAPON/MUNITION INDEX
                   200                                    9
    NUMBER OF ROUNDS FIRED      FOOD CONSUMED
              11                    3.94

C   DESIGNATED GROUND ZERO
    X-COORD     Y-COORD     RANGE FROM FIRING UNIT CENTER
    127703       90800                14317
```

Figure VI-3-C-2. Area Fire Event Record, History Tape Listing

Output Descriptor	Explanation
A	Report heading. The heading of the report, including the report title, record type, and game time of the firing event, is printed at the top of the page.
B	Firing unit description. The firing unit's identification number and location at the time of the event are printed. A description of the firing activity (event code, order code, scheduled duration of the event, weapon/munition index, number of rounds in the volley, and food consumed) is printed.
C	Designated ground zero. The estimated location and range of the target is printed.

4. AIR GROUND MISSION REQUEST RECORD. Figure VI-3-C-3 shows the report printed by routine SR211. A record is placed on the period history tape each time an air support mission is requested and a mission unit is assigned the mission. Each group of entries is described below.

Output Descriptor	Explanation
A	Report heading. The heading of the report, including the report title, record type, and game time of the request, visibility description, and day/night indicator is printed at the top of the page.
B	Mission and mission unit description. The identification number of the mission unit and a description of the mission (event code, order code, and mission type) are shown. The time of liftoff and flight time to the safe point are given. The number and type of aircraft, number of personnel, munitions, and fuel assigned to the mission are printed. In case of close air support missions, munitions supplied by allied forc (Air Force) are not included.
C	Target unit description. The identification number and estimated location, type, and size of the target unit is printed.
D	Airbase description. The identification number and location of the airbase from which the mission will originate is printed.

5. AIR GROUND EN ROUTE ATTRITION RECORD. This report is printed by routine SR221 and illustrated in Figure VI-3-C-4. A record is written for each mission unit for each leg of his flight path over enemy territory; i.e., from the safe point to the target and, if casualties were, not fatal, from the target back to the safe point. Each group of entries is described below.

```
                         AIR-GROUND MISSION REQUEST

(A)[ DAY  HOUR  MIN      RECORD TYPE       VISIBILITY       DAY/NIGHT INDICATOR
      1     7    32          211              GOOD                  DAY

                               MISSION UNIT
      IUID          EVENT CODE          ORDER CODE          MISSION TYPE
       321              10                  1                   OAFS
(B)  TIME UNTIL LIFTOFF (CENTIMINUTES)      TIME UNTIL ARRIVAL AT POINT A (CENTIMINUTES)
                     500                                    300
            NUMBER OF PERSONNEL             FUEL LOADED (GALLONS)
                     2                             162.00
            AIRCRAFT ITEM CODE              NUMBER OF AIRCRAFT
                     88                              2
            MUNITIONS ITEM CODE    90    7    0    0    0    0
            NUMBER OF MUNITIONS     6  500    0    0    0    0

                               TARGET UNIT
(C)[IUID  ESTIMATED X-COORD  ESTIMATED Y-COORD  ESTIMATED TARGET TYPE  ESTIMATED TARGET SIZE
    805        119203             83308                 4                      5

                                 AIRBASE
            (D)[IUID        X-COORD        Y-COORD
                195         105800          75000
```

Figure VI-3-C-3. Air Ground Engagement Mission Request Record History Tape Listing

AIR-GROUND EN ROUTE ATTRITION

A

DAY	HOUR	MIN	RECORD TYPE
1	7	38	221

MISSION UNIT

B

IUID	EVENT CODE	ORDER CODE	MISSION TYPE
[illegible]	10	0	DAFS

TARGET UNIT

C

IUID
835

FLIGHT LEG

D

X-COORD AT START	Y-COORD AT START	X-COORD AT END	Y-COORD AT END
11[illegible]	96559	92209	94628

TIME OF FLIGHT LEG (CENTIMINUTES)	PERSONNEL CASUALTIES
559	0.00

A-G WEAPON ITEM CODES	22	70	71	72	73	74	76	78	79
NUMBER OF A-G WEAPON FIRED	0	0	0	0	0	0	0	0	0

AIRCRAFT ITEM CODE	RESULTING AIRCRAFT KILLS A	B	C	D
88	0.00	0.00	0.00	0.00

Figure VI-3-C-4. Air Ground En Route Attrition Record, History Tape Listing

Output Descriptor	Explanation
A	Report heading. The heading of the report, including report title, record type, and game time at which the mission unit is attrited is printed at the top of the page.
B	Mission unit description. The identification number of the mission unit and a description of the mission (event code, order code, and mission type) are printed.
C	Target unit. The identification number of the target unit is shown.
D	Flight leg. The start and end points of this leg of the flight path and the flight time for this leg are shown. The casualties suffered by personnel and aircraft and the item code with number of air defense weapons inflicting the casualties are printed.

6. AIR GROUND TARGET ENGAGEMENT RECORD. See Figure VI-3-C-5. This record is printed by routine SR231. A record is written each time an air ground mission unit engages a target. Each group of entries is described below.

Output Descriptor	Explanation
A	Report heading. The report title, record type, and game time of the engagement are printed at the top of the page.
B	Mission description. The identification number of the mission unit and a description of the mission (event code, order code, and mission type) are shown.
C	Target unit. The identification number and location of the target unit are printed.
D	Target engagement. The length of time of the engagement and the number of personnel casualties suffered by the mission unit are printed. A table of the munition types and number of rounds of the shots exchanged is printed. The resulting aircraft losses are summarized.
E	Target damage results. A summary of the damage to the target unit's equipment and personnel is printed. A summary of the damage to air defense weapons in the target area is printed.

7. AIR GROUND TARGET ASSESSMENT RECORD. This record is printed by routines SR241 and SR242, and presented in Figure VI-3-C-6. A pair of records is written each time a unit suffers personnel casualties as the result of attack from an air ground mission unit. Each group of entries in the report is described below.

```
                         AIR-GROUND TARGET ENGAGEMENT

              (A) DAY  HOUR  MIN            RECORD TYPE
                   1     7   43                 231

                                 MISSION UNIT

      (B) IUID          EVENT CODE          ORDER CODE          MISSION TYPE
          309              10                   0                   DAFS

                                 TARGET UNIT

              (C) IUID          X-COORD           Y-COORD
                  836           117192             90007

                              TARGET ENGAGEMENT

       TIME OF ENGAGEMENT (CENTIMINUTES)          PERSONNEL CASUALTIES
                   300                                    .03

(D) AIRCRAFT MUNITIONS ITEM CODE            90       7       0       0       0       0
    NUMBER OF AIRCRAFT MUNITIONS FIRED  130.40    0.00    0.00    0.00    0.00    6.60

    A-D MUNITIONS ITEM CODE                 22      70      71      72      73      74      76      78      79
    NUMBER OF A-D MUNITIONS FIRED         0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00

          AIRCRAFT ITEM CODE                         RESULTING AIRCRAFT KILLS
                  80                 A-D WEAPONS      A       B       C       D
                                        <23MM       0.00    0.00    0.00    0.00
                                         23MM        .01    0.00    0.00    0.00
                                        >23MM        .02    0.00    0.00    0.00
                                          SAM       0.00    0.00    0.00    0.00

(E)       TARGET DAMAGE RESULTS
                                      NUMBER KILLED
    TANKS KILLED BY TOW                   3.96
    APC KILLED BY TOW                     0.00
    APC KILLED BY OTHER                   1.41
    VEHICLES KILLED BY TOW                0.00
    VEHICLES KILLED BY OTHER              0.00
    PERSONNEL KILLED                     24.05

            A-D ITEM CODE             NUMBER KILLED
                 22                       0.00
                 70                       0.00
                 71                       0.00
                 72                       0.00
                 73                       0.00
                 74                       0.00
                 76                       0.00
                 78                       0.00
                 79                       0.00
```

Figure VI-3-C-5. Air Ground Target Engagement Record, History Tape Listing

AIR-GROUND TARGET ASSESSMENT

(A) DAY 1 HOUR 7 MIN 43 RECORD TYPE 241

MISSION UNIT

(B) IUID 389 MISSION TYPE DAFS

ASSESSED UNIT

(C) IUID 836 EVENT CODE 10 ORDER CODE 2 X-COORD 116945 Y-COORD 98559

LENGTH OF TIME OF EVENT (CENTIMINUTES) 392 TIME EVENT IN PROGRESS (CENTIMINUTES) 1378

NUMBER PERSONNEL INITIALLY 137 NUMBER PERSONNEL CASUALTIES 24.08

EQUIPMENT LOSSES

(D)										
1	0.000	973.651	0.000	0.000	0.000	0.030	225.595	0.000	0.000	0.000
11	0.000	89.323	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
21	0.000	1.310	0.000	.136	0.000	0.000	.102	1.097	0.000	0.000
31	0.000	.041	3.000	0.068	3.963	0.000	0.000	0.060	0.000	0.000
41	0.000	3.000	0.000	0.600	0.000	0.068	0.000	0.000	0.000	0.000
51	0.000	0.000	0.600	0.000	0.000	0.000	0.000	0.000	0.000	0.000
61	0.000	0.003	3.000	0.000	0.000	0.000	0.030	0.000	0.000	0.000
71	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
81	0.000	0.003	3.000	0.000	0.000	3.000	0.000	0.000	0.000	0.000
91	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
101	0.009	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.660	0.000
111	0.003	0.000	0.030	0.000	0.000	0.000	0.000	0.000	0.000	0.000
121	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000
131	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000
141	0.020	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000
151	0.000	0.000	0.030	0.000	0.000	0.000	0.000	0.000	0.000	.224
161	.592	3.003	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000
171	0.000	3.000	9.000	0.000	0.000	.230	0.000	0.000	0.000	0.000
181	0.003	0.000	0.030	0.000	.224	0.000	0.000	0.000	0.000	0.000
191	0.000	0.000	0.030	0.000	0.000	0.000	0.030	0.000	0.000	0.000

SUMMARY ASSESSMENT TABLE

(E)	PERSONNEL	TANKS	APC	VEHICLES	AIRCRAFT	AIR DEFENSE WEAPONS
NUMBER ALIVE INITIALLY	137.000	14.000	6.000	7.000	2.000	615.000
NUMBER LOST	24.000	3.000	1.000	0.000	1.000	3.000

Figure VI-3-C-6. Air Ground Target Assessment Record, History Tape Listing

Output Descriptor	Explanation
A	Report heading. The report title, record type, and game time of the assessment is printed at the top of the page.
B	Mission unit. The identification number of the air ground mission unit and the mission type is shown.
C	Assessed unit. The identification number and location of the unit and a description of the activity in which it was engaged at the time of the assessment is printed (see paragraph 2, descriptor B). The personnel strength of the unit before the attack and the number of fatalities are also shown.
D	Equipment lost. The quantities of each of the 200 equipment types destroyed is printed in the table. The leftmost column indicates the equipment item code corresponding to the first entry in each row.
E	Summary assessment. The quantity of personnel and major items of equipment destroyed and the strength before the attack are shown.

8. GROUND COMBAT ATTACKER-DEFENDER PAIR RECORD. Figure VI-3-C-7 shows this report which is printed by SR311, SR312, and SR313. A trio of records is written for each attacker-defender pair engaged in ground combat for each iteration of the Ground Combat Model.

Output Descriptor	Explanation
A	Report heading. The heading of this report gives the report title, time at the completion of this battle increment, record type, battle identification, visibility range, the sky-ground ratio (relative brightness of horizon to backgroun length of battle increments in centiminutes, number of iterations, and the unit identification index of the opposing unit.
B	Combat unit description. This subreport gives the unit identification index of the firing unit, the event and order codes, the number of mortar rounds fired, and the number of personnel lost during this battle increment.
C	Weapon system/transport data. This subreport reflects the item codes of transports, R-bar (an empirical value used in the line of sight computation), and the initial quantities of such weapon system/transports of the defending unit.
D	Ammunition data. This subreport gives the item code of the ammunitions fired and the quantities fired for the attacking unit of this battle increment.

GROUND COMBAT ATTACKER-DEFENDER PAIR

(A)

DAY	HOUR	MIN	RECORD TYPE	BATTLE ID	VISIBILITY RANGE	SKY GROUND RATIO
1	8	17	311	CATK2	2144	2.58

TIME LENGTH OF BATTLE INCREMENT (CENTIMINUTES)	NUMBER OF ITERATIONS	OPPOSING UNIT IUID
1499	1	130

COMBAT UNIT

(B)

IUID	EVENT CODE	ORDER CODE	NUMBER MORTAR ROUNDS FIRED	NUMBER PERSONNEL INITIALLY	NUMBER PERSONNEL CASUALTIES
835	1	2		283	0.00

(C)

WEAPON SYSTEM/TRANSPORT ITEM CODES	35	36	161	160	32	23	25	27
R-BAR	1000	1000	1000	1000	1000	900	900	900
INITIAL QUANTITY	26.99	3.00	4.56	0.00	.41	.78	17.22	.49

(D)

AMMUNITION ITEM CODE	24	26	28	24	12	37	7	7	0	0	0	0	0	0	0	0
NUMBER OF ROUNDS FIRED	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

(E)

ROUNDS FIRED

AMMUNITION (ITEM CODE)	OPPOSING UNIT'S TARGET WEAPON SYSTEM/TRANSPORT TYPES								TOTALS
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

(F)

LOSSES

OPPOSING UNIT'S AMMUNITION TYPES	UNIT WEAPON SYSTEM/TRANSPORT (ITEM CODES) 35	36	161	160	32	23	25	27	PERSONNEL CASUALTIES
1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
16	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TOTAL	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Figure VI-3-C-7. Ground Combat Attacker-Defender Pair Record, History Tape Listing

Output Descriptor	Explanation
E	Rounds fired. This matrix reflects the number of rounds fired of the item codes described in descriptor D above at each weapon system/transport (descriptor C above), and the totals of each ammunition type fired.
F	Unit weapon system/transport. This matrix reflects the weapon system/transport, by item code, and personnel losses of the attacking unit to 16 defender ammunition types.

9. GROUND COMBAT BATTLE UNIT RECORD. This report, presented in Figure VI-3-C-8, is printed by routines SR321 and SR322. A record pair is written to the period history tape for each resolution unit engaged in ground combat during each iteration of the Ground Combat Model. Each group of entries in the report is described below.

Output Descriptor	Explanation
A	Report heading. The heading of the report, including report title, game time, record type, and the identification number of the simulation unit to which the report pertains, is printed at the top of the page.
B	Battle description. A description of the battle (event code, order code, battle identification, scheduled duration of the battle, and elapsed time since the beginning of the battle) is printed. Some of the conditions of the engagement (whether the unit was an attacker or defender, whether the unit was reinforced, a day/night battle, the unit's locations at the beginning and end of this iteration of the battle, indexes of roughness, forestation, and vegetation describing the terrain of the battleground, and the amounts of food and fuel used by the unit) are shown.
C	Equipment losses. A table of quantities of each of the 200 types of equipment lost by the unit during the battle is printed. The leftmost column indicates the equipment item code corresponding to the first entry in each row.
D	Summary assessment. The quantities of personnel and major items of equipment destroyed and the quantities before the battle are printed.

10. COMBAT SERVICE SUPPORT EVENTS RECORDS.

a. General. Two reports are printed for the Combat Service Support Model. The first report, from records type 511, provides information on items that are requested during each combat service support cycle. The second report, from records type 521, provides information on the item and its transport at discrete

A

GROUND COMBAT BATTLE UNIT

DAY	HOUR	MIN	RECORD TYPE	IUID
1	7	15	321	837

B

EVENT CODE	ORDER CODE	BATTLE ID
4	15	MECH1

LENGTH OF TIME OF EVENT (CENTIMINUTES)
1500

TIME EVENT IN PROGRESS (CENTIMINUTES)
1499

ATTACKER/DEFENDER
ATTACKER

REINFORCEMENT INDICATOR
NO REINFORCEMENT

DAY/NIGHT INDICATOR
DAY

X-COORD AT BEGINNING
121269

Y-COORD AT BEGINNING
92767

X-COORD AT END
121269

Y-COORD AT END
92767

AVERAGE ROUGHNESS INDEX
5.66

AVERAGE FORESTRATION INDEX
.66

AVERAGE VEGETATION
2.33

FOOD CONSUMED (POUNDS)
0.00

FUEL EXPENDED (GALLONS)
0.00

C

EQUIPMENT LOSSES

1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
21	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
31	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
41	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
51	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
61	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
71	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
81	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
91	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
101	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
111	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
121	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
131	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
141	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
151	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
161	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
171	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
181	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
191	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

SUMMARY ASSESSMENT TABLE

D

	PERSONNEL	TANKS	APC	VEHICLES	AIRCRAFT	AIR DEFENSE WEAPONS
NUMBER ALIVE INITIALLY	289.859	30.983	15.910	7.995	0.000	0.000
NUMBER LOST	0.000	0.000	0.000	0.000	0.000	0.000

Figure VI-3-C-8. Ground Combat Battle Unit Record, History Tape Listing times during the item's delivery. Each report is produced after each combat service support cycle. The cycles currently occur at 2-hour intervals.

b. Back Order Event. Figure VI-3-C-9 displays a page from the back order report. The time at the top of the report is the time at which all orders printed on the page were requested. Record type 511 identifies this record as the back order report. The columns on this report are self-explanatory. Each line provides information on a separate consumable order. The figure is explained as follows.

Output Descriptor	Explanation
A	Column 2 indicates the unit that is requesting the item of the equipment item code in column 3; e.g., unit 97 requesting equipment item 54. Column 5 (quantity back ordered) shows that unit 97 requires 3283 units of item 54. Column 4 (quantity not resupplied) shows that 749 units could not be resupplied and that only 2534 units could be delivered. No transportation, shown in column 6 (status of order), indicates that sufficient transportation to haul the supplies was unavailable at the supply point of the IUID given in column 7 or at the location of the requesting unit.
B	Sufficient supplies of item 51 were not available for requesting unit 90 at its supply point, IUID 88. Only 100 units of a 1322-unit order were available; thus, 1222 units could not be delivered.
C	If no supply point for a particular item for a unit is input in the data load, the order for the item may still appear on this report. In this case, unit 989 ordered 3344 units of item 1. Since no supply point was listed, however, none of the order was resupplied.
D	If the complete order can be filled, the quantity not resupplied is shown equal to zero, and order has been filled appears in column 6 (status of order).

c. Supply Action Event.

(1) Two types of supply methods are used; unit distribution and supply point distribution. There are three supply actions for each item delivered by unit distribution and four by supply point distribution. These actions are presented pictorially in Figure VI-3-C-10.

(2) Figure VI-3-C-11 displays samples from the supply action report. The time at the top of each page is the game time at which the actions listed were processed. Record type 521 identifies these as the supply action reports.

COMBAT SERVICE SUPPORT EVENTS

DAY 2 HOUR 4 MIN 58 RECORD TYPE 511

	EVENT TYPE	REQUESTING UNIT IUID	EQUIPMENT ITEM CODE	QUANTITY NOT RESUPPLIED	QUANTITY BACK ORDERED	STATUS OF ORDER	SUPPLY POINT
	BACK ORDER	86	1	0	2814	ORDER HAS BEEN FILLED	88
	BACK ORDER	81	1	0	2814	ORDER HAS BEEN FILLED	88
	BACK ORDER	80	1	0	1946	ORDER HAS BEEN FILLED	66
	BACK ORDER	97	54	749	3283	NO TRANSPORTATION	98
A	BACK ORDER	90	51	1222	1322	NO SUPPLIES	88
B	BACK ORDER	97	1	0	2028	ORDER HAS BEEN FILLED	88
	BACK ORDER	962	53	0	808	ORDER HAS BEEN FILLED	964
	BACK ORDER	991	1	0	1060	ORDER HAS BEEN FILLED	990
C	BACK ORDER	989	1	3344	3344	NO SUPPLIER LISTED	0
	BACK ORDER	986	1	0	700	ORDER HAS BEEN FILLED	998
D	BACK ORDER	972	1	0	5324	ORDER HAS BEEN FILLED	990

Figure VI-3-C-9. Back Order Event Record, History Tape Listing

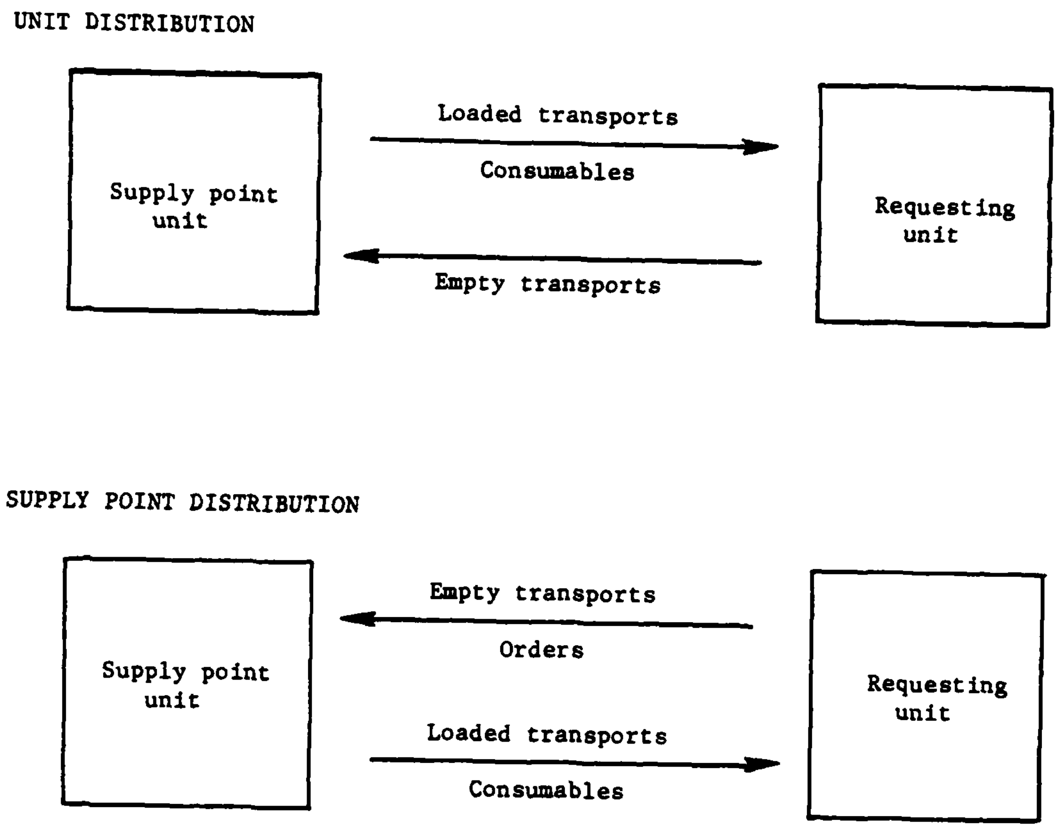


Figure VI-3-C-10. Supply Actions

COMBAT SERVICE SUPPORT EVENTS

DAY 2 HOUR 4 MIN 58 RECORD TYPE 521

	EVENT TYPE	REQUESTING UNIT TUID	SUPPLYING UNIT TUID	EQUIPMENT ITEM CODE	QUANTITY	SUPPLY TIME	DISTRIBUTOR	LOCATION / DESTINATION	ITEM	I/O
A	SUPPLY ACTION	07	08	54	1095.00	20551	SP	TO USP	ORDERS	OUT
A	SUPPLY ACTION	07	08	-161	6.83	20551	SP	TO SP	EMPTY TRANS	OUT
A	SUPPLY ACTION	07	08	54	1435.00	20653	UD	TO PU	CONSUMABLE	OUT
A	SUPPLY ACTION	07	08	-163	6.17	20652	UD	TO PU	LOADED TRANS	OUT

COMBAT SERVICE SUPPORT EVENTS

DAY 2 HOUR 6 MIN 58 RECORD TYPE 521

	EVENT TYPE	REQUESTING UNIT TUID	SUPPLYING UNIT TUID	EQUIPMENT ITEM CODE	QUANTITY	SUPPLY TIME	DISTRIBUTOR	LOCATION / DESTINATION	ITEM	I/O
B	SUPPLY ACTION	07	08	54	1095.00	20551	SP	AT USP	ORDERS	IN
B	SUPPLY ACTION	07	08	54	1095.00	20743	SP	TO PU	CONSUMABLE	OUT
B	SUPPLY ACTION	07	08	-161	6.83	20551	SP	AT SP	EMPTY TRANS	IN
B	SUPPLY ACTION	07	08	-161	6.83	20743	SP	TO PU	LOADED TRANS	OUT
B	SUPPLY ACTION	07	08	54	1435.00	20653	UD	AT PU	CONSUMABLE	IN
B	SUPPLY ACTION	07	08	-163	6.17	20653	UD	AT PU	LOADED TRANS	IN
B	SUPPLY ACTION	07	08	-163	6.17	20818	UD	TO SP	EMPTY TRANS	OUT

Figure VI-3-C-11. Supply Action Event Record, History Tape Listing
(Continued on Next Page)

COMBAT SERVICE SUPPORT EVENTS

DAY 2 HOUR 8 MIN 58 RECORD TYPE 521

	EVENT TYPE	REQUESTING UNIT IUID	SUPPLYING UNIT IUID	EQUIPMENT ITEM CODE	QUANTITY	SUPPLY TIME	DISTRIBUTOR	LOCATION / DESTINATION	ITEM	I/O
C	SUPPLY ACTION	97	98	54	1095.00	20743	SP	AT RU	CONSUMABLE	IN
C	SUPPLY ACTION	97	98	-161	6.83	20743	SP	AT RU	LOADED TRANS	IN
C	SUPPLY ACTION	97	98	-163	6.17	20818	UD	AT SP	EMPTY TRANS	IN
	SUPPLY ACTION	90	88	-161	0.30	20746	LC	AT SP	EMPTY TRANS	IN
	SUPPLY ACTION	97	88	-161	0.17	20736	UD	AT SP	EMPTY TRANS	IN
E	SUPPLY ACTION	53	102	185	4.00	20852	UD		MAJ END ITEM	IN

COMBAT SERVICE SUPPORT EVENTS

DAY 2 HOUR 6 MIN 58 RECORD TYPE 521

	EVENT TYPE	REQUESTING UNIT IUID	SUPPLYING UNIT IUID	EQUIPMENT ITEM CODE	QUANTITY	SUPPLY TIME	DISTRIBUTOR	LOCATION / DESTINATION	ITEM	I/O
	SUPPLY ACTION	56	102	201	165.00	21938	UD		PERSONNEL	OUT
D	SUPPLY ACTION	53	102	185	4.00	20852	UD		MAJ END ITEM	OUT
	SUPPLY ACTION	85	102	86	1.00	21521	UD		MAJ END ITEM	OUT

Figure VI-3-C-11. Supply Action Event Record, History Tape Listing (Concluded)

Output Descriptor	Explanation
A	It was shown in Figure VI-3-C-9, descriptor A, that unit 97 had ordered 3283 units of item 54 but that only 2534 could be delivered. In Figure VI-3-C-11 it can be seen that 1095.0 of item 54 were delivered under supply point distribution and 1439.0 were delivered under unit distribution. The following descriptors trace the items through the various actions that lead to delivery at the requesting unit.
	Under supply point distribution, the first two supply actions are the departure of the orders for consumables and empty transports from the requesting unit. As shown, 6.83 empty transports, equipment item 161*, depart the requesting unit (97) and are scheduled to arrive at the supply point at 5:51 A.M. of day 2. These trucks are carrying orders requesting 1095 units of item 54.
B	The supply actions were processed at 6:58 A.M. of day 2. The orders (line 1) for 1095.0 units of item 54 and 6.83 empty transports to carry the items (line 3) arrived as scheduled. At this time the necessary consumables are subtracted from the supply points (98) unit status file and loaded on the transports. The consumables (line 2) and loaded transports (line 4) are then scheduled to arrive back at the requesting unit at 7:43 A.M. of day 2.
C	The supply actions were processed at 8:58 A.M. of day 2. The 1095 units of item 54 (line 1) loaded on the 6.83 type 161 transports (line 2) arrived at the receiving unit at 7:43 A.M. as scheduled. These two activities conclude the delivery of 1095 units of item 54.
	Recap: The 1439 units of item 54 were delivered to unit 97 under unit distribution. Under this unit distribution method the supply point furnishes the transporting vehicles. Descriptor A displays the activity where the consumables (line 3) and 6.17 transports, type 163, (line 4) leave the supply point. They are scheduled to arrive at the receiving unit at 6:53 A.M. of day 2. Descriptor B shows 1439.0 item 54 consumables (line 5) loaded on 6.17 type 163 transports (line 6) arriving at the receiving unit. The empty transports are then returned to the supply point. The transports are scheduled to arrive back at the supply point at 8:18 of day 2 (line 7). Descriptor C shows the 6.17 type 163 transports returning to the supply point (line 3). This completes the activity on the items which were delivered under unit distribution.

---

* negative equipment items codes are used to distinguish the transports from the consumables

Output Descriptor	Explanation
D	All major end items and personnel are assumed to be under unit distribution. This entry shows the activity in which 4.0 units of major end item 185 leave (last column) the rear area and are scheduled to arrive at unit 53 at 8:52 on day 2. The item is identified as a major end item in column nine (item). If the item were personnel, it would be identified by the word personnel in column 9.
E	The arrival (last column) of the 4 items 185 at the receiving unit.

11. MOVEMENT EVENT RECORDS. See Figure VI-3-C-12. This report is printed by routine SR64. A record is written to the period history tape for each segment of a unit's movement simulated by the movement model. Each group of entries in the report is described below.

Output Descriptor	Explanation
A	Report heading. The heading of the report, including the report title, identification number of the moving unit, game time of the beginning of this move segment, and length of time of the move segment, is printed.
B	Move description. A description of the move segment (order code, event code, and mobility code), weather conditions and terrain, the unit locations at the beginning and end of the move segment, and the rate of movement are printed.
C	If two consecutive movement event records occur on the period history tape, the two reports can be printed on the same page.

```
                                   MOVEMENT EVENT

      A   IUID            TIME MOVE SEGMENT BEGAN            MOVE TIME LENGTH
                              DAY   HOUR   MIN               (CENTI-MINUTES)
          114                  1      7    30                       56

  ORDER       EVENT      MOBILITY      PRECIPITATION        FOG        TERRAIN CODE, RFS
  CODE        CODE         CODE
    3           2          TROM            NONE              NO              5110
B
          STARTING COORDINATES       ENDING COORDINATES       SPEED (KILOMETERS/HOUR)
            X               Y          X            Y
          116300          96230      116337       95999                 22.


                                   MOVEMENT EVENT

          IUID            TIME MOVE SEGMENT BEGAN            MOVE TIME LENGTH
                              DAY   HOUR   MIN               (CENTI-MINUTES)
          162                  1      7    30                      192
C
  ORDER       EVENT      MOBILITY      PRECIPITATION        FOG        TERRAIN CODE, RFS
  CODE        CODE         CODE
    3           2          TROM            NONE              NO              5110

          STARTING COORDINATES       ENDING COORDINATES       SPEED (KILOMETERS/HOUR)
            X               Y          X            Y
          119500          96700      118499       95999                 22.
```

Figure VI-3-C-12. Movement Event Record, History Tape Listing

APPENDIX D

SOURCE LISTINGS FOR ANALYSIS OUTPUT PROCESSOR HISTORY TAPE LISTING ROUTINES

(AVAILABLE UNDER SEPARATE COVER)

CHAPTER 4

ANALYSIS MATRIX FORMULATION

1. INTRODUCTION. The analysis matrix formulation routines of the Analysis Output Processor extract data from abbreviated period period history tapes, and array the data in the format required by the statistical analysis routines. Routine ANCARD processes the input cards for the three extractor routines, AFM, AGM, and GCMOD. The extractor routines generate data matrices. Each matrix is an array of the losses or effects for an equipment type by classes of units over a time period. The losses or effects are expressed in terms of either quantities or rates.

2. ROUTINE ANCARD. Routine ANCARD interprets and reformats the input data for the extractor routines and builds a table of the unit identification record numbers of units (IUIDs) in each class for each extractor routine. ANCARD requires a unit cross reference table relating IUIDs to unit identifications (UIDs) and unit type designators (UTDs) similar to the table created by routine UXR. ANCARD generates the table from FILE36 which must be loaded to a mass storage device by the utility routine UTILLD. The input is passed to the extractor routines in a large file containing four 3000-word records and ten 600-word records.[1] The first record contains the unit cross reference table; the second record contains input for routine AFM; the third record contains input for routine AGM; and the last eleven records contains input for routine GCMOD.

3. ROUTINES AFM AND AGM. Routines AFM and AGM, the Area Fire Model and Air Ground Engagement Model extractor routines, are nearly identical. There are no differences in the logic used. The routines extract data from assessment records from the Area Fire and Air Ground Engagement Models respectively. Matrices are built corresponding to the equipment types input for equipment lost or killed. Fixed length time intervals are used, and each column of a matrix generated by one of these routines describes one time interval.

a. Routine AFM. For example, if the effect rates are considered for nine Blue force artillery units of tanks, APCs, and personnel for a 1-hour period, the nine units are grouped into two classes of four and five units respectively, and the hour is divided into three equal intervals, three matrices will be formed, one each describing Red force tanks, APCs, and personnel killed by the four artillery units. Each matrix will have two rows and three columns. The first entry in the first row of the matrix that describes tank kills will describe the combined tank kills of the four artillery units in the first class for the first 20-minutes of the hour. The second entry in the row will describe the combined tank kills for the second 20-minute interval, and the final entry will describe the combined tank kills for the final 20-minute interval. The second row of the matrix will describe

1. This file cannot be written to 9-track magnetic tape under the SCOPE 3.3 operating system, because of record length limitations in effect for 9-track tape. The file can be written to 7-track magnetic tape or disk).

the combined tank kills of the five units in the second class over the 1-hour period. The other two matrices will similarly describe APCs and personnel killed. Since effect rates were specified, each entry in each matrix will be the quotient of the sum of tanks, APCs, or personnel killed by each class for a time interval divided by the number of minutes in the interval.

b. Routine AGM. As another example, suppose four classes are defined to contain all of the infantry, armor, cavalry, and artillery units of the Blue force respectively. Matrices of quantities of machineguns and personnel lost are requested from the Air Ground Engagement Model routine AGM, over a 2-hour period using 15-minute time intervals. Two four-by-eight matrices will be constructed, describing losses of Blue force units to fire from Red force aircraft.

4. ROUTINE GCMOD. Routine GCMOD, the Ground Combat Model extractor is more complicated than the other two extractor routines. Data are extracted from Ground Combat attacker-defender pair records. Matrices are extracted for each of nine equipment types. The nine types of equipment are not defined by input through routine ANCARD; they are the eight weapon system/transport types (victims), defined by input to the Period Processor, and personnel. These equipment types may be killed by any of 16 ammunition types in the Ground Combat Model. Input passed through routine ANCARD defines those ammunition types (killers) to be considered, and losses or effects for victims are summed over those killers to be considered. As in the Area Fire and Air Ground extractor routines, the rows of each matrix are defined by classes of units and the columns are defined by time intervals. A fixed time interval length is not used, and the time intervals for any given column can differ; i.e., a column, can represent the losses of units in the first class over a 2-hour period, 0700 - 0900, and the losses of units in the second class over a 15-minute period, 1130 1145. The only restriction on time intervals used to define the columns of the matrices is that the time intervals must be in chronological order; they need not be continuous. The 9, 18, 27, or 36 matrices will be constructed depending on the number of the four possible matrix types (loss quantities,..., effect rates) that have been requested. In some cases, matrix sums of the basic matrices can be of interest. For example, two of the victims might be tanks. In this case, it is possible to generate the additional matrices, but care should be exercised in exercising this feature of the routine.

APPENDIX A

INPUT REQUIREMENTS FOR ANALYSIS MATRIX FORMULATION PROGRAMS

1. INTRODUCTION. This appendix contains descriptions of card and tape inputs required to execute the controlling matrix formulation program ANCARD, and the extractor routines AFM, AGM, and GCMOD.

2. ROUTINE ANCARD:

a. Card Input. Eight types of input cards are recognized by routine ANCARD. They are unit identification (UID) cards, unit type designator (UTD) cards, time cards, equipment cards, quantity-rate (Q-R) cards, killer selection cards, combination cards, and the END (of input) card. For each extractor routine to be used, (1) one to ten classes (matrix rows) must be defined using UID and/or UTD cards; (2) the time intervals (matrix columns) must be defined using time cards; (3) the matrices to be constructed must be defined using equipment cards for AFM/AGM and/or killer selection cards (and optionally combination cards) for GCMOD; and (4) the kinds of matrices must be defined using Q-R cards. The last card in the input deck must be an end card. Diagnostics are not issued if input for one or more extractor routines is incomplete, and this condition is not fatal to execution of routine ANCARD (and may not be fatal to execution of the extractor program). It is the responsibility of the user to insure that the input is complete. The formats and data for each of the eight card types are discussed in the following paragraphs.

(1) UID Card. This card defines a row (class) by UIDs of the units to be included.

(a) Model to be Selected (Columns 1-2). This entry may be 01, 02, or 03 where 01 is the Area Fire Model, 02 is the Air Ground Engagement Model, and 03 is the Ground Combat Model.

(b) Card Type (Column 3). The number 1 must be entered in column 3.

(c) Class (or Row) to which UID card applies (Columns 4-5). The class, 1-10, is entered, right justified, in these columns.

(d) UID to be Selected (Columns 11-18, 20-27, 29-36, 38-45, 47-54, 56-63, 65-72). A UID must contain eight alphanumeric characters and begin with B or R. An exception is if the class is to contain all Blue or all Red units, wherein the mnemonic ALLB or ALLR respectively, is entered in columns 11-14.

(e) Additional Cards. Additional cards, prepared as above, are required when more than seven UIDs are to be defined in one class.

(2) UTD Card. This card defines a row (class) by UTD of the units to be included.

(a) Model Code Number (Columns 1-2). The entry is 01, 02, or 03.

(b) Card Type (Column 3). The number 2 is entered.

(c) Class (or Row) of Matrix to Which UTD Card Applies (Columns 4-5). The class, 1-10, right justified, is entered.

(d) UTD to be Selected (Columns 11-14, 16-19, 21-24, 26-29, 31-34, 36-39, 41-44, 46-49, 51-54, 56-59, 61-64, 66-69, 71-74). A UTD must be four alphameric characters, and is entered in these columns.

(e) Additional Cards. Additional cards, prepared as above, are required when more than 13 UTDs are specified.

(3) Time Card. The time card defines the matrix columns, (i.e., the length of the time interval for the Area Fire and Air Ground Engagement Model matrices, and the individual interval end points for each column of the Ground Combat Model matrices). The Area Fire and Air Ground models require only one time card each specifying the length of the interval; however, the Ground Combat Model requires at least one time card for each row (class).

(a) Model Code Number (Columns 1-2). The entry can be 01, 02, or 03.

(b) Card Type (Column 3). The number 4 is entered for the Area Fire Model time card. The number 5 is entered for the Air Ground Engagement Model. The number 3 is entered when the time card applies to the Ground Combat Model.

(c) Class (or Row) to Which the Times Apply (Columns 4-5). This field is applicable only to Ground Combat time cards. For other models, all classes have the same time intervals.

(d) Time Interval in Minutes (Columns 11-16). This field applies only to the Area Fire and Air Ground Engagement models. Enter the length of the time interval (right justified) in minutes to be used.

(e) Ground Combat Model Time Interval Boundary Specifications (Columns 11-16 and 18-23, 25-30 and 32-37, 39-44 and 46-51, and 53-58 and 60-65). Two entries are required to define a time interval, and each card allows the specification of four time intervals for a Ground Combat Model class. The first entry of each pair of columns on the card is the interval starting time, and the second is the interval ending time. The times must all be in ascending order on each Ground Combat Model time card. The first Ground Combat Model time card encountered will specify time intervals for the first four entries in a row; the second card encountered for that row (class) specifies the time intervals for the next four entries, etc. A dash or hyphen may be used between the times defining a time interval, and a comma may be used to separate interval pairs; however, both hyphens and commas are optional.

(4) Equipment Card. This card is used to specify equipment types for which each analysis matrix is to be built.

(a) Model Code Number (Columns 1-2). The entry can be 01 (Area Fire) or 02 (Air Ground Engagement) only.

(b) Card Type (Column 3). The entry must be 3.

(c) Equipment Number for Which a Matrix Should be Built (Columns 11-13, 14-16,..., 74-76, and 77-79). Equipment numbers must be right justified.

(d) Additional Cards. Additional cards, prepared as above, are required when the equipment types for which matrices are being built exceed 23 items (maximum is 25).

(5) Quantity-Rate Cards. The Q-R card is used to select matrices containing data in quantity or rate form for either losses or effects.

(a) Model Number (Columns 1-2). Entry can be 01, 02, or 03.

(b) Card Type (Column 3). Enter 5 for Area Fire, 7 for Air Ground Engagement, or 4 for Ground Combat.

(c) Quantity of Losses (Column 11). Enter 1 if quantity of losses matrices are desired. Leave blank if matrix is not desired.

(d) Rate of Losses (Column 12). Enter 1 if rate of losses matrices are desired. Leave blank if matrix is not desired.

(e) Quantity of Effects (Column 13). Enter 1 if quantity of effects matrices are desired. Leave blank if matrix is not desired.

(f) Rates of Effects (Column 14). Enter 1 if the rates of effects matrices are desired. Leave blank if matrix is not desired.

(6) Killer Selection Card. This card is used to select the killers whose victims are to be used in building Ground Combat analysis matrices.

(a) Model Number (Columns 1-2). These columns must have 03 entered since this card is applicable only to the Ground Combat Model.

(b) Card Type (Column 3). The column must have 5 entered.

(c) Mnemonic or Comment (Columns 4-10). Optional entry.

(d) Killer Ordinal (Columns 11-12,..., 41-42). The killer ordinal refers to the row number of the killer in the killer-victim matrix output by the Ground Combat Model in the Period Processor technical output. The ordinal may have a value from 1 to 16 and is right justified.

(7) Combination Card. The combination card is used to inform the Ground Combat Model data extractor how to combine (matrix addition) Ground Combat Model victim matrices.

(a) Model Number (Columns 1-2). The entry must be 03.

(b) Card Type (Column 3). The entry must be 6.

(c) Combined Matrix Definition (Columns 11-20, 21-30, 31-40, 41-50, 51-60, and 61-70). Each 10-column group may contain any combination of numbers from 1 to 9. The matrix for each of the victims specified in a group are added together and the sum matrix will be subjected to analysis as well as each of the nine victim matrices.

(8) End Card. A card with END in columns 1-3 is required to signify the end of the data deck.

(9) Example. An example of input cards for routine ANCARD is shown in Figure VI-4-A-1.

b. Tape Input. A period history dump tape generated by the DIVWAG Period Processor is input to routine ANCARD.

3. ROUTINE AFM:

a. Card Input. No card input is required if only one abbreviated period history tape created by one of the tape preprocessors is to be input. If more than one history tape is to be input, a single card with the number of history tapes to be input right justified in columns 9 and 10 is required.

b. Tape Input. An abbreviated period history tape created by one of the tape preprocessors is required input for routine AFM. Optionally, several such tapes may be input, provided they are entered in correct time sequence. If the program is not executed as part of the same job with routine ANCARD, the output tape from ANCARD must be input.

4. ROUTINE AGM:

a. Card Input. No card input is required if only one abbreviated period history tape created by one of the tape preprocessors is to be input. If more than one history tape is to be input, a single card with the number of history tapes to be input right justified in columns 9 and 10 is required.

INPUT CARD	MODEL NO.	CARD TYPE	CLASS (ROW)		ANCARD DATA FIELDS
UID	01	1	1		ALLB
UID	02	1	2		B30002TO, B31002T0
UTD	03	2	3		SEMT, GENT
TIME	02	5			15
TIME	03	8	1		010500-010529, 010530-010559, 010600-010659, 010800-010814
EQUIPMENT	01	3			21 22 35 81201165 2
QR	02	7			1 1
KILLER SELECTOR	03	5			1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
COMBINATION	03	6			123456789 23456789
END	EN	D			

Figure VI-4-A-1. Input Cards for Routine ANCARD

b. Tape Input. An abbreviated period history tape created by one of the tape preprocessors is required input for routine AGM. Optionally, several such tapes may be input, provided they are entered in correct time sequence. If the program is not executed as part of the same job with routine ANCARD, the output tape from ANCARD must be input.

5. ROUTINE GCMOD:

a. Card Input. No card input is required if only one abbreviated period history tape created by one of the tape preprocessors is to be input. If more than one history tape is to be input, a single card with the number of history tapes to be input right justified in columns 9 and 10 is required.

b. Tape Input. An abbreviated period history tape created by one of the tape preprocessors is required input for routine GCMOD. Optionally, several such tapes may be input, provided they are entered in correct time sequence. If the program is not executed as part of the same job with routine ANCARD, the output tape from ANCARD must be input.

APPENDIX B

ANALYSIS MATRIX FORMULATION PROGRAM DESCRIPTIONS

1. INTRODUCTION. Data contained on period history tapes must be reformated for use by the analysis routines. To accomplish this, a set of data extractors for history tape records written by the Ground Combat, Area Fire, and Air Ground Engagement Models of the DIVWAG Period Processor was developed. The package consists of a control card processor, the extractor routines, and data manipulation utility routines.

2. ROUTINE ANCARD:

a. Purpose. This routine reads the matrix selection criteria cards which describe the matrices to be built by the three data extractor routines from Area Fire, Air Ground Engagement, and Ground Combat Models' period history records. ANCARD translates the data on the input cards and builds an output tape with record(s) for each model describing the matrices to be built. ANCARD also preforms elementary error checking; an output tape is created even when the input data contain some invalid cards. This allows the tape to be used by the data extractors when there were no errors in their data cards.

b. Input Variables:

Name	Source	Contents
ICARD	Card	Card from card reader.
ICL	Card	Class, 1-10.
UUID	Card	UID.
IIUTD	Card	UTD.
IEQUIP	Card	Equipment item codes selected.
ICOMB	Card	Combination matrices selected for Ground Combat Model data extractor.
ITIME	Card	Length of time interval.
IGCTM	Card	Times for Ground Combat extraction intervals.
LQ	Card	Indicator for quantity of losses selected.
LR	Card	Indicator for rate of losses selected.
EFQ	Card	Indicator for quantity of effects selected.

Name	Source	Contents
EFR	Card	Indicator for rate of effects selected.
IKILL	Card	Killer numbers selected (1-16).

c. Output Variables:

Name	Destination	Contents
UID	TAPE10	UID cross reference table.
IUTD	TAPE10	UTD cross reference table.
AFIUID	TAPE10	IUIDs selected for Area Fire extraction.
IAFL	TAPE10	Losses flag for Area Fire extraction.
IAFE	TAPE10	Effects flag for Area Fire extraction.
IAFEQP	TAPE10	Equipment item codes selected for Area Fire extraction.
IAFT	TAPE10	Time interval in centiminutes for Area Fire extraction.
AGIUID	TAPE10	IUIDs selected for Air Ground Engagement extraction.
IAGL	TAPE10	Losses flag for Air Ground Engagement extraction.
IAGE	TAPE10	Effects flag for Air Ground Engagement extraction.
IAGEQL	TAPE10	Equipment item codes selected for loss matrices for Air Ground Engagement extraction.
IAGTL	TAPE10	Time interval for Air Ground Engagement loss matrices.
IAGEQE	TAPE10	Equipment numbers selected for effects matrices for Air Ground Engagement extraction.
IAGTE	TAPE10	Time interval for Air Ground Engagement effects matrices extraction.
GCMUID	TAPE10	IUIDs selected for Ground Combat extraction.
KILLER	TAPE10	Killers selected for Ground Combat extraction.

Name	Destination	Contents
IGCML	TAPE10	Losses flag for Ground Combat extraction matrices.
IGCME	TAPE10	Effects flag for Ground Combat extraction matrices.
MATRIX	TAPE10	Matrix combinations selected for Ground Combat extraction.
IGCTIM	TAPE10	Time intervals for Ground Combat extraction.

d. Logical Flow (Figure VI-4-B-1):

(1) Block 1. Initialization consists of calling GETWRD to obtain the UID and UTD cross-reference files as well as writing a 3000-word record containing the UID cross-reference table in the first 2000 words. The last 1000 words are unused. The common areas for the three model records are also initialized to the appropriate value, usually zero.

(2) Block 2. Read an input card and write card image onto scratch file. The card images can then be decoded with a formatted read from the scratch file.

(3) Block 3. If this is a UID card go to block 13.

(4) Block 4. If this is a UTD card go to block 16.

(5) Block 5. If this is an END card go to block 29.

(6) Block 6. If this is an equipment card go to block 18.

(7) Block 7. If this is an Area Fire or Air Ground Engagement time card go to blocks 20 or 21 respectively.

(8) Block 8. If this is a Ground Combat time card go to block 22.

(9) Block 9. If this card is a quantity rate indicator go to block 24.

(10) Block 10. If this is a Ground Combat killer specification card go to block 26.

(11) Blocks 11 and 12. If this is a combination card go to block 28; otherwise, print an error message indicating an illegal card or model type.

(12) Block 13. Read UID card from scratch file.

(13) Blocks 14 and 15. If the class (row) number is illegal or if the UID does not begin with an R or B print the appropriate error message; otherwise, find the UID's corresponding IUID in the cross-reference table and

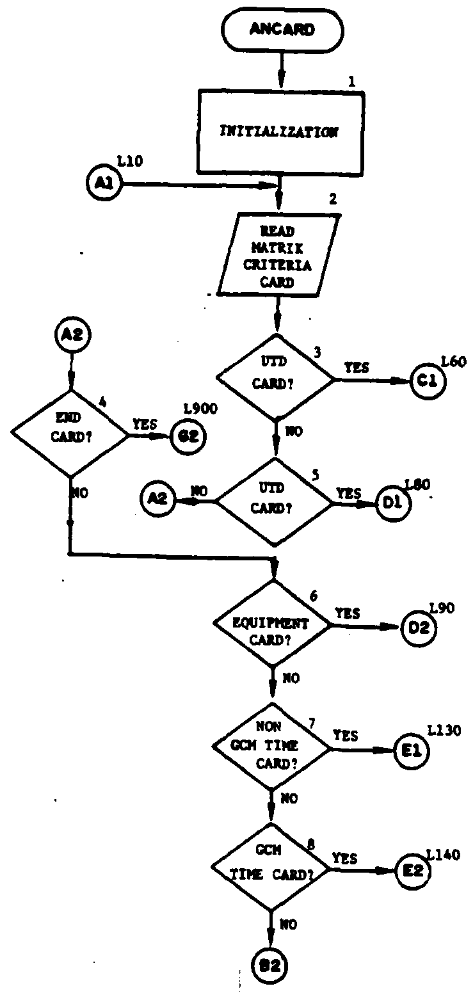


Figure VI-4-B-1. Routine ANCARD (Continued on Next Page)

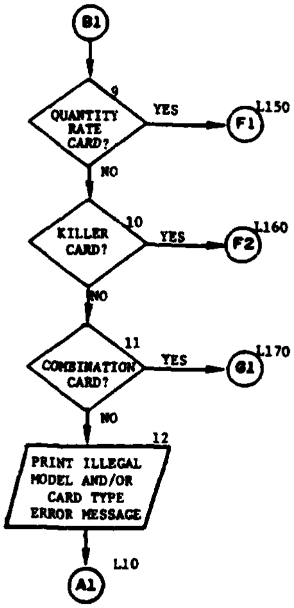


Figure VI-4-B-1. Routine ANCARD (Continued)

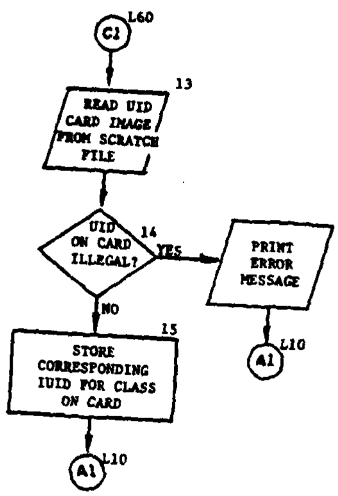
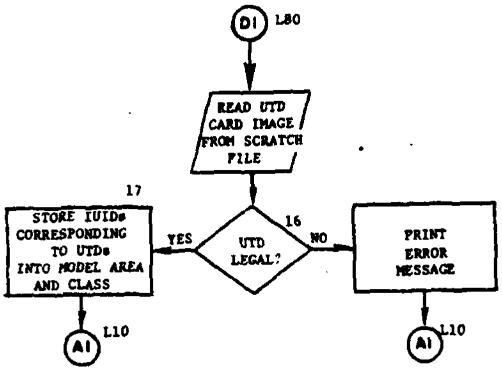


Figure VI-4-B-1. Routine ANCARD (Continued)



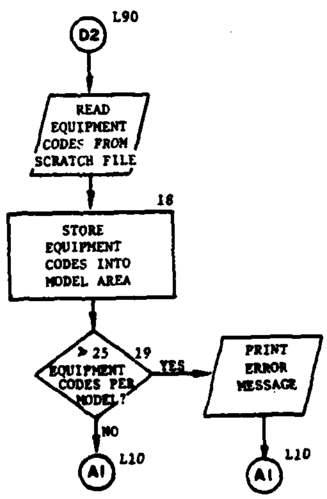
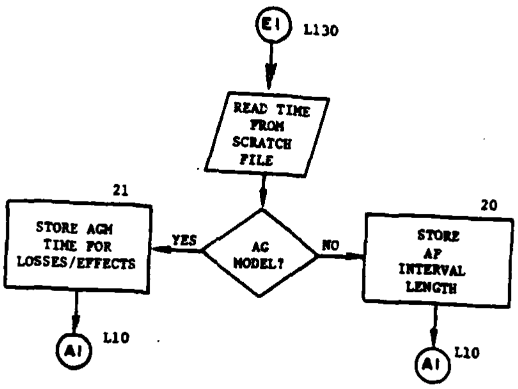


Figure VI-4-B-1. Routine ANCARD (Continued)



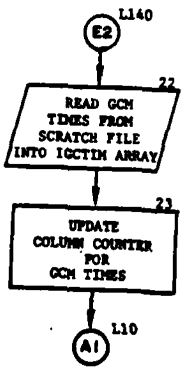


Figure VI-4-B-1. Routine ANCARD (Continued)

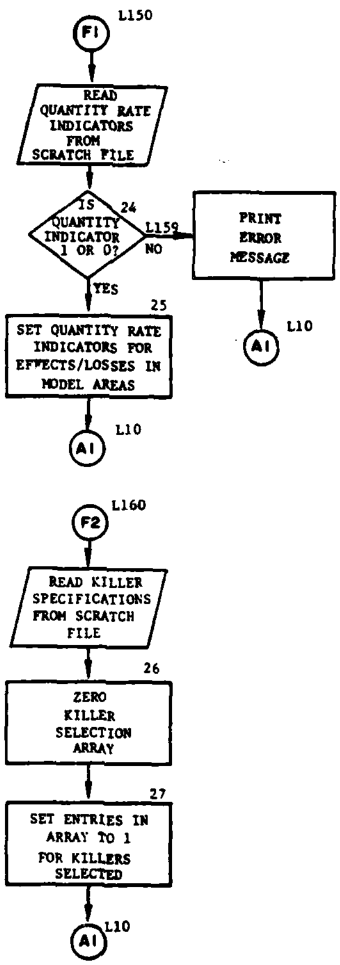


Figure VI-4-B-1. Routine ANCARD (Continued)

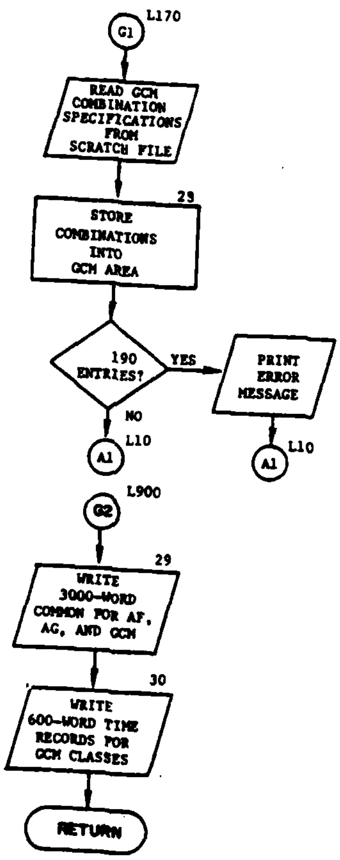


Figure VI-4-B-1. Routine ANCARD (Concluded) store the IUID in the proper extractor's IUID selected area. If after processing this card there are over 200 IUIDs for this class, print the appropriate error message. Return to block 2.

(14) Blocks 16 and 17. Read UTD card image from scratch file. If the class on the card is illegal, print an error message and return to block 2. Find the selected UTDs on the cross-reference table and enter the corresponding IUIDs into the selected extractor's IUID table. If the IUID table for the model is exceeded, print the error message and return to block 2. After all the UTDs are processed return to block 2.

(15) Blocks 18 and 19. Read equipment selection criteria from scratch file. If the card is an Area Fire specifications card the equipment codes are stored in the Area Fire area; however, if the card is an Air Ground Engagement card, the codes are stored in the Air Ground Engagement loss table for card type 3 and the Air Ground Engagement effects table for card type 4. If the number of equipment item codes read exceeds 25 for any group of equipment an error message is printed. Return to block 2.

(16) Blocks 20 and 21. Read Area Fire or Air Ground Engagement time from scratch file. If Area Fire, store the time interval in Area Fire section of common. If Air Ground Engagement and card type 5, store the time interval in the Air Ground Engagement losses time interval area; otherwise, store the time in the Air Ground Engagement effects time interval area. Return to block 2.

(17) Block 22. Read Ground Combat time from scratch file. Each time interval from this card is assigned the next available column for the class specified on the card. The time for each class is stored into the 600 x 10 array IGCTIM. If more than 300 intervals is counted an error message is printed.

(18) Block 23. Update the counter of time intervals used for the class for which the time record was just updated. Return to block 2.

(19) Block 24. If all the quantity rate indicators are either 1 or 0 go to block 25; otherwise, print an error message and return to block 2.

(20) Block 25. Set the quantity rate indicators into the loss and effectiveness areas of the records. The loss and effectiveness indicator values have the following significance; 0 = none, 1 = quantities only, 2 = rates only, and 3 = quantities and rates. Return to block 2.

(21) Blocks 26 and 27. Read Ground Combat killer specifications from scratch file (the default condition for no card is to select all 16 killers in the initialization procedure). Set the Ground Combat killer table to zero and set entries equal to one using the killer numbers read from the card as a subscript to the killer table in the Ground Combat area of common. Return to block 2.

(22) Block 28. Read combination specifications from scratch file and set the requested combinations into the matrix table of the Ground Combat area in common. If the total number of combinations exceeds the 100 entries available in the matrix table, print an error message. Return to block 2.

(23) Block 29. After the END card has been detected write the output tape. The UID cross-reference table record was written during initialization. Write the 3000-word common for Area Fire, Air Ground Engagement, and Ground Combat in that order. The tape now contains four 3000-word records.

(24) Block 30. Write 10 Ground Combat time records from IGCTIM array.

3. ROUTINE GCMOD:

a. Purpose. Program GCMOD is the driving program of the Ground Combat Model data extractor.

b. Input Variables:

Name	Source	Contents
UID (200,10)	TAPE7	Up to 200 UIDs which define the class for each of 10 rows.
KILLER(16)	TAPE7	An array which defines which killers are to be used in constructing the matrices.
LOSS	TAPE7	A flag indicating whether loss matrices are to be constructed.
EFF	TAPE7	A flag indicating whether effects matrices are to be constructed.
MATCMB(100)	TAPE7	An array which allows for the combination of victim matrices.
TIME(600,10)	TAPE7	The beginning and ending time interval for each entry in each row.
RCDTYP	TAPE5	Record type.
ETIME	TAPE5	Time for end of battle increment.
IUID	TAPE5	Unit identification.
LTIME	TAPE5	Time length of battle increment.
COIUID	TAPE5	Opposing unit of IUID.
KVMTRX(16,9)	TAPE5	Matrix of weapon system/transport plus personnel losses.

c. Output Variables:

Name	Destination	Contents
SUM	Call	Array containing the victim losses.
ESUM	Call	Array containing the victim contributions.

d. Logical Flow (Figure VI-4-B-2):

(1) Block L11. Initialize all arrays and pointers required by this routine. A call to INITIL initializes those arrays required by that routine. A call to CREATE initializes data file 24 where matrix arrays will be stored.

(2) Block 1. The UID cross-reference table is read, then two dummy records, and finally a record which loads the Ground Combat extractor common area with the exception of time.

(3) Block L2. The IUIDs of each class are matched with the UID cross-reference table, and then the UIDs of each class are printed.

(4) Block L6. Read and list the time increments of each class.

(5) Block L40. Read an analysis output record. If an end of file is sensed, transfer control to block L1000.

(6) Block 2. If the record is not a 311 type go to block L40.

(7) Block 3. Extract end of battle increment time and length of battle increment time. Then compute start of battle increment time.

(8) Block 4. Extract the IUID of the record and the opposing IUID of the record.

(9) Block 5. A search is made through each class. If the IUID or the opposing IUID of the record does not match any IUID in any of the classes a transfer is made to block L40. If the IUID matches, set the losses flag (ILOSS=1); if the opposing IUID matches, set the effects flag (IEFF=1).

(10) Block 6. Set the start and end times of the time interval of the class being processed. If the start or end time of the record is greater than the end time of the time interval, go to block L290. If the end time of record is less than the start time of the record, transfer to block 5.

(11) Blocks L200 and 7. Read next two records. They should be a 312 type record followed by a 313 type rocord. Load the killer/victim matrix from the input buffer area.

(12) Block 8. If this is a loss record, sum each column into the losses array, SUM. If this is an effects record sum each column into the effects array, ESUM. Then go to block L40.

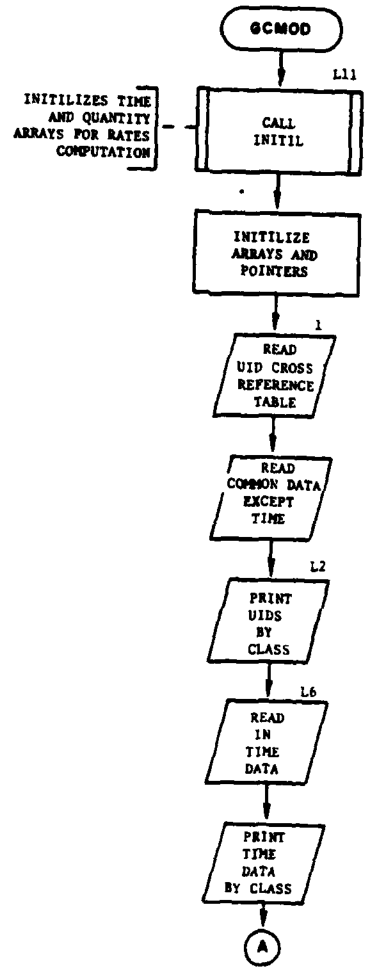


Figure VI-4-B-2. Routine GCMOD (Continued on Next Page)

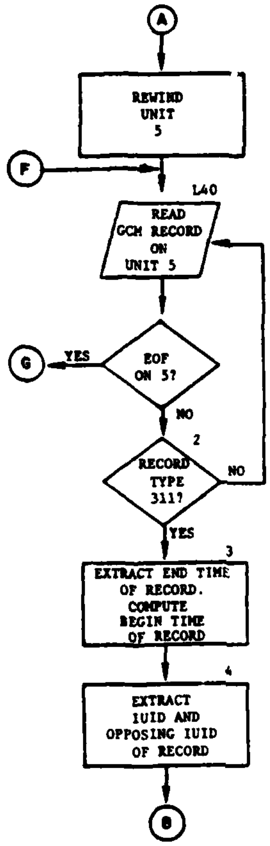


Figure VI-4-B-2. Routine GCMOD (Continued)

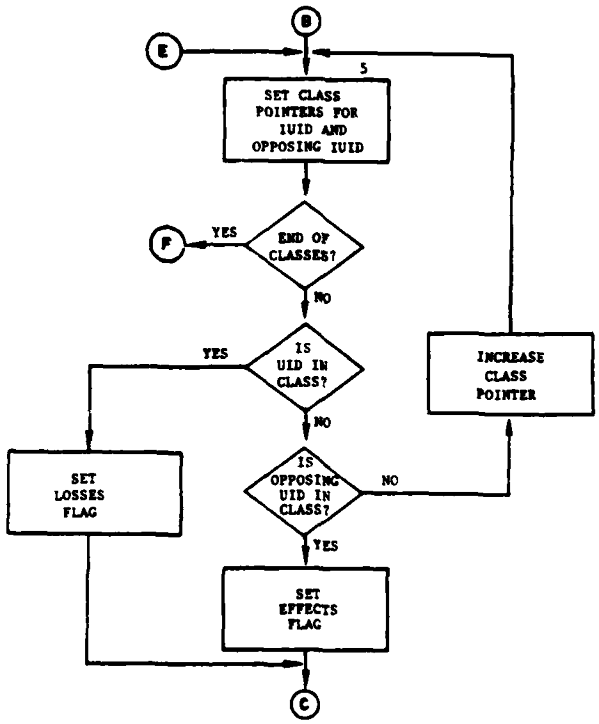


Figure VI-4-B-2. Routine GCMOD (Continued)

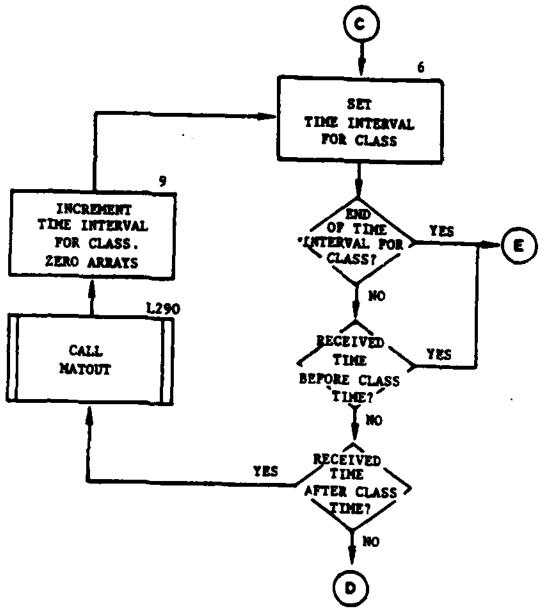


Figure VI-4-B-2. Routine GCMOD (Continued)

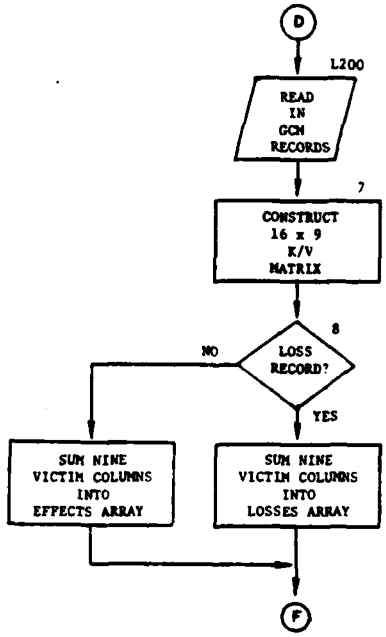


Figure VI-4-B-2. Routine GCMOD (Continued)

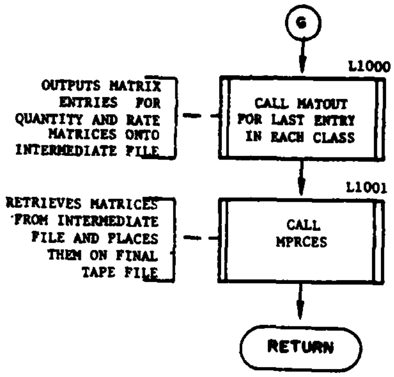


Figure VI-4-B-2. Routine GCMOD (Concluded)

(13) Block L290. All processing is complete for a particular class and time interval. A call is made to routine MATOUT with the summed data for this entry (SUM, ESUM) and the data are placed in the appropriate location of the appropriate matrix in an intermediate output file.

(14) Block 9. The column pointer for class being processed is incremented and the SUM arrays are zeroed. Return to block 6.

(15) Block LI000. An end of file has been sensed on the analysis data input tape. A call is made to routine MATOUT for the last entry in each class.

(16) Block L1001. A call is made to routine MPRCES. That routine determines what analysis requirements are called for, accesses the appropriate matrices on the intermediate file, and writes them on tape.

4. ROUTINE MATOUT:

a. Purpose. The purpose of the MATOUT routine is tc place matrix entries into the Ground Combat Model matrices on the disk file. DIVWAG data file 24 is used. This data file is not related to data file 24 used by the other processors.

b. Input Variables:

Name	Source	Contents
IROW	Call	The class or row number in which the entries will be entered into the matrices.
K	Call	The index to the maximum time value of the column in which the entries will be entered into the matrices.
SUM	Call	An array containing nine victim losses for the losses matrices.
ESUM	Call	An array containing nine victim effects for the effects matrices.

c. Output Variables:

Name	Destination	Contents
SUM	DF24	Loss data which is placed into the losses matrices 1-9.
ARATE	DF24	Rate of losses or effectiveness data which is placed into the rate of losses matrices 10-18 or 28-36.
ESUM	DF24	Effectiveness data which are placed into effectiveness matrices 19-27.

d. Logical Flow (Figure VI-4-B-3):

(1) Blocks 1-7. The column number (time interval) where the matrices entries will be placed is computed. A call is then made to routine IOMAT for each of the victim loss quantities. This call places the loss quantities in each of nine matrices (one for each victim) in the column (time interval) and row (class) requested. The nine quantities are then divided by the time to give the rate of losses for this class for each of the victim matrices. A call to routine IOMAT places each of these rate quantities in the appropriate positions in the loss rate matrices.

(2) Blocks 8-13. The above logic is repeated for the effects quantities, and a return is made to the calling routine.

5. ROUTINE MPRCES:

a. Purpose. MPRCES retrieves matrices from an intermediate Ground Combat extractor file requested by the user and generates an output tape of these matrices for use by the ANALYS routine.

b. Input Variables:

Name	Source	Contents
NROW	Call	The number of rows in the matrices.
NCOL	Call	The number of columns in the matrices.
XY	DF24	An array which holds a matrix when retrieved from the intermediate data file 24.

c. Output Variables:

Name	Destination	Contents
IHEADR	TAPE10	An array which precedes and describes each matrix.
XY	TAPE10	Same as input variable.
XYSUM	TAPE10	Array which holds summed matrices before output.

d. Logical Flow (Figure VI-4-B-4):

(1) Block 1. Initialize header record array for Ground Combat matrices and the number of columns and rows.

(2) Block 2. If the loss flag is not on, go to block L100. If it is on, check to determine if loss quantities are wanted. If not, go to block L30. Set the flags in the header record to losses/quantities.

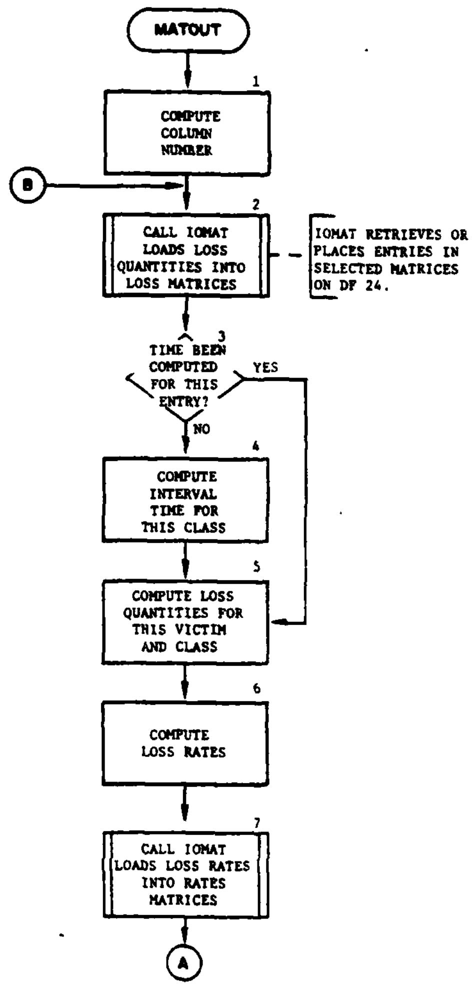


Figure VI-4-B-3. Routine MATOUT (Continued on Next Page)

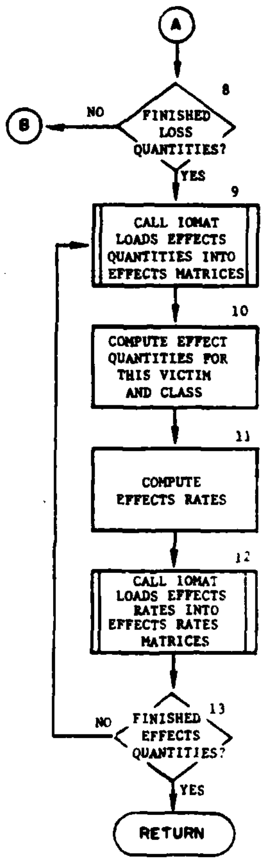


Figure VI-4-B-3. Routine MATOUT (Concluded)

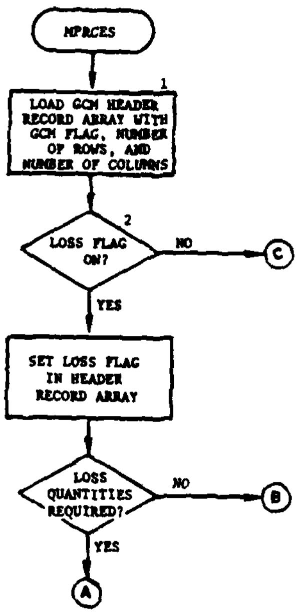


Figure VI-4-B-4. Routine MPRCES (Continued on Next Page)

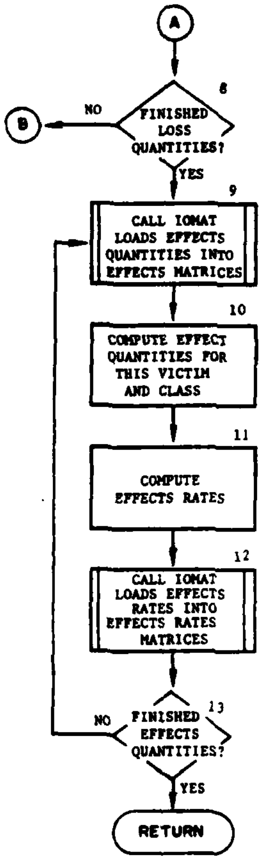


Figure VI-4-B-3. Routine MATOUT (Concluded)

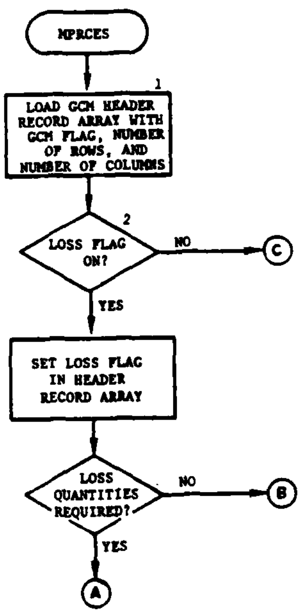


Figure VI-4-B-4. Routine MPRCES (Continued on Next Page)

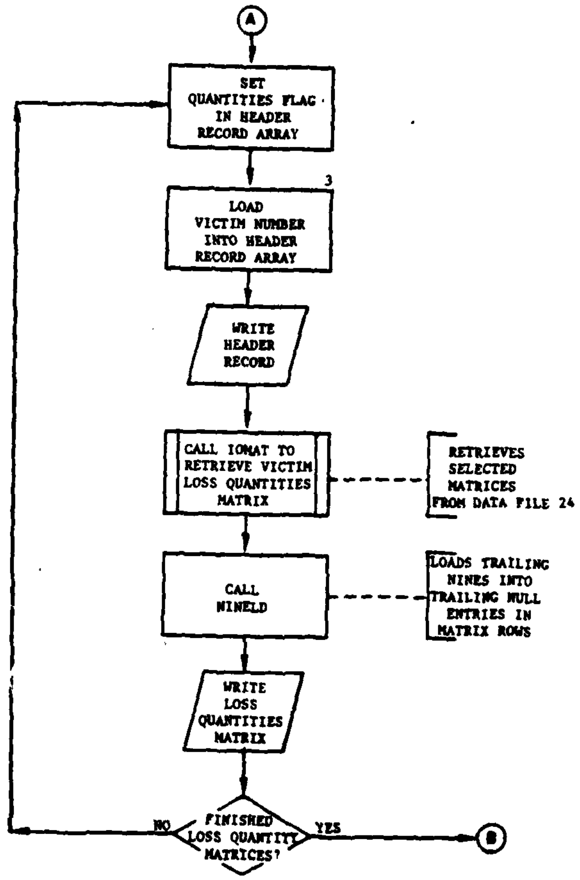


Figure VI-4-B-4. Routine MPRCES (Continued)

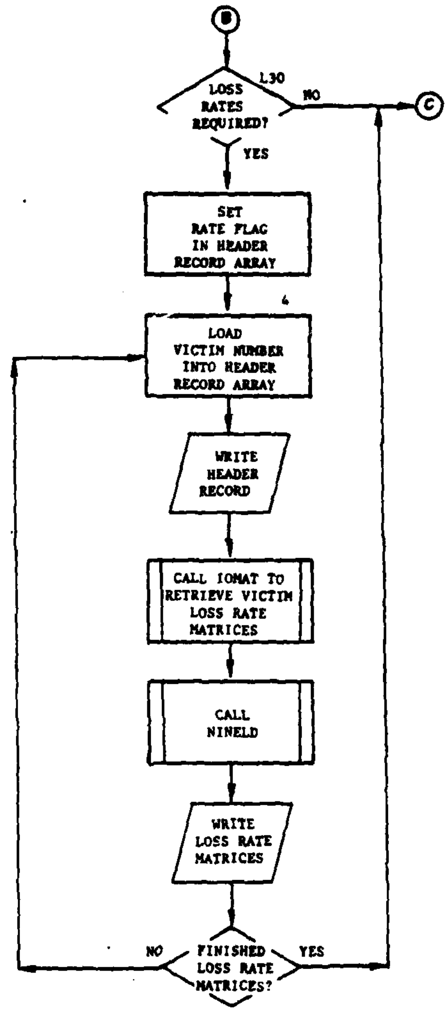


Figure VI-4-B-4. Routine MPRCES (Continued)

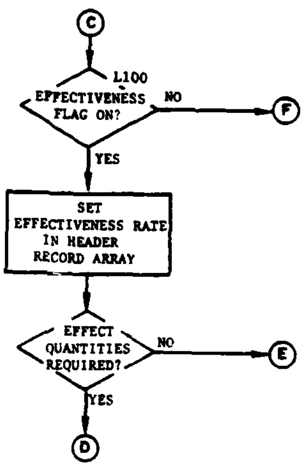


Figure VI-4-B-4. Routine MPRCES (Continued)

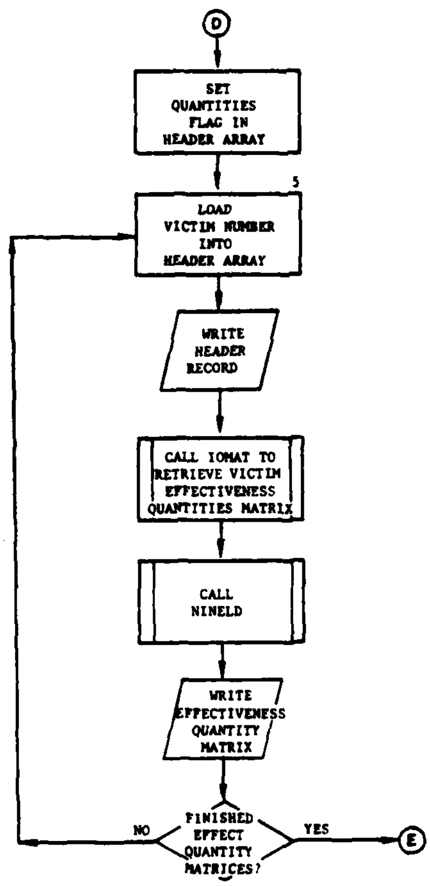


Figure VI-4-B-4. Routine MPRCES (Continued)

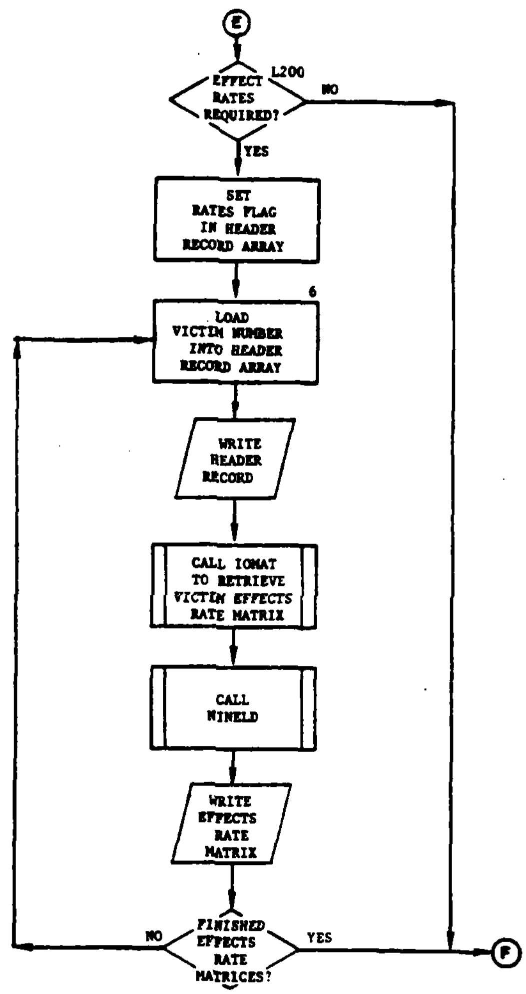


Figure VI-4-B-4. Routine MPRCES (Continued)

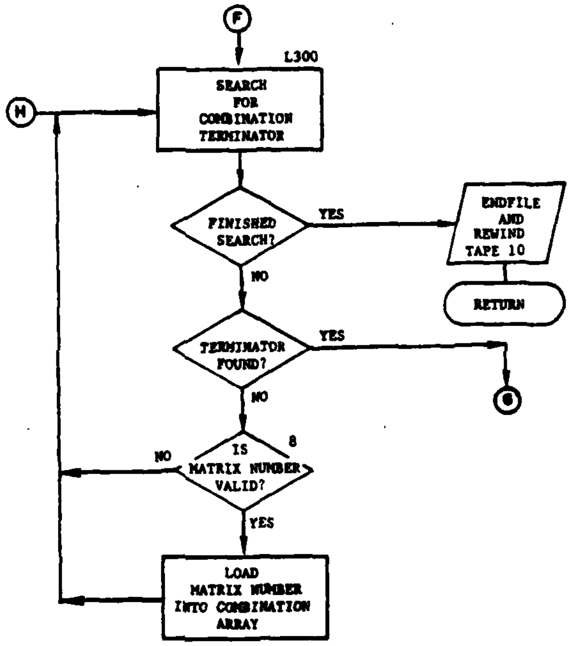


Figure VI-4-B-4. Routine MPRCES (Continued)

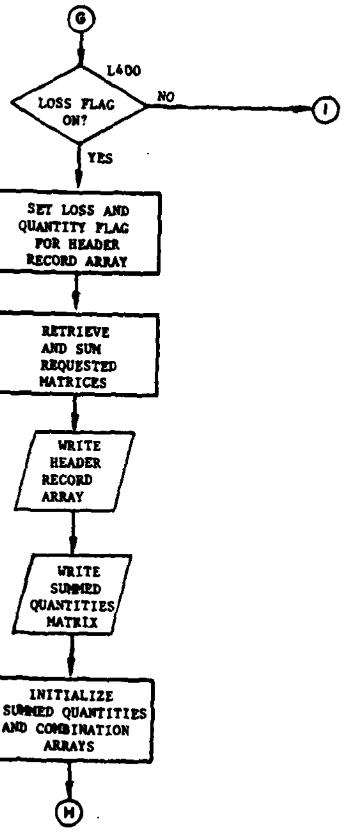


Figure VI-4-B-4. Routine MPRCES (Continued)

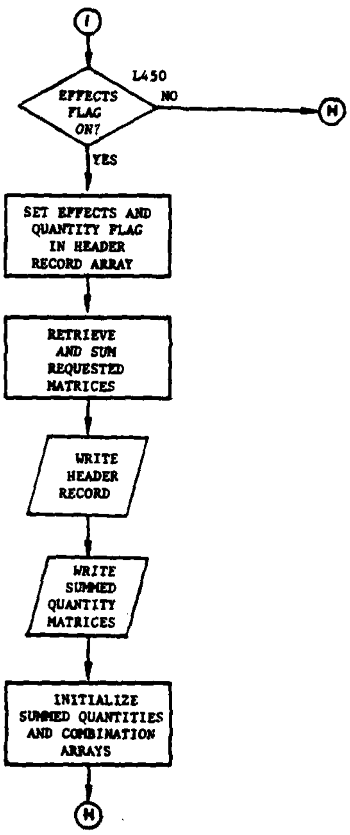


Figure VI-4-B-4. Routine MPRCES (Concluded)

(3) Block 3. For each of the nine loss/quantity matrices set the index of the matrix in the header record and retrieve the matrix from intermediate data file 24. Nines are then loaded into trailing null fields in each row, and the header record and matrix are written to tape 10.

(4) Block L30. If loss rates are not wanted go to block L100. Set the flags in the header record to losses/rates.

(5) Block 4. For each of the nine loss/rates matrices set the index of the matrice in the header record, and retrieve the matrix from intermediate data file 24. Nines are loaded into trailing null fields in each row, and the header record and matrix are written to tape 10.

(6) Block L100. If the effects flag is not set go to block L300. If the effects quantities are not wanted go to block L200. Set the flags in the header record to effects/quantities.

(7) Block 5. For each of the nine effects/quantity matrices set the index of the matrix in the header record, and retrieve the matrix from intermediate data file 24. Nines are then loaded into trailing null fields of each row, and the header record and matrix are written to tape 10.

(8) Block L200. If effects rates are not wanted go to block L300. Set the flags in the header record to effects/rate.

(9) Block 6. For each of the nine effects/rate matrices set the index of the matrix in the header record, and retrieve the matrix from intermediate data file 24. Nines are loaded into trailing null fields in each row, and the header record and matrix are written to tape 10.

(10) Block L300. An array which will hold each combination requirement is initialized. Each word of the combination array is examined. If a combination terminator is reached, go to block L400.

(11) Block 8. The word is examined to determine whether it is a valid matrix number. If it is not return to block L300 to examine the next word; otherwise, move the matrix number into the combination requirements array.

(12) Block L400. If the combination terminator was a blank, return to block L300. If the losses flag is not set, go to block L450; otherwise, set the header record for loss/quantities and retrieve and sum the requested matrices from data file 24. The header record and summed matrices are then written to tape 10.

(13) Block L450. The effects matrices are then processed under the same logic as block L400.

6. ROUTINE AGM:

a. Purpose. AGM extracts and accumulates data from the Air Ground Engagement period history records and writes them on tape for routine ANALYS.

b. Input Variables. The three sources of input are the card reader, the third record of TAPE2 which was created by routine ANCARD, and selected records type 241-242 from TAPE3.

Name	Source	Contents
NTPS	Card	Number of period history tapes.
IRC(3000)	TAPE2	Input record from TAPE2.
IUID(200,10)		IRC(1) to IRC(2000). IUID class table.
IRQ(2)		IRC(2001) and IRC(2000). Loss and effects request codes.
IEOH(25)		IRC(2003) to IRC(2027). Equipment item codes.
INT		IRC(2028). Time interval length (minutes).
IR241(127)	TAPE3	Input period history record type 241.
IR241(1)		Packed time of period history record.
IR241(2)		Period history record type.
IR241(3)		IUID of unit suffering losses.
IR241(7)		IUID of unit inflecting losses.
IR242(109)	TAPE3	Input period history record type 242.
IR242(1)		Packed time of period history record.
IR242(2)		Period history record type.
EQLOST(201)	TAPE3	Quantities of equipment and personnel lost. EQLOST(1) to EQLOST(100) = IR241(28) to IR241(127); EQLOST(101) to EQLOST(200) = IR242(3) to IR242(102); EQLOST(201) = IR242(109).

c. Output Variables. AGM creates a tape (TAPE4) to be input to routine ANALYS. Each output record consists of two logical records, a nine-word header record identifying the following data record, and a 3000-word data record (matrix) of losses or effects, in terms of either quantities or rates lost or ki-led, corresponding to an equipment type. Only nonzero matrices are output. A complete map of TAPE4 is printed.

d. Logical Flow (Figure VI-4-B-5):

(1) Block 1. Call SETFLE to initialize disk file 1.

(2) Block 2. Call CREATE to create scratch area for 50 matrices on disk file 1.

(3) Block 3. Set EFFR, the transfer array, and QUAN, the accumulator array, to zero.

(4) Block 4. Read the third record of the tape (TAPE2) created by ANCARD. By equivalence statements IUID(I,J), the IUID class table, IRQ(I), the request codes, IEOH(I), the table of equipment types, and INT, the time interval length are read. EOF(2) is not checked. The program will abort with an error message if the ANCARD tape is not valid.

(5) Block 5. Count the number of valid (nonzero) equipment types (NEQTPS) and IUID classes (NROWS).

(6) Block 6. Read the number of period history tapes (NTPS) from the card reader. The format is I10.

(7) Block 7. Read the period history tape (TAPE3) until a record type 241 is encountered followed by record type 242. An unaccompanied record 241 is ignored and search continues until a 241-242 record pair is read. By equivalence statements, the first 100 entries of the array EQLOST are filled. Increment the record counter NR.

(8) Block 8. After each READ statement described in block 7, routine TAPEND is called with EOF(3), NTPS, and an end of job flag (IEOJ) as formal parameters. If no end of file was read, IEOJ=0 is returned. If an end of file was read on the final period history tape, IEOJ=2 is returned. If an end of file was read and there are more tapes to be read, TAPEND requests the next tape and pauses. IEOJ=1 is returned.

(9) Block 9. The IEOJ flag is checked. If it is set to 2, control is transferred to block 15.

(10) Block 10. The remaining 101 entries of EQLOST are defined by replacement and the time of the period history record pair, ITIME, is determined as a function of IR241(1).

(11) Block 11. The record counter NR is checked. If it is greater than one, control is transferred to block 13.

(12) Block 12. The initial time interval is defined to begin at the largest multiple of the time interval length, INT, which is less than or equal to the time of the first period history record pair encountered, MNT, and to end at MXT = MNT + INT.

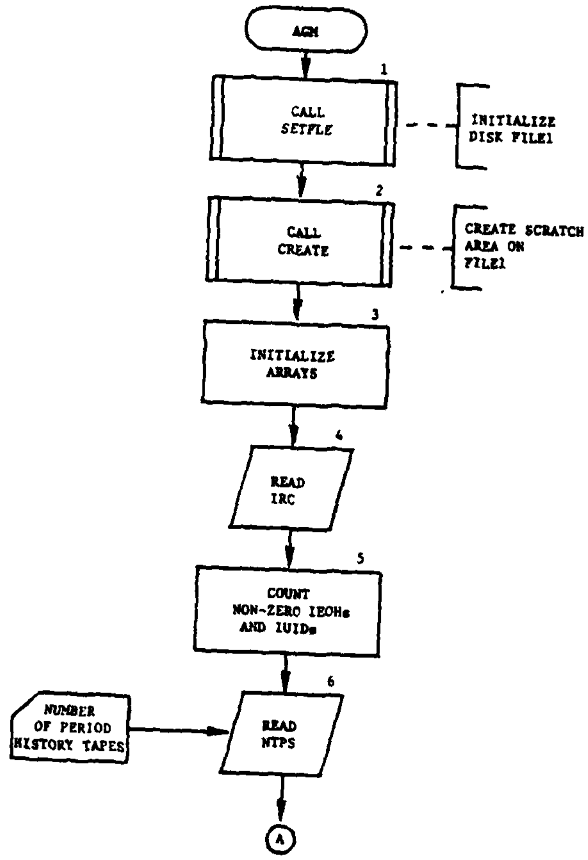


Figure VI-4-B-5. Routine AGM (Continued on Next Page)

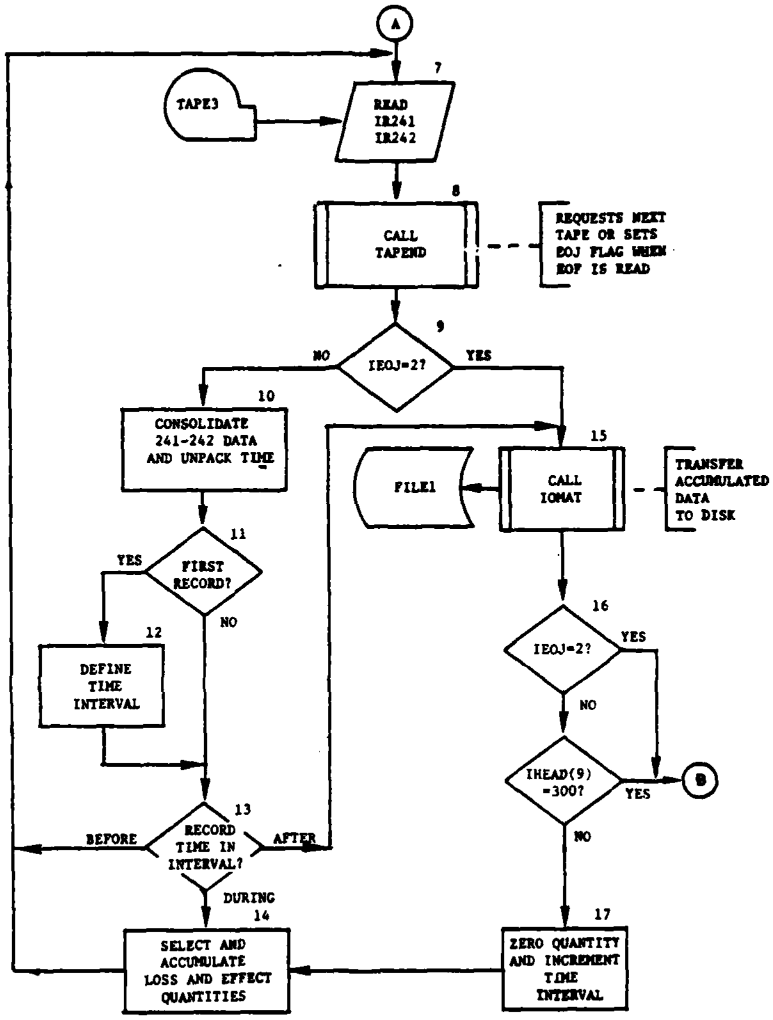


Figure VI-4-B-5. Routine AGM (Continued)

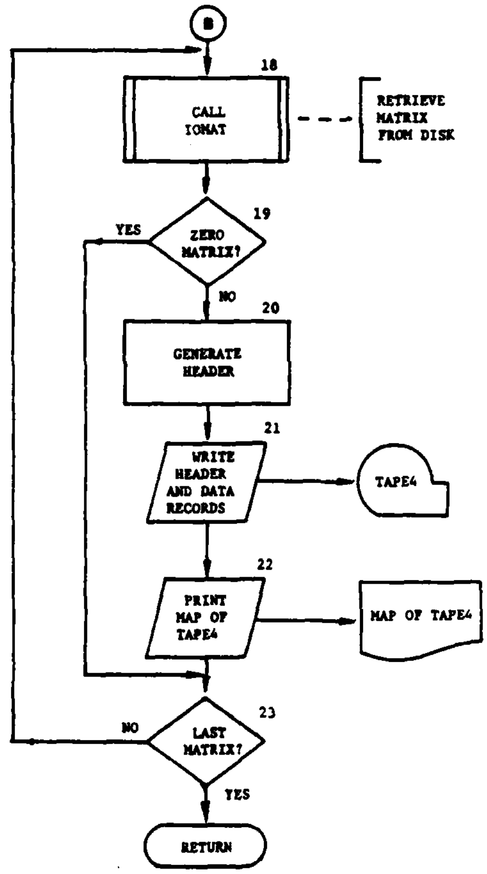


Figure VI-4-B-5. Routine AGM (Concluded)

(13) Block 13. The time of the period history record pair is checked. If it is less than MNT, the control returns to block 7. If it is greater than MXT, the upper bound of the current interval, control is transferred to block 15.

(14) Block 14. Data from array EQLOST are selected and added to the accumulator array, QUAN. Selection criteria are IRQ, the request codes, IEOH, the equipment type codes, and IUID, the IUID class table. After accumulation is complete, control returns to block 7.

(15) Block 15. The accumulated data in QUAN are transferred to EFFR, the transfer array, and routine IOMAT is called to transfer the data in EFFR to disk file 1. The process is repeated for each active matrix.

(16) Block 16. If the IEOJ flag is set to 2, or the column counter, IHEAD(9), is equal to 300, control is transferred to block 18.

(17) Block 17. The array, QUAN, is zeroed, the upper and lower bounds of the time interval, MXT and MNT, are incremented by the value of INT, and the column counter IHEAD(9) is incremented by 1. Control is transferred to block 14.

(18) Block 18. The matrices are retrieved individually from disk file 1 using routine IOMAT.

(19) Block 19. The matrix retrieved in block 18 is checked to insure that it contains nonzero data; if not, control is transferred to block 23.

(20) Block 20. The header array, IHEAD, is generated to identify the matrix in EFFR. If this is a rate matrix, EFFR is multiplied by the reciprocal of INT. A counter for matrices output, NUM, is incremented.

(21) Block 21. IHEAD and EFFR are written on TAPE4.

(22) Block 22. A message identifying the matrix with the value of NUM is printed.

(23) Block 23. If this is not the last matrix requested, control returns to block 18.

7. ROUTINE AFM:

a. Purpose. AFM extracts and accumulates data from the Area Fire period history records and writes them on tape for routine ANALYS.

b. Input Variables. The three sources of input are the card reader, the second record of TAPE2 which was created by routine ANCARD, and selected records type 111-112 from TAPE3.

Name	Source	Contents
NTPS	Card	Number of period history tapes.
IRC(3000)	TAPE2	Input record from TAPE2.
IUID(200,10)		IRC(1) to IRC(2000). UID class table.
IRQ(2)		IRC(2001) and IRC(2000). Loss and effects request codes.
IEOH(25)		IRC(2003) to IRC(2027). Equipment item codes.
INT		IRC(2028). Time interval length (minutes).
IR241(127)	TAPE3	Input period history record type 111.
IR241(1)		Packed time of period history record.
IR241(2)		Period history record type.
IR241(3)		IUID of unit suffering losses.
IR241(7)		IUID of unit inflecting losses.
IR242(109)	TAPE3	Input period history record type 112.
IR242(1)		Packed time of period history record.
IR242(2)		Period history record type.
EQLOST(201)	TAPE3	Quantities of equipment and personnel lost. EQLOST(1) to EQLOST(100) = IR241(28) to IR241(127); EQLOST(101) to EQLOST(200) = IR242(3) to IR242(102); EQLOST(201) = IR242(109).

c. Output Variables. AFM creates a tape (TAPE4) to be input to routine ANALYS. Each output record consists of two logical records, a nine-word header record identifying the following data record and a 3000-word data record (matrix) of losses or effects, in terms of either quantities or rates lost or killed, corresponding to an equipment type. Only nonzero matrices are output. A complete map of TAPE4 is printed.

d. Logical Flow (Figure VI-4-B-6):

(1) Block 1. Call SETFLE to initalize disk file 1.

(2) Block 2. Call CREATE to create scratch area for 50 matrices on disk file 1.

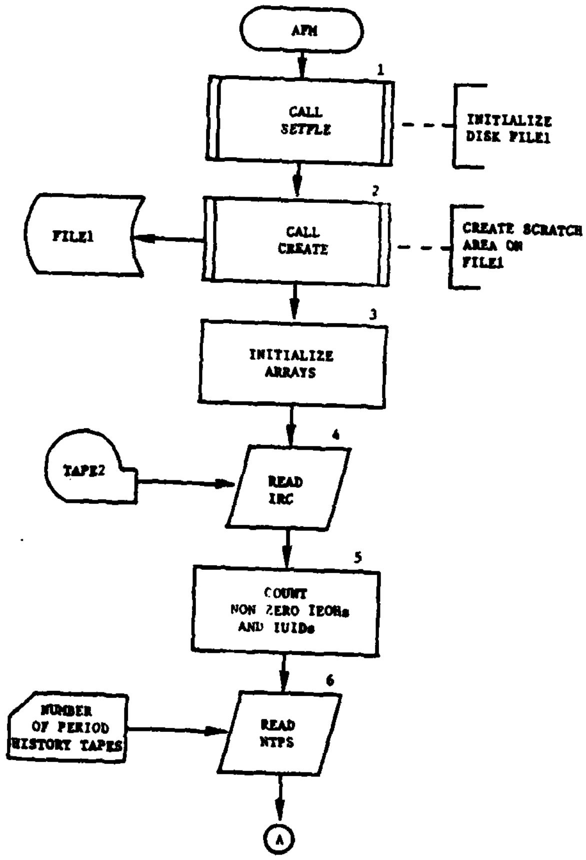


Figure VI-4-B-6. Routine AFM (Continued on Next Page)

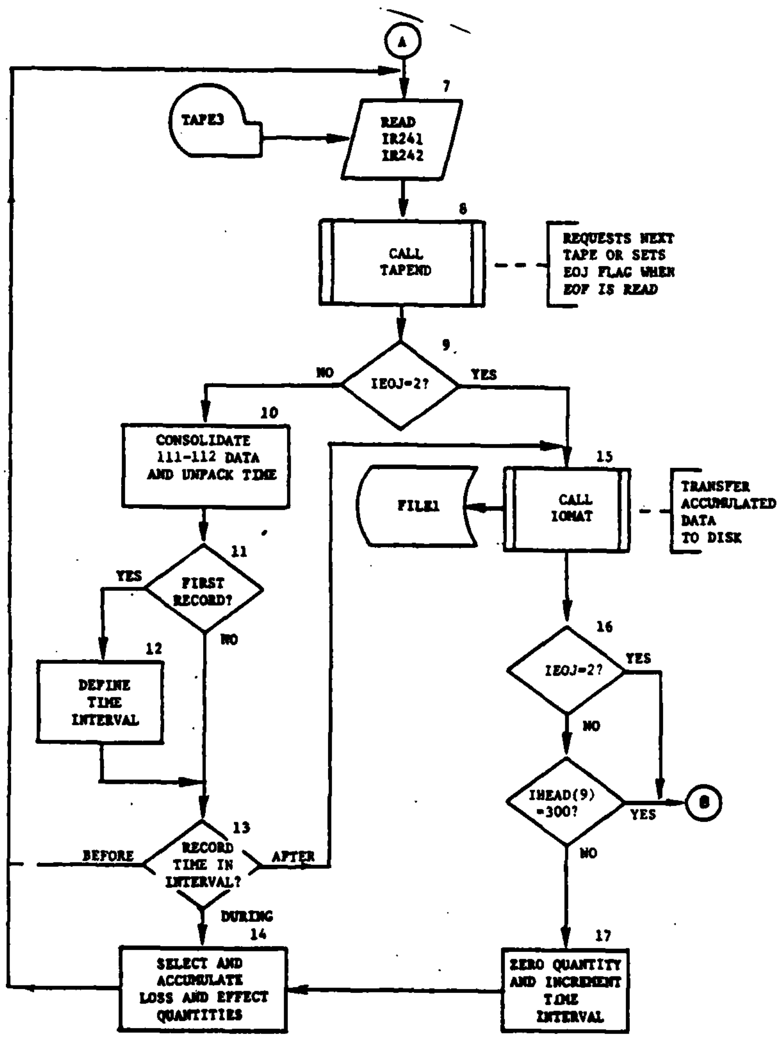


Figure VI-4-B-6. Routine AFM (Continued)

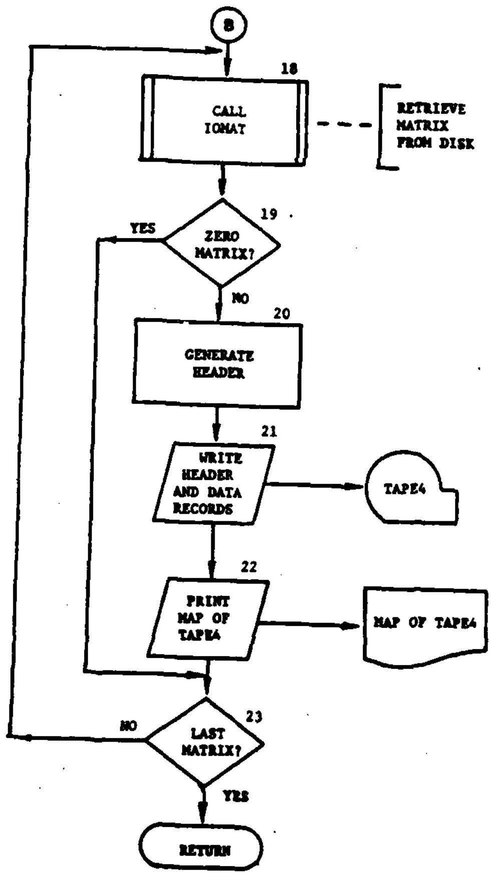


Figure VI-4-B-6. Routine AFM (Concluded)

(3) Block 3. Set EFFR, the transfer array, and QUAN, the accumulator array, to zero.

(4) Block 4. Read the second record of the tape (TAPE2) created by ANCARD. By equivalence statements IUID(I,J), the IUID class table, IRQ(I), the request codes, IEOH(I), the table of equipment types, and INT, the time interval length, are read. EOF(2) is not checked. The program will abort with an error message if the ANCARD tape is not valid.

(5) Block 5. Count the number of valid (nonzero) equipment types (NEQTPS) and IUID classes (NROWS).

(6) Block 6. Read the number of period history tapes (NTPS) from the card reader. The format is I10.

(7) Block 7. Read the period history tape (TAPE3) until a record type 111 is encountered, followed by record type 112. An unaccompanied record 111 is ignored and search continues until a 111-112 record pair is read. By equivalence statements, the first 100 entries of the array EQLOST are filled. Increment the record counter NR.

(8) Block 8. After each READ statement described in block 7, subroutine TAPEND is called with EOF(3), NTPS, and an end of job flag (IEOJ) as formal parameters. If no end of file was read, IEOJ=0 is returned. If an end of file was read and there are more tapes to be read, TAPEND requests the next tape and pauses. IEOJ=1 is returned.

(9) Block 9. The IEOJ flag is checked. If it is set to 2, control is transferred to block 15.

(10) Block 10. The remaining 101 entries of EQLOST are defined by replacement and the time of the period history record pair, ITIME, is determined as a function of IR241(1).

(11) Block 11, The record counter NR is checked. If it is greater than one, control is transferred to block 13.

(12) Block 12. The initial time interval is defined to begin at the largest multiple of the time interval length, INT, which is less than or equal to the time of the first period history record pair encountered, MNT, and to end at MXT = MNT + INT.

(13) Block 13. The time of the period history record pair is checked. If it is less than MNT, the control returns to block 7. If it is greater than MXT, the upper bound of the current interval, control is transferred to block 15.

(14) Block 14. Data from array EQLOST are selected and added to the accumulator array, QUAN. Selection criteria are IRQ, the request codes, IEOH, the equipment type codes, and IUID, the IUID class table. After accumulation is complete, control returns to block 7.

(15) Block 15. The accumulated data in QUAN are transferred to EFFR, the transfer array, and routine IOMAT is called to transfer the data in EFFR to disk file 1. The process is repeated for each active matrix.

(16) Block 16. If the IEOF flag is set to 2, or the column counter, IHEAD(9), is equal to 300, control is transferred to block 18.

(17) Block 17. The array, QUAN, is zeroed, the upper and lower bounds of the time interval, MXT and MNT, are incremented by the value of INT, and the column counter IHEAD(9) is incremented by 1. Control is transferred to block 14.

(18) Block 18. The matrices are retrieved individually from disk file 1 using routine IOMAT.

(19) Block 19. The matrix retrieved in block 18 is checked to insure that it contains nonzero data; if not, control is transferred to block 23.

(20) Block 20. The header array, IHEAD, is generated to identify the matrix in EFFR. If this is a rate matrix, EFFR is multiplied by the reciprocal of INT. A counter for matrices output, NUM, is incremented.

(21) Block 21. IHEAD and EFFR are written on TAPE4.

(22) Block 22. A message identifying the matrix with the value of NUM is printed.

(23) Block 23. If this is not the last matrix requested, control returns to block 18.

8. ROUTINE IOMAT:

a. Purpose. This utility routine is used by the analysis data extractor routines to construct a data matrix scratch file (data file 24). The file is used as a scratch area by the extractor routines in construction of analysis data matrices to conserve computer memory space. It is a DIVWAG data file not related to data file 24 used by other processors.

b. Input Variables:

Name	Source	Contents
MN	Call	Matrix number where data are going to or coming from. (If MN equals zero, the purpose of the call is to zero some or all of the matrices.)
NCOL	Call	Column number where data are going to or coming from. (If NCOL equals zero, data are transferred to or from all columns of matrix MN. If MN equals zero, NCOL is the number of the first matrix to be zeroed.)

Name	Source	Contents
NROW	Call	Row number where data are going to or coming from. (If NROW equals zero, data are transferred to or from all rows of column NCOL. If MN equals zero, NROW is the number of the last matrix to be zeroed.)
IGP	Call	If IGP equals zero, data will be returned to the calling routine from the disk. If IGP equals one, data will be transferred to the disk from the calling routine.
DATA	Call	DATA is the name of the array where the data to be transferred are stored.

c. Output Variables:

Name	Destination	Contents
IER	Call	Error code.
ICALL	Printer	Number of times routine has been called.
ARRAY	DF24	Array where data are to be transferred are stored.

d. Logical Flow (Figure VI-4-B-7):

(1) Block 1. If MN equals zero, the purpose of the call is to zero some or all of the data blocks on the data matrix scratch file. If MN does not equal zero, it is the number of the matrix where the data will be transferred to or from the scratch file.

(2) Block 2. Matrix numbers NCOL through NROW are loaded with zeros in all data locations and the call counter is set equal to zero.

(3) Block 3. Increment the call counter (ICALL) by one. If an error occurs in the routine, ICALL will be printed giving the number of times the routine was called when the error occurred.

(4) Block 4. If NCOL equals zero, data will be transferred to or from the entire matrix. If NCOL is not equal to zero, data will be transferred to or from column number NCOL.

(5) Block 5. The data block number is determined from the matrix number and column number, and the data from this block are retrieved. Each data block contains three columns.

(6) Block 6. The get-put code (IGP) determines whether the data goes to the calling routine from the scratch file (IGP=0) or to the scratch file from the calling routine (IGP=1).

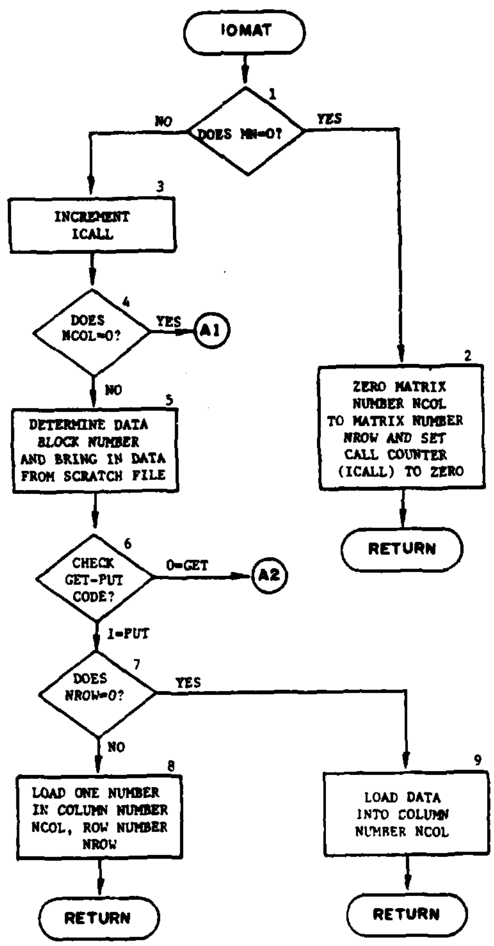


Figure VI-4-B-7. Routine IOMAT (Continued on Next Page)

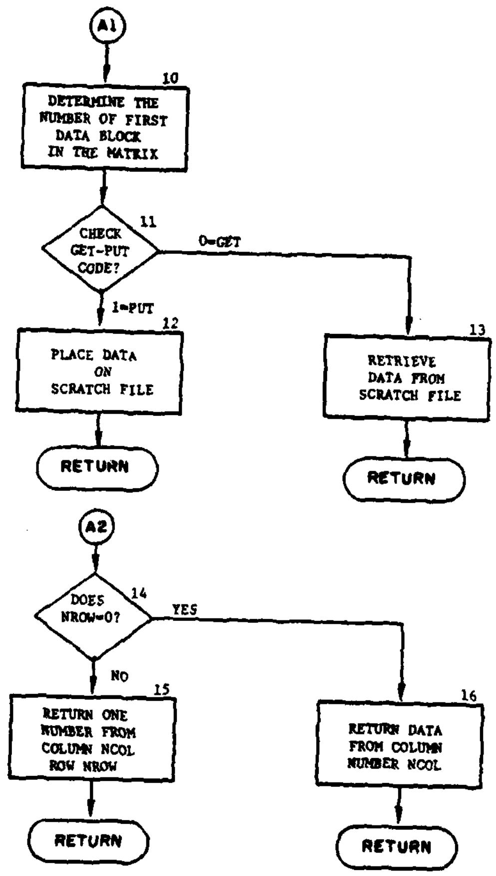


Figure VI-4-B-7. Routine IOMAT (Concluded)

(7) Block 7 and 8. If NROW is not equal to zero, one number is entered in the appropriate place in the data block and the data are placed in the scratch file.

(8) Block 9. If NROW equals zero, a column of data are loaded into the appropriate place in the data block and the data are placed in the scratch file.

(9) Block 10. The number of the first data block to be transferred is determined.

(10) Blocks 11 and 12. If the get-put code (IGP) equals one, the data for one matrix are placed in the scratch file.

(11) Block 13. If the get-put code equals zero, the data from one matrix are retrieved from the scratch file and returned to the calling routine.

(12) Block 15. If NROW does not equal zero, the data in column NCOL, row NROW are returned to the calling routine.

(13) Block 16. If NROW equals zero, the data in column NCOL are returned to the calling routine.

9. ROUTINE TAPEND:

a. Purpose. This is a utility routine which checks for end of tape. If more tapes are to be read, it rewinds and pauses.

b. Input Variables:

Name	Source	Contents
EOF	Call	System EOF(3).
NTPS	Call	Number of input tapes .

c. Output Variables:

Name	Destination	Contents
N	Call	N=0, No EOF read; N=1, next tape mounted; N=2, EOJ.

d. Logical Flow. TAPEND checks the system EOF function after each binary READ of TAPE3. If an end of file was read, TAPEND compares the number of tapes read (NTPSR) to the number of input tapes (NTPS). If there is at least one more tape to be read, TAPEND rewinds the tape, requests the next tape be mounted, and pauses.

10. ROUTINE ERROR:

a. Purpose. Routine ERROR is called only if an error occurs in disk input/output. ERROR prints the error code (IER) and terminates execution of the program.

b. Input Variables:

Name	Source	Description
IER	Call	Error code.
N	Call	Location code.

11. ROUTINE NINELD:

a. Purpose. Routine NINELD loads nines into trailing null entries of matrix rows.

b. Input Variables:

Name	Source	Description
NROW	Call	Number of rows in matrix.
NCOL	Call	Number of columns in matrix.
XY	Call	Matrix array.

c. Output Variables

Name	Destination	Description
XY	Call	Matrix array with nines loaded.

12. ROUTINE SETUP:

a. Purpose. Routine SETUP initializes the file name table and disk scratch file (file 1) used by the extractor programs AFM, AGM, and GCMOD.

b. Input Variables:

Name	Source	Description
NWRDS	Call	Number of words of mass storage area to be initialized.

c. Output Variables:

Name	Destination	Description
IFNT(56,3)	ONE	File name table.
MTAB(2)	MSTBL	Pointer index.
IBUF(1023)	FILE1	Zero array.

d. Logical Flow (Figure VI-4-B-8):

(1) Block L1. The IFNT table is zeroed.

(2) Block L2. The array IBUF(1023) is zeroed.

(3) Block 3. Disk FILE1 is opened by calling system routine OPENMS.

(4) Block 4. The number of physical record units (IPRU) required to store NWRDS words is calculated.

(5) Block 5. IPRU records of FILEI are zeroed.

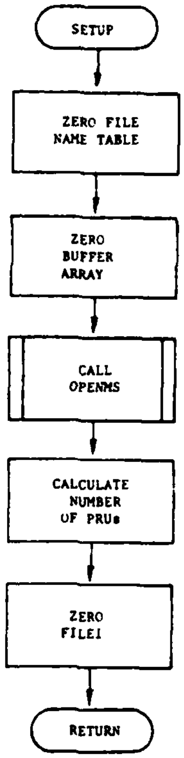


Figure VI-4-B-8. Routine SETUP

APPENDIX C

OUTPUT DESCRIPTIONS OF ANALYSIS MATRIX FORMULATION ROUTINES

1. INTRODUCTION. Routine ANCARD reads, interprets, and reformats data from input cards containing input values for extractor routines, AFM, AGM, and GCMOD. ANCARD also writes the data to a file that is read by these routines. The extractor routines extract and cumulate data from abbreviated period history tapes and output the data to tape in the form of matrices. If null data are extracted, zero matrices are accumulated. Routines AFM and AGM do not output zero matrices; thus, it is not possible to determine, a priori, the number of matrices with nonzero data that will be output. Routine GCMOD does output zero matrices, and the number of matrices that it will output is determined by the input passed from ANCARD. Routines AFM and AGM therefore print a list of output matrices; routine GCMOD does not. A figure depicts the format of each routine's output. In the figure an alphabetical descriptor designates an appropriate line or group of lines that is explained in the following paragraphs.

2. ROUTINE ANCARD. Figure VI-4-C-1 shows the printed output of this routine.

Output Descriptor	Explanation
A	Images of the input cards are printed
B	An end message is printed indicating completion of the routine.

3. ROUTINE AFM. The format for the Area Fire Model extractor routine is shown in Figure VI-4-C-2.

Output Descriptor	Explanation
A	A page heading is printed.
B	A list of output matrices is printed. The matrix is identified by an EI # (matrix number) and described by its type (L.Q.'S = loss quantities, L.R.'S = loss rates, E.Q.'S = effect quantities, E.R.'S = effect rates) and the equipment item code to which it pertains.
C	A brief description of the matrices, including the number of nonzero matrices, the size of the matrices, the number of matrices accumulated, the number of zero matrices, and the number of area fire assessment records examined by the routine is printed.

4. ROUTINE AGM. The output of AGM, the Air Ground Engagement Model extractor routine presented in Figure VI-4-C-3, is similar to that of routine AFM. The

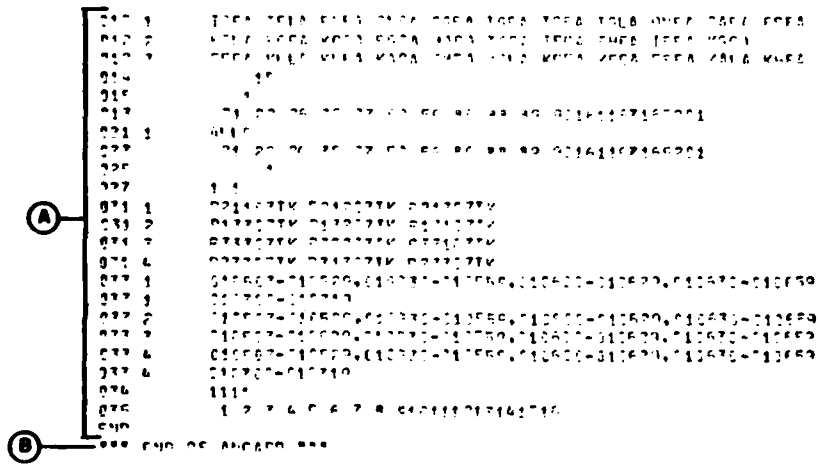


Figure VI-4-C-1. Printed Output of Routine ANCARD

```
(A)—A R E A   F I R E   E X T R A C T O R

     FT #  1 IS F.R.'S OF EQ TYPE  21.
     FT #  2 IS F.R.'S OF EQ TYPE  22.
     FT #  3 IS F.R.'S OF EQ TYPE  35.
(B)  FT #  4 IS F.R.'S OF EQ TYPE  50.
     FT #  5 IS F.R.'S OF EQ TYPE 151.
     FT #  6 IS F.R.'S OF EQ TYPE 157.
     FT #  7 IS F.R.'S OF EQ TYPE 201.

      7 3000-WORD RECORDS, EACH PRECEDED BY A 9-WORD
     HEADER RECORD, HAVE BEEN WRITTEN ON MAGNETIC TAPE.
     EACH 3000-WORD RECORD CONTAINS A  3 BY  10 MATRIX
(C)  CORRESPONDING TO THE LOSSES OF OR EFFECTS ON (IN
     TERMS OF EITHER QUANTITIES OR RATES) AN EQUIPMENT
     TYPE.  15 MATRICES WERE REQUESTED.   8 CONTAINED
     NULL DATA. DATA WAS EXTRACTED FROM  346 PERIOD
     HISTORY RECORD TYPE 111-112 PAIRS.
```

Figure VI-4-C-2. Printed Output from Routine AFM

```
(A)—A I R   G R O U N D   E X T R A C T O R

     FT #  1 IS F.Q.'S OF EQ TYPE  22.
(B)  FT #  2 IS F.Q.'S OF EQ TYPE  35.
     FT #  3 IS F.Q.'S OF EQ TYPE 151.
     FT #  4 IS F.Q.'S OF EQ TYPE 201.

      4 3000-WORD RECORDS, EACH PRECEDED BY A 9-WORD
     HEADER RECORD, HAVE BEEN WRITTEN ON MAGNETIC TAPE.
     EACH 3000-WORD RECORD CONTAINS A  1 BY  87 MATRIX
(C)  CORRESPONDING TO THE LOSSES OF OR EFFECTS ON (IN
     TERMS OF EITHER QUANTITIES OR RATES) AN EQUIPMENT
     TYPE.  30 MATRICES WERE REQUESTED.  26 CONTAINED
     NULL DATA. DATA WAS EXTRACTED FROM    5 PERIOD
     HISTORY RECORD TYPE 241-242 PAIRS.
```

Figure VI-4-C-3. Printed Output from Routine AGM differences in format are in the page heading and the record types of the period history records examined.

5. ROUTINE GCMOD. Figure VI-4-C-4 shows the output of GCMOD, the Ground Combat Model extractor routine.

Output Descriptor	Explanation
A	The unit identifications of the simulation units in each class, which define the rows of the matrices, are printed.
B	The time intervals for each class, which define the columns of the matrices, are printed.
C	A brief description of each period history record from which data was extracted is printed. The description includes the unit identification record numbers of the combat units and the time interval of the battle segment that the record describes.
D	The number of period history tapes processed and the total number to be processed are printed each time a tape is processed.

```
   CLASS  1
    P21137TK  P21237TK  P21307TK

   CLASS  2
    R13337TK  R13297TK  R13107TK
(A)
   CLASS  3
    R3130ZTK  P32297TK  P32197TK

   CLASS  4
    P23397TK  R3130ZTK  P23312TK

   CLASS  1 TIME INTERVALS
     10593- 10529  10530- 10559  10630- 10629  10630- 10659  10700- 10719     0-    0     0-    0     0-    0     0-    0

   CLASS  2 TIME INTERVALS
(B)  10593- 10529  10530- 10559  10600- 10629  10630- 10659     0-    0     0-    0     0-    0     0-    0     0-    0

   CLASS  3 TIME INTERVALS
     10503- 10529  10530- 10559  10630- 10629  10630- 10559     0-    0     0-    0     0-    0     0-    0     0-    0

   CLASS  4 TIME INTERVALS
     10593- 10529  10530- 10559  10600- 10629  10630- 10659  10700- 10719     0-    0     0-    0     0-    0     0-    0

   DATA EXTRACTED FROM KILLER-VICTOM RECORD FOR 837 VS 213  TIME  10630- 10645
   DATA EXTRACTED FROM KILLER-VICTOM RECORD FOR 213 VS 837  TIME  10630- 10645
(C)DATA EXTRACTED FROM KILLER-VICTOM RECORD FOR 806 VS 223  TIME  10700- 10715
   DATA EXTRACTED FROM KILLER-VICTOM RECORD FOR 223 VS 806  TIME  10700- 10715
   DATA EXTRACTED FROM KILLER-VICTOM RECORD FOR 807 VS 223  TIME  10700- 10715
   DATA EXTRACTED FROM KILLER-VICTOM RECORD FOR 223 VS 807  TIME  10700- 10715
(D)--1 TAPES HAVE BEEN PROCESSED. THERE ARE A TOTAL OF  1 TO BE PROCESSED.
```

Figure VI-4-C-4. Printed Output from Routine GCMOD

APPENDIX D

SOURCE LISTINGS FOR ANALYSIS OUTPUT PROCESSOR ANALYSIS MATRIX FORMULATION

(AVAILABLE UNDER SEPARATE COVER)

CHAPTER 5

ANALYSIS ROUTINES

1. INTRODUCTION. The purpose of the statistical analysis routines is to display, correct, and analyze the data extracted from the period history tapes. Routine MTXMRG displays the matrices. Routine MTXUP is used to present data in a format amenable to particular analyses. Its function is to selectively suppress data of no interest to the game analyst. Routine ANALYS performs a rank ordering analysis on the data to obtain performance rankings of the unit classes.

2. ROUTINE MTXMRG. Routine MTXMRG prints the matrices of data, and, if more than one file of matrices is input, combines the input files into a single output file. No calculations are performed. The identifying leader records preceding each matrix record are interpreted and printed, and the matrices are printed for inspection.

3. ROUTINE MTXUP. It may be desired to evaluate certain data points. As an example, refer to the three matrices of Blue force artillery unit effects against tanks, APCs, and personnel discussed in Chapter 4. If the first entry in the first row of both the tank and APC-kill matrices is zero, and inspection of the Period Processor printouts shows that none of the units in the first class received orders to fire at tanks during the time interval described by the first column of the matrices, but three of the units fired at APCs at least once during this interval, the zero entry in the matrix of APC-kills is a significant data point; but, the zero entry in the matrix of tank kills is not significant and should not be considered in the analysis. MTXUP is used to replace the nonsignificant zero entries with null numbers that will not be used in the statistical analysis. Any number equal to or greater than 99999.0 is considered to be a null number by the statistical analysis routines.

4. ROUTINE ANALYS. Routine ANALYS performs both a parametric and a non-parametric analysis of variance. For each effectiveness indicator (matrix) of interest the relative performance of the classes of simulation units is examined. The null hypothesis that there is no significant difference in performance among the classes is made and tested. If the null hypothesis is rejected, the nonparametric analysis of variance, a Nemeni, a postori, pairwise testing scheme, yields rankings of the performance of the classes. These rankings, for several effectiveness indicators, are subjected to Friedman analysis and a Nemeni two-way pairwise test to determine final rankings.

APPENDIX A

INPUT REQUIREMENTS FOR ANALYSIS PROGRAMS

1. INTRODUCTION. This appendix contains a description of card and tape inputs required to execute the analysis routines MTXMRG, MTXUP, and ANALYS.

2. ROUTINE MTXMRG:

a. Card Input. A single card is optional input to routine MTXMRG. The card contains one value, the number of tapes to be input to the routine. This value is entered, right justified in columns 4 and 5 of the card. The card may be omitted if the number of input tapes is one.

b. Tape Input. Any number of tapes generated by the extractor programs, AFM, AGM, and GCMOD, are input to routine MTXMRG.

3. ROUTINE MTXUP:

a. Card Input. A number-of-tapes card and any number of update data cards are input for routine MTXUP. These card types are described in the following subparagraphs.

(1) Number-of-Tapes Card. The number of tapes to be input is entered in columns 4 and 5.

(2) Update Data Card. Five values are entered on each update data card. They are the output record number (EI number) of the matrix to be updated (columns 1-5). The model code--01, 02, or 03--of the extractor program which created the record (columns 6-10), the column (columns 11-15) and row (columns 16-20) of the zero entry in the matrix to be updated, and the new value of the entry (columns 23-27). All values must be right justified in the indicated columns. The update cards must be sequenced in ascending order by output record number. Figure VI-5-A-1 shows an example of an update card.

b. Tape Input. Any number of tapes generated by the extractor routines or routine MTXMRG are input to routine MTXUP.

4. ROUTINE ANALYS:

a. Card Input. Routine ANALYS requires a number-of-tapes card and two data cards per effectiveness measure partition for each partition to be calculated. These input cards are described in the following subparagraphs.

(1) Number-of-Tapes Card. This card indicates the number of tapes to be input in columns 4 and 5.

MTXUP UPDATE						
EI (MATRIX) NUMBER	MODEL NUMBER	COLUMN NUMBER	ROW NUMBER		NEW VALUE	
7	01	7	5		99999	

Figure VI-5-A-1. Update Data Card for Routine MTXUP

(2) Data Cards. For each effectiveness measure partition, a card indicating the effectiveness measure number (columns 3-4) and the output record numbers of the matrices (effectiveness indicator number) which make up the partition (columns 11-13, 14-16,..., 68-70), and a card indicating the desired level of confidence (alpha level) must be input. The level is indicated by the following code numbers in column 5 of the card:

Code	Alpha Level
1	0.10
2	0.20
3	0.30
4	0.40
5	0.50

All input values are right justified in the indicated columns of the cards. See Figure VI-5-A-2 for an example of the first card type described above.

b. Tape Input. Any number of tapes generated by the extractor programs and/or routines MTXMRG, MTXUP are input to routine ANALYS.

ANALYS

EFFECTIVENESS MEASURE NUMBER		EFFECTIVENESS INDICATOR (OUTPUT RECORD) NUMBERS																				
1		1	2	5	7	19	29															

Figure VI-5-A-2. Input Card For Routine ANALYS

AD-A112 654 ARMY COMBINED ARMS COMBAT DEVELOPMENTS ACTIVITY FORT--ETC F/G 15/7
DIVWAG MODEL DOCUMENTATION. VOLUME II. PROGRAMMER/ANALYST MANUA--ETC(U)
JUL 76

UNCLASSIFIED CACDA-TR-8-76-VOL-2-PT-5 NL

4 of 6

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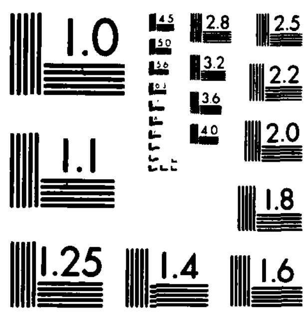
A112654



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

APPENDIX B

ANALYSIS ROUTINES PROGRAM DESCRIPTIONS

1. INTRODUCTION. The statistical calculations described in Chapter 5, Analysis Routines, are performed by the group of routines presented in this appendix. The entire statistical calculation package is run independently under control of the driving routine ANALYS. MTXMRG and MTXUP, two additional independently-run routines, may be used at the analyst's option, but neither is mandatory.

2. ROUTINE MTXMRG:

a. Purpose. The MTXMRG (matrix merge) routine consolidates several output tapes from the Area Fire, Air Ground Engagement, and Ground Combat data extractor routines onto as few tapes as possible.

b. Input Variables:

Name	Source	Contents
NTAPE	Card	Number of input tapes to be processed.

c. Output Variables. Merged output tape.

d. Logical Flow (Figure VI-5-B-1):

(1) Block 1. The number of tapes to be processed is read from a data card.

(2) Block 2. The nine-word header which precedes each data record is read from the input tape.

(3) Block 4. If an end of file or end of device was detected while reading the tape, a check is made to determine if more input tapes are to be processed.

(4) Block 5. If another tape is to be processed, the execution of the program is stopped while the next input tape is mounted. The program then returns to block 2.

(5) Block 6. If an end of file or end of device was not detected at block 3, the data record is read.

(6) Block 7. If an end of file or end of device was detected while reading data, control goes to block 8; otherwise, control goes to block 11.

(7) Block 8. If an end of file or end of device was detected while reading the data record, a check is made to determine if more input tapes are to be processed.

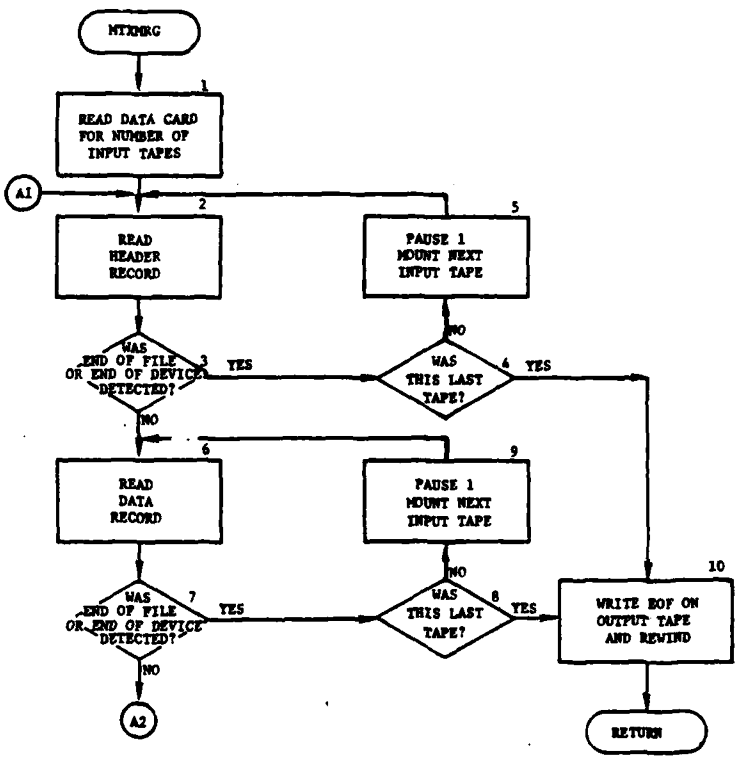


Figure VI-5-B-1. Routine MTXMRG (Continued on Next Page)

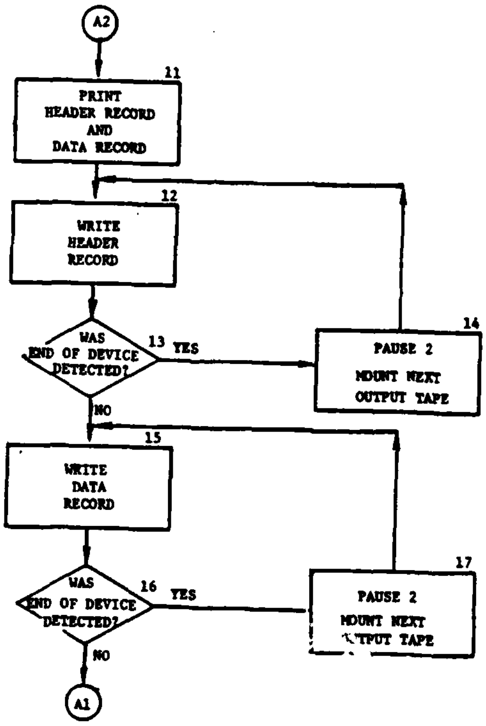


Figure VI-5-B-1. Routine MTXMRG (Concluded)

(8) Block 9. If another tape is to be processed, the execution of the program is stopped while the next input tape is mounted. The program the returns to block 6.

(9) Block 10. When all tapes have been processed, an end of file mark is written on the output tape and it is rewound.

(10) Block 11. The information in the header record and the data record is printed so that it can be inspected.

(11) Block 12. The header record is written to the output tape.

(12) Block 13. If an end of device was detected while writing the header, control goes to block 14.

(13) Block 14. If an end of device was detected, the program is stopped while another output tape is mounted. The program then returns to block 12.

(14) Block 15. If an end of device was not detected, the data record is written to the output tape.

(15) Block 16. If an end of device was not detected in the last buffer operation, the next header record is read at block 2.

(16) Block 17. If an end of device was detected, the program is stopped while another output tape is mounted. The program then returns to block 15.

3. ROUTINE MTXUP:

a. Purpose. The MTXUP (matrix update) routine allows numbers in a matrix to be changed.

b. Input Variables:

Name	Source	Contents
NTAPE	Card	Number of tapes to be read.
IREC	Card	Number of matrix to be changed.
MOD	Card	Model number of routine which generated matrix to be changed; 1 = Area Fire, 2 = Air Ground, 3 = Ground Combat.
NCOL	Card	Number of column where change is to be made.
NROW	Card	Number of row where change is to be made.
ENTRY	Card	New value to be entered.

c. Output Variables:

Name	Destination	Contents
NREC	Print	Number of matrix being changed.
IHEAD	Print	Header information.
J	Print	Column number.
DATA	Print	Matrix data.

d. Logical Flow (Figure VI-5-B-2):

(1) Block 1. A data card is read giving the number of input tapes to be read.

(2) Block 2. The next data card is read giving the location and new value of the first change.

(3) Block 3. The header record preceding each data matrix is read.

(4) Block 4. The status of the last read operation is checked.

(5) Block 5. If an end of file or end of device was detected, the number of input tapes is checked to see if all have been read.

(6) Block 6. If another tape is to be read, the program is stopped while the next tape is mounted.

(7) Block 7. The data matrix is read.

(8) Block 8. The status of the last read operation is checked.

(9) Block 9. If an end of file or end of device was detected, the number of input tapes is checked to see if all have been read.

(10) Block 10. If another tape is to be read, the program is stopped while the next tape is mounted.

(11) Block 11. If no more tapes are to be read, an end of file is written on the output tape and it is rewound.

(12) Block 12. If this matrix is to be changed, control goes to block 13. Otherwise, control goes to block 17.

(13) Block 13. When the matrix to be changed is read, the contents of the data card are printed out and the change is made.

(14) Block 14. The next data card is read.

(15) Block 15. If the same matrix is to be changed again, return to block 13.

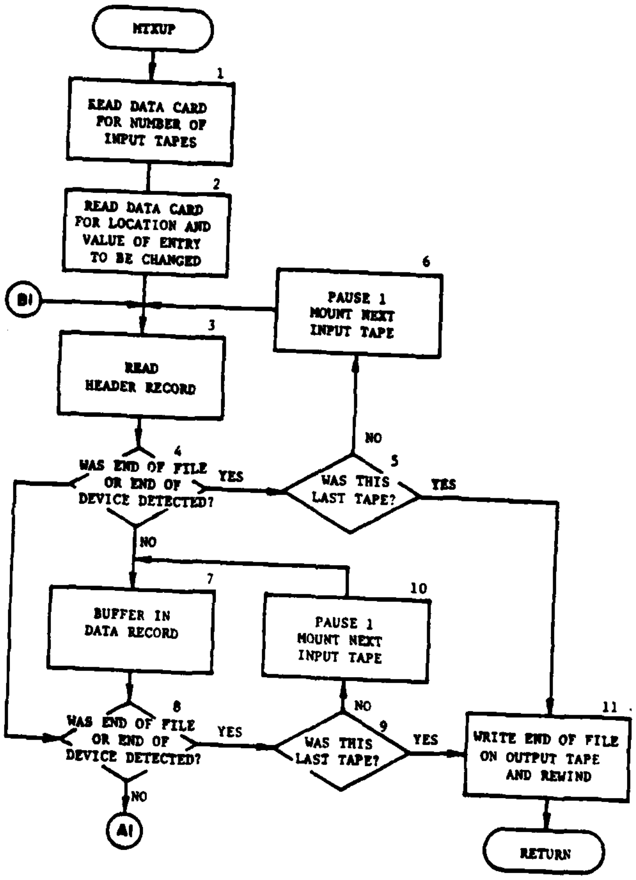


Figure VI-5-B-2. Routine MTXUP (Continued on Next Page)

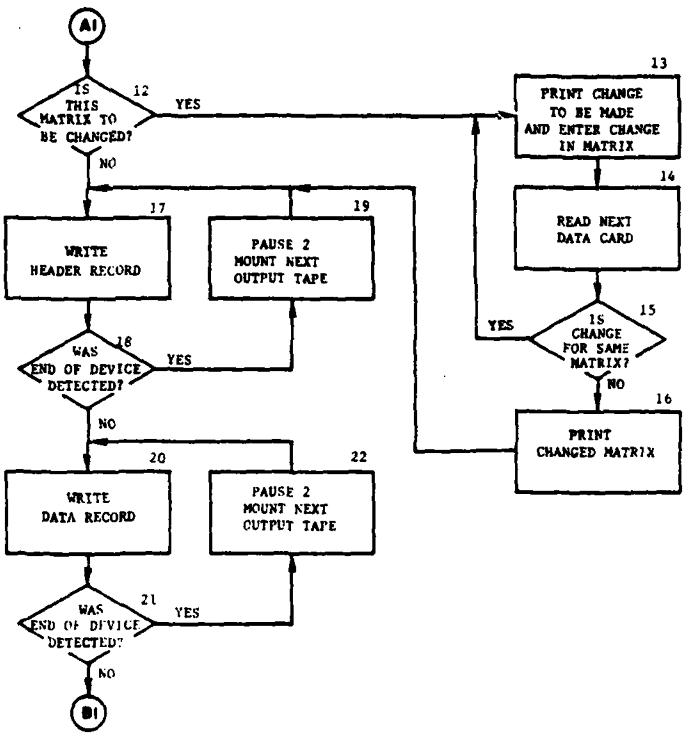


Figure VI-5-B-2. Routine MTXUP (Concluded)

(16) Block 16. If the next change is for another matrix, print the changed matrix and go to block 17.

(17) Block 17. Write header record on output tape.

(18) Blocks 18 and 19. If an end of device was detected in last write operation, pause while the next output tape is mounted. Control then returns to block 17.

(19) Block 20. Write data record on output tape.

(20) Blocks 21 and 22. If an end of device was detected in last write operation, pause while the next output tape is mounted. Control then returns to block 20.

4. ROUTINE ANALYS:

a. Purpose. This routine is the controlling routine of the analysis subsystem.

b. Input Variables:

Name	Source	Contents
NTAPES	Card	Number of input tapes.
IEM	Card	Effectiveness measure.
IEI	Card	List of matrices to be considered as part of the above effectiveness measure.
ILEV	Card	Significance level.
IHEADR	TAPE10	Header record describing the following matrix record.
X	TAPE10	Array containing matrix values.

c. Output Variables:

Name	Destination	Contents
MSSG	Print	Classes for each row of printed matrix.
X	Print	Array containing matrix values.
RANK	Print	Array containing relative rank of each entry in the matrix.
RANKSM	Print	Sum of ranks of each matrix row.
MEANSM	Print	The mean sum of the ranks of each matrix row.

d. Logical Flow (Figure VI-5-B-3):

(1) Block 1. The null hypothesis counter, effectiveness measure counter, matrix counter, tape counter, and record counter are initialized. The number of input tapes (NTAPES), the effectiveness measure (EM), and the matrix numbers (IEI) for that effectiveness measure are read, and the significance level (ILEV) is read.

(2) Block 2. The number of matrices requested for the input effectiveness measure is computed.

(3) Block L5. A header record is input from TAPE10 and the number of rows and columns for the matrix is extracted. If the input matrix number is greater than the one requested, an error condition exists and the program is stopped. If the input matrix number is less than the one requested control passes the next record and returns to the beginning of the block to input the next header record; however, if the record input is the one requested control goes to block L7.

(4) Block L7. Initialize TIE counter and matrix array. The header record is examined to determine the characteristics of the matrix array. These characteristics are printed to identify the matrix.

(5) Block L26. The matrix to be analyzed is input and listed.

(6) Block 3. A call is made to routine FRGFIT.

(7) Block 4. The matrix entries are ranked from largest to smallest, their ranks are placed in a corresponding RANK matrix, and this matrix is printed. The sum, mean sum, and square sum of each row of the RANK matrix are computed, and the sum and square are printed.

(8) Block 5. The mean sums of each row are sorted and printed.

(9) Block 6. A call is made to routines CALCH and PAIR.

(10) Block 7. If additional matrices are to be processed for this effectiveness measure, go to block L5. If all matrices have been processed, reinitialize the matrix counter and null hypothesis counter. Read the next effectiveness measure and corresponding matrix numbers, compute the number of matrices, read the new effectiveness indicator, and go to block L5.

5. ROUTINE CALCH:

a. Purpose. Routine CALCH calculates the Kruskal-Wallis statistic.

b. Input Variables:

Name	Source	Contents
NRO	COM	Number of rows in matrix.
RSUMSQ	COM	Mean rank sum squared.

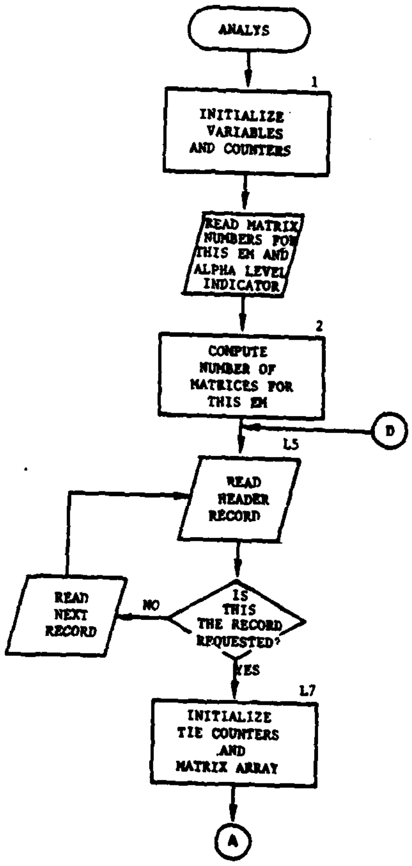


Figure VI-5-B-3. Routine ANALYS (Continued on Next Page)

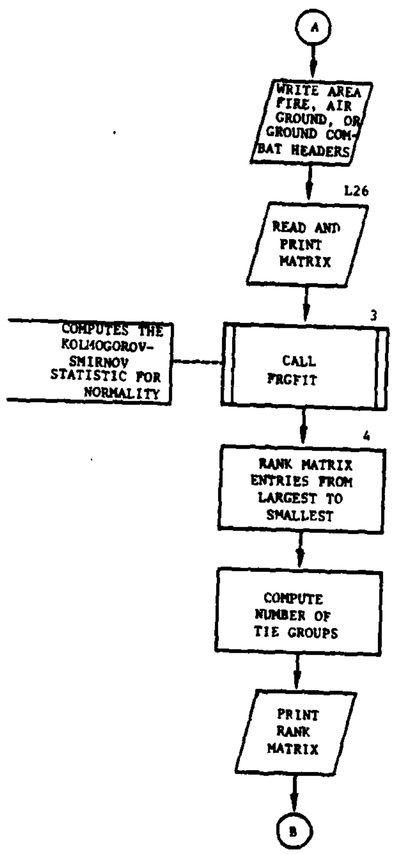


Figure VI-5-B-3. Routine ANALYS (Continued)

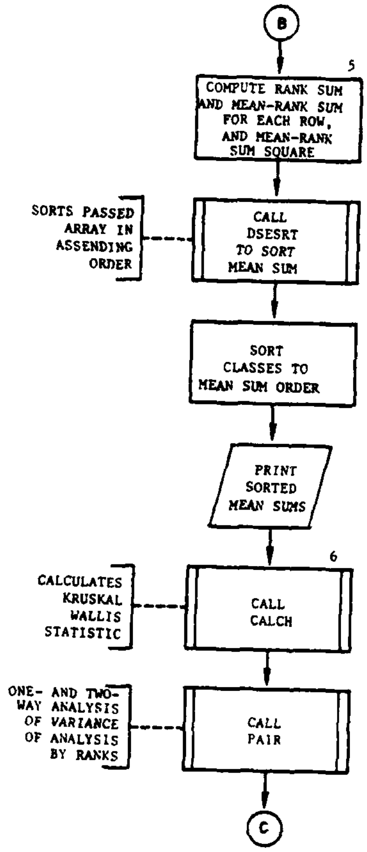


Figure VI-5-B-3. Routine ANALYS (Continued)

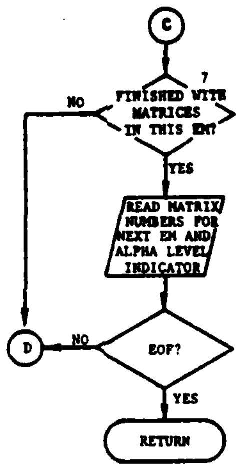


Figure VI-5-B-3. Routine ANALYS (Concluded)

Name	Source	Contents
NTOT	COM	Total number of entries in matrix.
RTIE	COM	TIE correction.

c. Output Variables:

Name	Destination	Contents
H	COM	Kruskal-Wallis statistic.

d. Logical Flow (Figure VI-5-B-4):

(1) Block 1. Using the mean sum squared of each row of the RANK matrix, compute the sum of these mean rank sums squared.

(2) Block 2. Using the mean rank sum squared, the total number of entries in the matrix, and the TIE correction, compute the Kruskal-Wallis statistic.

6. ROUTINE PAIR:

a. Purpose. Routine PAIR applies the Nemenyi one-way analysis test and the Friedman two-way analysis test for testing the null hypothesis that a number of related samples were drawn from the same number of identically distributed populations.

b. Input Variables:

Name	Source	Contents
ILEV	COM	Significance level.
MN	COM	Number of rows in matrix.
ISIG	DATM	Alpha value.
H	COM	Kruskal-Wallis statistic.
MEANSM	COM	Mean sum of each matrix row.
SRTCT	COM	Number of entries in matrix row.
NTOT	COM	Total number of entries in matrix.
NOMAT	COM	Total number of matrices in effectiveness measure.
NK	COM	Matrix number in effectiveness measure.

c. Output Variables:

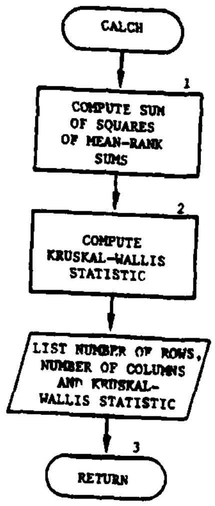


Figure VI-5-B-4. Routine CALCH

Name	Destination	Contents
BEE	COM	Friedman matrix.
R	COM	Ordinal rank array of mean sums.
AVSUM	COM	Mean for each row of Friedman matrix.
BSUM	COM	Sum of the elements of each row of the Friedman matrix.

d. Logical Flow (Figure VI-5-B-5):

(1) Block 1. Initialize pointers and counters. The alpha value is retrieved from the ISIG table using the significance level indicator as an index.

(2) Blocks 2 and 3. If the Kruskal-Wallis statistic is greater than the alpha value do not accept the null hypothesis and control goes to block L14. If the null hypothesis was accepted, increment the null hypothesis counter for this effectiveness measure and initialize the Friedman matrix array for this matrix.

(3) Block 4. If this is the last matrix in this effectiveness measure control goes to block L1119; otherwise, returns to the calling routine.

(4) Block L1119. If the null hypothesis was accepted for all the matrices in this effectiveness measure return to the calling routine; otherwise, control goes to block L501.

(5) Block L14. Initialize variables for the pairwise testing scheme.

(6) Block 5. If two-way analysis of variance by ranks is now required, control is transferred to block L5000.

(7) Block L15. The left limit of the scan for the pairwise testing scheme is set.

(8) Block L1500. The right limit of the scan for the pairwise testing scheme is set.

(9) Block L1501. If the ranks are tied for this set, control goes to L40.

(10) Blocks L20, 6, and 7. If the last index of the test group has changed, a check is made to determine whether the testing is complete. If so, control goes to block L65. If the testing is not complete, control returns to block L15 for one-way testing or to block L5000 for two-way testing.

(11) Blocks L40, 8, 9, and 10. The new Nemenyi one-way average ranks from this set are calculated. If there are more sets to be tested for this matrix, the variable pointers are reset and control returns to block L15 for one-way analysis or to block L5000 for two-way analysis; otherwise, control goes to block L65.

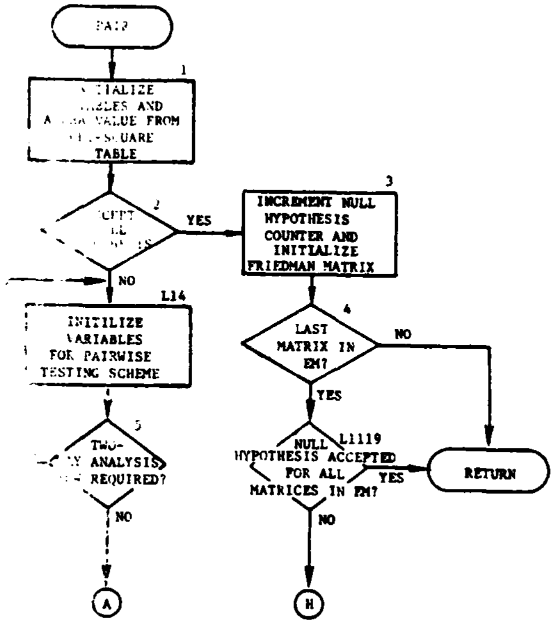


Figure VI-5-B-5. Routine PAIR (Continued on Next Page)

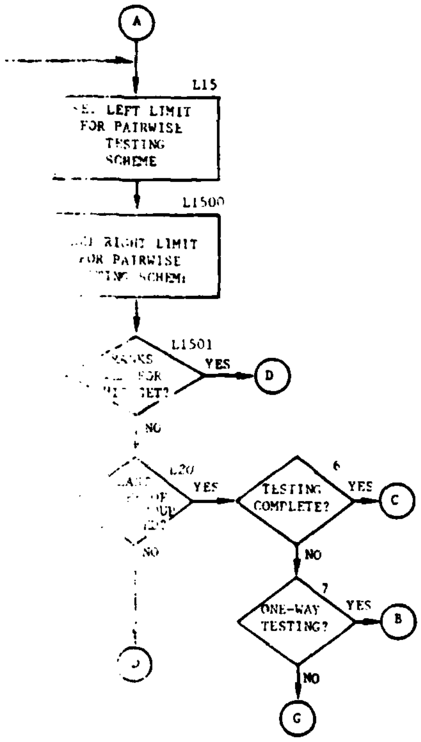


Figure VI-5-B-5. Routine PAIR (Continued)

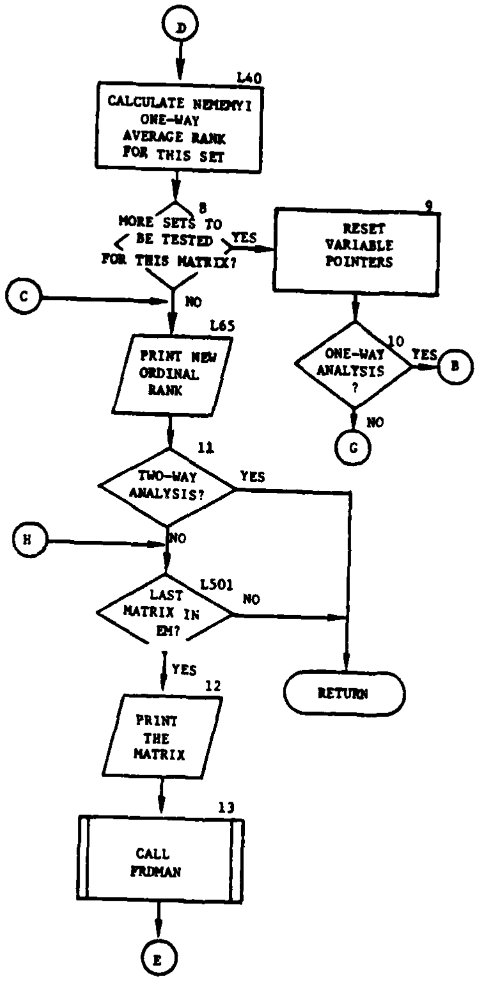


Figure VI-5-B-5. Routine PAIR (Continued)

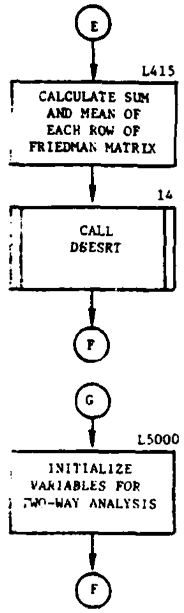


Figure VI-5-B-5. Routine PAIR (Concluded)

(12) Blocks L65, and 11. Print the new ordinal rank produced by the pairwise testing scheme of the mean sums. If the testing scheme is for two-way analysis, the test is complete and control returns to the calling routine.

(13) Blocks L501, 12, and 13. If this is not the last matrix of this effectiveness measure, control returns to the calling routine. If so, the matrix is printed and routine FRDMAN is called.

(14) Blocks L415, and 14. The sum and mean of each row of the Friedman matrix is calculated and routine DSESRT is called. Upon return from DSESRT control is passed to block L14.

(15) Block L5000. Initialize variables for two-way analysis and transfer control to block L14.

7. ROUTINE FRDMAN:

a. Purpose. This routine determines the sum of the ranks in each row of the Friedman matrix, computes the Friedman two-way statistic, and determines the degrees of freedom.

b. Input Variables:

Name	Source	Contents
A	COM	Friedman matrix.
IIE	COM	Index of matrix being processed.

c. Output Variables:

Name	Destination	Contents
SUM	COM	Rank sum array.
SUMSQ	COM	Sum of the squares.
XR	COM	Friedman statistic.
IDF	COM	Degree of freedom.

d. Logical Flow (Figure VI-5-B-6):

(1) Block 1. Print headings and Friedman matrix.

(2) Block 2. Sum each column in the Friedman matrix and print that sum; then, compute the sum of the squares.

(3) Block 3. Compute the Friedman statistic, degrees of freedom, and return.

8. ROUTINE DSESRT:

a. Purpose. DSESRT sorts the indicated array in ascending order.

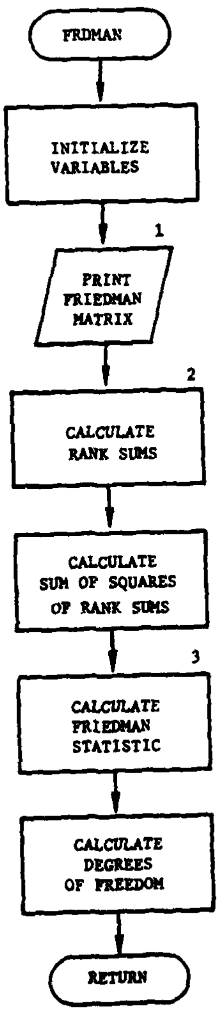


Figure VI-5-B-6. Routine FRDMAN

b. Input Variables:

Name	Source	Contents
IPOINT	Call	Flag indicating which array to sort.
N	Call	Number of entries in array to be sorted.

c. Output Variables. The sorted array.

d. Logical Flow (Figure VI-5-B-7):

(1) Block 1. Determine which array is to be sorted (MEANSM, AVSUM, or Y), and transfer this array to a working array for sorting.

(2) Block 2. Calculate and set the number of passes through the array to be made.

(3) Block 3. This block scans the array from left to right. Each scan identifies the location of the maximum value within the scan limits. The contents of the rightmost location within the scan and the location containing the maximum value are exchanged. After each scan the rightmost scan limit is decremented.

(4) Block 4. Load the sorted array back into its original variable array and return.

9. ROUTINE FRGFIT:

a. Purpose. The purpose of this routine is to compute the Kolmogorov-Smirnov statistic (KS) for normality which is a test for assessing the agreement of a sample cumulative distribution with a theoretical cumulative distribution.

b. Input Variables:

Name	Source	Contents
X	COM	Array holding the data matrix.
NOPS	COM	Number of columns of matrix.
NRO	COM	Number of rows of matrix.

c. Output Variables:

Name	Destination	Contents
B	COM	Sum of the entries in each row.
A	COM	Sum of the squares of the entries in each row.
NOL	COM	Number of entries in each row.

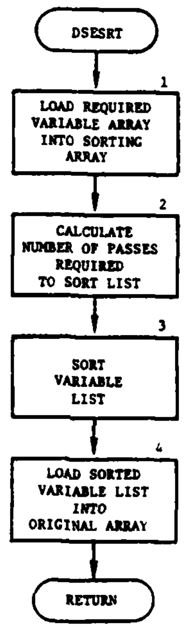


Figure VI-5-B-7. Routine DSESRT

Name	Destination	Contents
D	COM	Square of the sum of entries in each row.
XBAR	COM	The mean of each row.
VAR	COM	The variance of each row.
S	COM	The standard deviation of each row.
KS	COM	Kolmogorov-Smirnov statistic.
VMED	COM	The median of each row.
RANGE	COM	The range (spread) of each row.

d. Logical Flow (Figure VI-5-B-8):

(1) Block 1. Each row of the data matrix is loaded into a sort array and a call is made to routine DSESRT to sort them into ascending order. The sorted array is loaded into its original row of the data matrix.

(2) Block 2. The sorted data matrix is printed with its appropriate headings.

(3) Block 3. The statistical variables computed by this routine are initialized.

(4) Block 4. The sum of the entries in each row, the number of entries in each row, the sum of the squares of the entries in each row, the mean of each row, the variance of each row, and (if the variance is not equal to zero) the standard deviation of each row are computed. These statistical variables are printed.

(5) Block 5. This block computes the Kolmogorov-Smirnov statistic. For each entry in each row the cumulative distribution function is computed by dividing the entry number by the number of entries in the row. If the standard deviation is zero for any one row, the Kolmogorov-Smirnov statistic will not be computed and a transfer is made to block L23; otherwise, the normal distribution function is computed and the Kolmogorov-Smirnov statistic is computed as the maximum difference between the normal distribution function and the cumulative distribution function of any row in the matrix.

(6) Block L23. The median and range for each row is computed and routine ANOVA is called.

(7) Block 6. The Kolmogorov-Smirnov statistic, median, and range are printed, and a return is made to the calling routine.

10. ROUTINE ANOVA:

a. Purpose. This routine's function is the analysis of variance. It primarily computes the Bartlett statistic, which is a method of analyzing differences between means of several sets of samples.

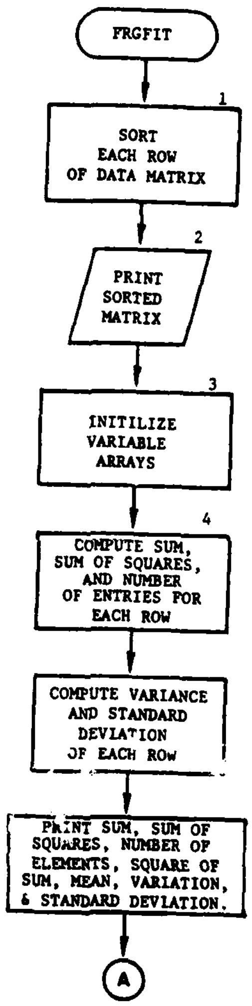


Figure VI-5-B-8. Routine FRGFIT (Continued on Next Page)

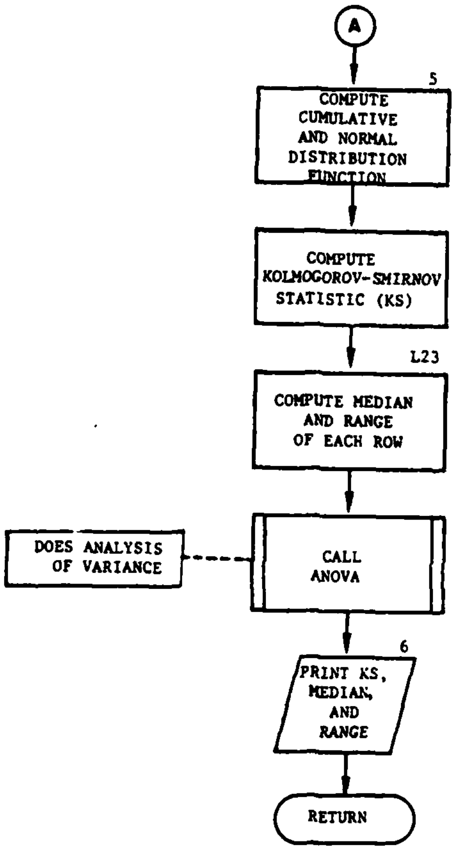


Figure VI-5-B-8. Routine FRGFIT (Concluded)

b. Input Variables:

Name	Source	Contents
B	COM	Sum of each row of the data matrix.
A	COM	Sum of the squares of each row of the data matrix.
NOL	COM	Number of entries in each row of the data matrix.

c. Output Variables:

Name	Destination	Contents
BS	COM	Bartlett statistic for homogeneity of variances.

d. Logical Flow (Figure VI-5-B-9):

The Bartlett statistic is computed by standard statistical methodologies. For a description see any standard statistical textbook; e.g., Statistical Methods by George W. Snedecor and William G. Cochran, Iowa State University Press, 1967.

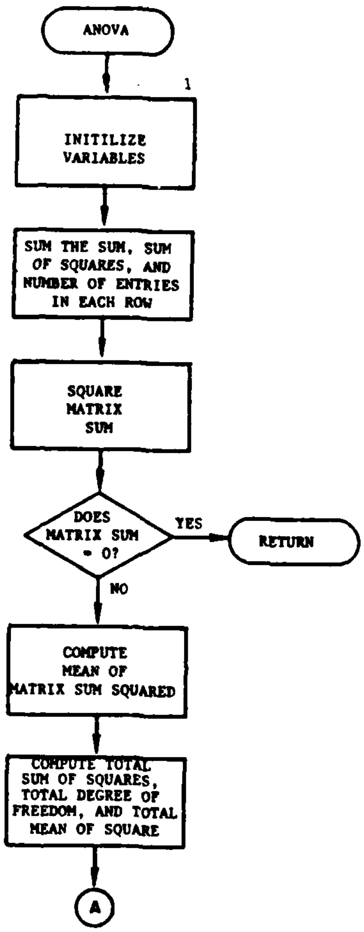


Figure VI-5-B-9. ROUTINE ANOVA (Continued on Next Page)

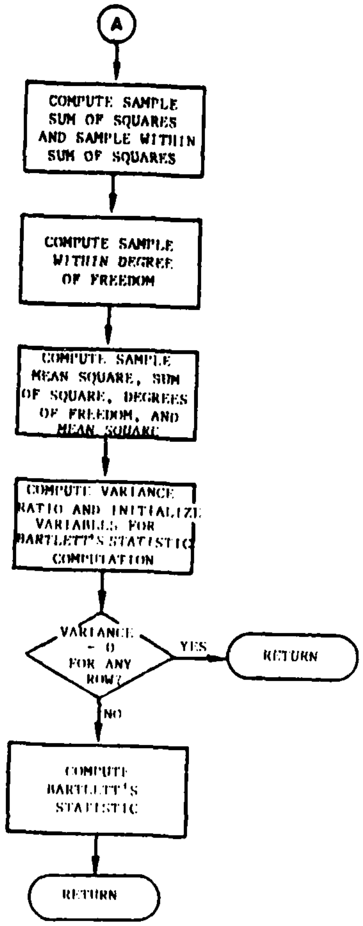


Figure VI-5-B-9. ROUTINE ANOVA. (Concluded)

APPENDIX C

OUTPUT DESCRIPTIONS OF ANALYSIS ROUTINES

1. INTRODUCTION. This appendix contains samples and detailed descriptions of printed output from routines within the Analysis Output Processor. The printed output of each routine is presented in a figure. In the figure an alphabetical descriptor designates an appropriate line or group of lines that is explained in the following paragraphs.

2. ROUTINE MTXMRG. Routine MTXMRG is used to print the matrices generated by the extractor routines for inspection before the analysis process is initiated. The printed output is shown in Figure VI-5-C-1. The description is as follows:

Output Descriptor	Explanation
A	For each matrix, the information from the header record identifying the matrix is interpreted. Information shown includes the type of the matrix; i.e., loss or contribution (effect), quantity or rate, the model that generated the data in the matrix, the equipment item code or weapon system to which the matrix pertains, and the size of the matrix.
B	The transposition of the matrix is printed. When two or more contiguous columns are all zeros, the following message is substituted for the zero data: THE DATA IN COLUMN M THROUGH COLUMN N IS ALL ZERO. where M and N are column numbers.
C	A message showing the columns containing no data is printed.

3. ROUTINE MTXUP. Routine MTXUP is used to suppress ranking of some entries in the matrices. The printed output is presented in Figure VI-5-C-2. The description is as follows:

Output Descriptor	Explanation
A	For each matrix in which ranking of one or more entries is to be suppressed, the images of the input cards controlling the modification to the matrix are printed with headings showing the meaning of the input values (see Appendix A to this chapter). The input cards are numbered sequentially by the routine.

```
(A)  MATRIX NUMBER=    1         RATE  OF  CONTRIBUTION  FOR  AREAFIRE  MODEL.        EQUIP  NUMB
     NUMBER OF ROWS =  3     NUMBER OF COLUMNS WITH DATA =  10
      1        0.0000        .0485        .0517
      2         .0923        .0421        .1129
      3        0.0000        .0743        .0774
(B)   4         .0195        .0415        .0489
      5         .0352        .0838        .1100
      6         .0527        .0599        .0494
      7        0.0000        .0397        .0416
      8         .0133        .0399        .0391
      9        0.0000        .0396        .0548
     10        0.0000        .0391       0.0000
(C)  COLUMNS  11 THROUGH 300 CONTAIN NO DATA.
```

Figure VI-5-C-1. Routine MTXMRG Sample Printed Output, History Tape Listing

```
     CARD      MATRIX     MODEL      COLUMN      ROW       NEW
      NUM       NUM        NUM        NUM        NUM       VALUE
(A)    1         1          1          1          1      99999.0000
       2         1          1          1          2      99999.0000
       3         1          1          1          3      99999.0000
(B)  MATRIX NUMBER =        1

     HEADER DATA            1          2          2         21         111         0         0         3        10

 COL                                                              CLASS   NUMBER
 NUM          1            2            3              4            5           6          7          8          9          10
   1   99999.0000   99999.0000   99999.0000
   2        .0903        .0421        .1129
   3       0.0000        .0743        .0774
(C)4        .0195        .0415        .0489
   5        .0052        .0838        .1100
   6        .0507        .0589        .0404
   7       0.0000        .0397        .0416
   8        .0133        .0399        .0391
   9       0.0000        .0396        .0548
  10       0.0000        .0391       0.0000
 COLUMNS   11 THROUGH 300 CONTAIN NO DATA.
```

Figure VI-5-C-2. Routine MTXUP Sample Printed Output, History Tape Listing

Output Descriptor	Explanation
B	The matrix number of the matrix being modified and its nine-word header record are printed.
C	The transposition of the modified matrix is printed as in routine MTXMRG (see paragraph 2, descriptors B and C).

4. ROUTINE ANALYS. Routine ANALYS performs the rank-ordering analysis. Input cards for this routine define one or more partitions of the firepower effectiveness measure to be sets of effectiveness indicators in the form of matrices with data extracted from the period history tapes. Each matrix is subjected to a rank-ordering analysis, and the final ranks of the classes (rows) are entered into the Freidman matrix. When all of the effectiveness indicators in a partition have been processed, the Freidman matrix is analyzed to obtain a final ranked set for the partition. Figure VI-5-C-3 presents the printed output of the ANALYS routine and is explained below.

Output Descriptor	Explanation
A	For each effectiveness indicator, a heading is printed identifying the model from which the data was obtained and the type of matrix and equipment item code or weapon system which it describes.
B	The transposition of the matrix is printed. Entries greater than 99998 are null.
C	Each row of the matrix is reranked in ascending order, and the transposition of the sorted matrix is printed.
D	The sum, sum of squares, number of non-null entries, square of sum, mean, variance, and standard deviation of each row are printed.
E	A parametric analysis of variance is performed if the variance of each row is larger than 0.001. When this occurs, a table showing the results of the analysis is printed. Values in the table are the sum, sum of square, number of non-null entries, square of sum and mean of the entire matrix, sum of squares between groups, sum of squares within groups, number of degrees of freedom for each category, the F statistic and the Bartlett statistic.
F	The Kolmogorov-Smirnov statistic, median, and range of each row are printed.

A R E A   F I R E   M O D E L

EQUIPMENT TYPE 201
CONTRIBUTION RATES

CLA1	CLA2	CLA3
99999.0000	99999.0000	99999.0000
.6205	.0375	1.6608
0.0000	.9492	4.3621
.0308	.2205	.2552
.0100	2.1661	2.2449
.2007	.0843	.1620
0.0000	.1229	1.3776
.0127	.0481	.7590
0.0000	.4513	1.1937
0.0000	.0142	0.0000

SORTED MATRIX

CLA1	CLA2	CLA3
0.0000	.0142	0.0000
0.0000	.0375	.1620
0.0000	.0481	.2552
0.0000	.0843	.7590
.0100	.1229	1.1937
.0127	.2205	1.3776
.0308	.4513	1.6608
.2007	.9492	2.2449
.6205	2.1661	4.3621
99999.9999	99999.9999	99999.9999

SUM	SUM OF SQ	NO IN ROW	SQ OF SUM	MEAN	VARIANCE	S.D.
.875	.427	9	.765	.097	.043	.207
4.094	5.972	9	16.751	.455	.501	.708
12.015	30.816	9	144.370	1.335	1.947	1.359

Figure VI-5-C-3. Routine ANALYS Sample Printed Output, History Tape Listing (Continued on Next Page)

E

```
************************************************************************
*               SUM     SUM OF SQUARE  ENTRIES   SQ OF SUM      MEAN OF SQ *
************************************************************************
* TOTAL                                                                 *

*  FOR        15.984       37.115        27        288.461        1.017  *
* MATRIX                                                                *
************************************************************************

******************************************************
*     SOURCE          SS         DF         MS        F  *
******************************************************
*1. BETWEEN                                             *

*    GROUPS (BG)     7.305      2.000      3.652    4.583*
*
*2. WITHIN                                              *
*    GROUPS (WG)    19.126     24.000       .797        *
******************************************************
*3. TOTAL           26.431     26.000                   *
*                                                       *

BARTLETT STATISTIC FOR HOMOGENEITY OF VARIANCES =      19.327
```

F

```
KS          VMED          RANGE

.404         .010          .621
.296         .123         2.152
.183        1.194         4.362
```

Figure VI-5-C-3. Routine ANALYS Sample Printed Output, History Tape Listing (Continued)

```
THE CORRESPONDING RANKS ARE--

          CLA1        CLA2        CLA3
         3.0000      8.0000      3.0000
         3.0000     10.0000     14.0000
         3.0000     11.0000     17.0000
         3.0000     12.0000     20.0000
         6.0000     13.0000     22.0000
         7.0000     16.0000     23.0000
         9.0000     18.0000     24.0000
        15.0000     21.0000     26.0000
        19.0000     25.0000     27.0000
         0.0000      0.0000      0.0000

RANKSUMS ARE

   68.00000   134.00000   176.00000
MEANSUMS ARE

    7.55556    14.88889    19.55556
```

```
MEANSUMS SORTED BELOW--AND THE CLASS TO WHICH IT BELONGS--

    7.556      1      CLA1
   14.889      2      CLA2
   19.556      3      CLA3
```

```
THE KRUSKAL - WALLIS  H TEST FOR THIS PERIOD =       10.519
THE SUM OF THE SQUARES OF THE MEAN-RANK-SUMS =    5950.667
THE TOTAL NUMBER OF ROWS (SUBSETS OR GROUPS) =        3
THE TOTAL NUMBER OF ENTRIES (THE POPULATION) =       27
```

Figure VI-5-C-3. Routine ANALYS Sample Printed Output, History Tape Listing (Continued)

J

```
THE PAIRWISE TESTING SCHEME

NOTE. IF SUM IS NEGATIVE, THEN WE HAVE A TIE.

WE ARE PAIRWISE TESTING    1  AND      2
WE ARE PAIRWISE TESTING    1  APART

THE NUMBER OF ENTRIES IN THE    1  ROW IS (I.E. NI OR GT =)       9.
THE NUMBER OF ENTRIES IN THE    2  ROW IS (I.E. NJ OR GS =)    9.000
FOP =      .222

THE SAMPLE SIZE (I.E. NI+NJ) =        18.000
MEANSUM(J)=      7.556
MEANSUM(K)=     14.889
 DDD       =    63.000
 DDKW      =    17.024
 TD        =     7.333
 DKW       =     8.025
 TD - DKW  =     -.692
```

K

```
OLD RANK   FINAL RANK   SUBSET

    1          1.500      CLA1
    2          1.500      CLA2
    3          3.000      CLA3

FINAL RANK SORTED ACCORDING TO CLASS

CLA1           1.500
CLA2           1.500
CLA3           3.000

NK =  3
```

Figure VI-5-C-3. Routine ANALYS Sample Printed Output, History Tape Listing (Continued)

```
L   THE FRIEDMAN MATRIX

             CLA1        CLA2        CLA3
    EI1      1.500       1.500       3.000
    EI3      0.000       0.000       0.000
    EI7      1.500       1.500       3.000
    SUMS ARE

             3.000       3.000       6.000

M   THE SUM OF THE SQUARES OF THE RANK SUMS =    54.000
    THE FRIEDMAN TEST STATISTIC =     3.000
    DEGREES OF FREEDOM =    2

N   RANKSUMS OF ROWS IN THE FRIEDMAN MATRIC          MEANSUMS OF ROWS IN THE FRIEDMAN MATRIX

                     3.000                                    1.500
                     3.000                                    1.500
                     6.000                                    3.000
    THE MEAN RANK SUMS FOR THE FRIEDMAN MATRIX SORTED

             1.500
             1.500
             3.000

O   THE PAIRWISE TWO-WAY ANALYSIS
    NEMENYI  DF  =      2.145
    NEMENYI   D  =      0.000
    NO. OF COLUMNS (JO)=    2

P   OLD RANK    FINAL RANK    SUBSET

       1           1.500       CLA1
       2           1.500       CLA2
       3           3.000       CLA3

    FINAL RANK SORTED ACCORDING TO CLASS

    CLA1          1.500
    CLA2          1.500
    CLA3          3.000
```

Figure VI-5-C-3. Routine ANALYS Sample Printed Output, History Tape Listing (Concluded)

Output Descriptor	Explanation
G	The entries of the matrix are ranked, and the transposition of the matrix of ranks along with the rank sums and mean sums for each row are printed.
H	The mean sums are sorted, and tentative ranks are assigned to the classes on the basis of the mean sums.
I	The Kruskal-Wallis H statistic for the matrix, the sum of the squares of the mean rank sums, the number of rows, and the total number of non-null entries are printed.
J	The H statistic is compared to a chi-squared value and the decision to accept or reject the null hypothesis; i.e., the data in all rows were taken from the same distribution, is made. If the null hypothesis is accepted, the message ACCEPT NULL HYPOTHESIS is printed, zeros are entered in the Friedman matrix for each class, and the next effectiveness indicator is processed. If the null hypothesis is rejected, a Nemenyi--a posteriori pairwise testing scheme--is initiated. Output printed during this process has value only in tracing logic. The figure shows a test in which rankings could be assigned as the result of a single test. Many such tests may be required to assign final ranks to larger populations.
K	The final ranks of the classes are printed and entered into the Freidman matrix.
L	When all effectiveness indicators in a partition have been processed, the Freidman matrix is printed with the sums of the rows.
M	The sum of the squares of the rank sums, the Freidman test statistic, and the degrees of freedom are printed.
N	The rank sums, mean sums, and sorted mean rank sums for the Freidman matrix are printed.
O	A pairwise two-way analysis is performed and values used in this analysis are printed.
P	On the basis of the two-way analysis, final ranks are assigned, to the classes for this partition. The final ranks are printed.

APPENDIX D

SOURCE LISTINGS FOR ANALYSIS OUTPUT PROCESSOR ANALYSIS ROUTINES

(AVAILABLE UNDER SEPARATE COVER)

SECTION VII

DIVWAG SYSTEM UTILITY PACKAGES

CHAPTER 1

GENERAL DESCRIPTIONS OF DIVWAG SYSTEM UTILITY PACKAGES

1. INTRODUCTION. The DIVWAG system utility packages are categorized into three general areas:

- Utility load and dump routines
- DIVWAG input/output routines
- Other miscellaneous utility routines.

2. UTILITY LOAD AND DUMP ROUTINES. In the normal flow of processing the DIVWAG data file is maintained in residence on the disk pack only during computer execution. Otherwise, the file is maintained on magnetic tape. To accomplish this, the utility load routine UTILLD, which writes the contents of the DIVWAG data file on magnetic tape to the disk pack, and the utility dump routine UTILDP, which writes the contents of the DIVWAG data file on the disk pack to a magnetic tape, are used. These routines are maintained as executable tasks on permanent disk files and are called by attaching the appropriate disk file.

3. DIVWAG INPUT/OUTPUT ROUTINES. Once the DIVWAG data file has been loaded to the disk pack, the DIVWAG input/output routines provide a means to access the DIVWAG data file at logical file, record, and word resolution levels. It provides a means to remove and create files, remove and add records, remove and add words, and to replace words and records. Before the DIVWAG input/output package can function the file name table (IFNT(56,3)) must be retrieved from the first 168 words of the DIVWAG data file and loaded into the IFNT array of common ONE. This table is the logical file directory for the DIVWAG input/output package and is used for the management of all operations on the DIVWAG data file.

4. OTHER UTILITY ROUTINES. Other miscellaneous utility routines include the routines MVCHAR, KHAR, PACK28, INTCHR, and SNATCH, and are described in detail in Chapter 5 of this section.

CHAPTER 2

DIVWAG DATA FILES

The DIVWAG data file structure, which is defined by the file name table (FNT) allows a total of 55 logical data files within the physical file TAPE1. Of these, 43 logical files are actually allocated and in use within the DIVWAG system, leaving ample space for expansion as may be required. Contents of each defined logical file are enumerated in Appendix A of this chapter; unallocated files are identified. The programmer will note a wide variety of logical file size definitions and, in some cases, logical subfiles imbedded within the logical file. File definition is, in fact, a matter of programmer convenience and as long as a logical file is treated consistently throughout the various processors of the DIVWAG system, there are no inviolable rules of file definition. The only practical constraint is, obviously, the physical storage capacity of available disk packs and drives.

APPENDIX A

DATA FILE FORMATS

1. UNIT STATUS FILE:

a. Data file 1 of the DIVWAG data system contains information on the status of each unit being gamed. Data file 1 consists of 1000 records, each of which contains 512 words. Following is a breakdown of the contents of a record.

Variable	Type	Description	Word Location
UID(2)	INT	Unit identification code	1
UTD	INT	Unit type designator	3
TYPE	INT	Unit type designator	3
XACT	REAL	Actual X coordinate	4
YACT	REAL	Actual Y coordinate	5
ITMDLY	INT	Time delay at obstacle	6
WIDTH	INT	Unit width (meters)	7
DEPTH	INT	Unit depth (meters)	8
XACTL	REAL	Previous X coordinate	9
YACTL	REAL	Previous Y coordinate	10
PRESTR	INT	Present strength	11
SUPSTR	INT	Suppressed strength	12
NBAND	INT	Number of subelement bands	13
EOH(200)	REAL	Equipment on hand	14
ENTGM	INT	End time of engineer event	214
IUID	INT	USF record number of this unit	215
POS1	INT	Percent dismounted	216
POS2	INT	Percent in tanks	217
POS3	INT	Percent in APCs	218
DOST(35)	INT	DSL order table	219

Variable	Type	Description		Word Location
NORD	INT	Pending order number	DOST(1)	219
NTIME	INT	Ending time of total stay	DOST(2)	220
AIRSPD	INT	Airspeed (knots)	DOST(3)	221
ALT	INT	Altitude	DOST(4)	222
DGZX	REAL	Designated ground zero X coordinate	DOST(5)	223
DGZY	REAL	Designated ground zero Y coordinate	DOST(6)	224
NOR	INT	Number of volleys or rounds	DOST(7)	225
MUNTPY	INT	Munition type	DOST(8)	226
IR	INT	Impact radius	DOST(9)	227
HOB	INT	Height of burst	DOST(10)	228
COPUID(2)	INT	Cooperating unit ID	DOST(11)	229
BATID(2)	INT	Battle ID	DOST(13)	231
OBJX	REAL	Next objective of move order X coordinate	DOST(15)	233
OBJY	REAL	Next objective of move order Y coordinate	DOST(16)	234
RRRCD	INT	Movement type code or reconnaissance control code	DOST(17)	235
MVPRTY	INT	Movement priority	DOST(18)	236
		Not used	DOST(19) thru DOST(35)	237 253
XKK	REAL	X distance of move segment		254
YKK	REAL	Y distance of move segment		255

Variable	Type	Description	Word Location
DELT	INT	Delta time of pending event	256
MEVTX	REAL	Objective X coordinate of move event	257
MEVTY	REAL	Objective Y coordinate of move event	258
LTASMT	INT	Time this unit was last assessed	259
FIN	INT	Order completion flag	260
IORENT	INT	Orientation of unit (centiradians from X axis)	261
NORREC	INT	Number of rounds or volleys fired under this order	262
ISEQNT	INT	Sensor report sequence number	263
MVRATE	INT	Movement rate for this unit's present move	264
STYFLG	INT	Not used	265
NUCDOSE(3,2)	INT	Table with percent and rads	266
ITGTPT	INT	Target block number pointer	272
FSUP	REAL	Fire suppression factor	273
IEV	INT	Previous event code	274
ATHSTR	INT	Authorized strength	275
IBOSS	INT	IUID of superior unit	276
ISUB(10)	INT	IUIDs of subordinate units	277
ISUP	INT	IUID of supported unit	287
KSUP(10)	INT	IUIDs of supporting units	288
UPFLAG	INT	Update flag (0=Basic, 1=Complex, 2=Nominal)	298
IDDIV	INT	IUID of division	299
YCEPT1	REAL	Y intercept of zone upper boundary	300

Variable	Type	Description	Word Location
YCEPT2	REAL	Y intercept of zone lower boundary	301
IREC28	INT	Vulnerability record (File 28)	302
IACTX	INT	Activity index to vulnerability tables	303
ICFRAC	INT	Cumulative casualty fraction (hundredths)	304
IREC23	INT	Aggregated unit record (File 23)	305
IREC48	INT	Battle history record (File 48)	306
ISUPLY(10)	INT	Supply source IUIDs by class	307
IREC31	INT	Beginning supply status record (File 31)	317
JREC31	INT	Ending supply status record (File 31)	318
MOBCAT	INT	Mobility category	319
INDXEX	INT	Exclusion index	320
IBCHIN	INT	IUID chain of units waiting in queue	321
AIRDAT(9)	INT	Aircraft data and accounting array	322
AMBLFG	INT	Airmobile flag (1=Across FEBA, -1=En route and across the FEBA, -2=En route not across FEBA	331
IREC8	INT	Pointer to File 8	332
SUPTIM	INT	Suppression time (centiminutes)	333
ACKILL(6)	INT	Aircraft kill data	334
IREC24	INT	FARR facility record on File 24	340
ZACT	REAL	Elevation at XACT-YACT (meters)	341
MASKF(2,24)	INT	Dominant mask (range, angle)	342

Variable	Type	Description	Word Location
ACTVTY(30)	INT	Activity count	390
ENGMOV	INT	Engineer movement code coming to - or going away from	420
IREC37	INT	Pointer to File 37	421
		Not used	422-500

b. Exceptions to the Unit Status File Contents. The mission units that fly air missions in the Air Ground Engagement Model use 10 additional words of the Unit Status File. These units are created, used, and removed, only by the Air Ground Engagement Model. When they are removed, all the words for the unit are zeroed except the first four.

Variable	Type	Description	Word Location
MTSAVE(10)	INT	Air Ground Mission requirements	479

2. BARRIER-FACILITY FILE. Data file 2 of the DIVWAG data files contains data describing playable barriers for the Engineer Model. The file is loaded by BARLD. Data file 2 contains 4250 records, each 35 words in length. Following is a breakdown of the contents of each record on data file 2, one of which describes each barrier segment.

Variable	Description	Word Location
PVNMCD	Barrier record number of previous barrier in this barrier line	1
FLNMCD	Barrier record number of following barrier in this barrier line	2
XCORD1 XCORD2	Two X coordinates of barrier line segment	3 5
YCORD1 YCORD2	Two Y coordinates of barrier line segment	4 6
IDSLPY	DSL specified task priority	10
BUID	Mnemonic identification of barrier (alphanumeric)	11
BUIDNM	Mnemonic identification of barrier (alphanumeric)	12
SIZE	Minefield tasks: Density of Blue mines Non-minefield tasks: Size of Blue barrier	13

Variable	Description	Word Location
CHAR1(2)	The first four characters of CHAR1(1) contain: . Build, breach, or remove request . DSL STOP order . Unused . Bridge-barrier flag The first four characters of CHAR1(2) contain: . Location of engineer units with respect to task requested . Intelligence information known about barrier . Physical status of barrier . Result or activity status of task	14
INTUPR	Time of next intelligence change affecting Red	16
RQIUID	Requesting unit when Movement Model requests an engineer task	17
IUIDMU	Cohesive mission unit IUID for this engineer task	18
MANHRS	Manhours required for completion of task	19
MHRCMP	Manhours completed on task by Blue force	20
BGNCMP	Begin by-complete by type task	21
TMLSUP	Time of last engineer update on this barrier	22
ENOPR	Operator keying barrier through proper area of Engineer Model	23
INTUPB	Time of next Blue change of intelligence on this barrier	24

Variable	Description	Word Location
RADLVL	Nuclear radioactivity at barrier site	25
TMOFXP	Time of exposure to radiological contamination	26
IDNTR	Tas': and troop type required for this barrier	27
IDNTB	Task and troop type required for this barrier	28
IUIDM2 IUIDM3 IUIDM4 IUIDM5	IUIDs of up to four additional units, subordinate to IUIDMU at task site, working on task in addition to IUIDMU	29 30 31 32
ICHARR	When used contains same data for the Red force as characters 1-4 of variable CHAR1(2) contains for the Blue force	33
MHRCMR	Manhours completed on task by Red force	34
SIZER	Minefield tasks: Density of Red mines Non-minefield tasks: Size of Red barrier facility	35

The Nuclear Assessment Model stores its own information in the following manner for all nuclear barriers:

Variable	Description	Word Location
RAD1 RAD2 RAD3	Radii of three concentric circles representing varying effects of damage at site with RAD1 the smallest and RAD3 the largest	21 23 25
IIHOB	Height of burst	24
TMOFBL	Time nuclear blast occurred	26
IREC22	Record on file 22 of this barrier	29
IWRD22	Word on file 22 of this barrier	30
GNDZRX	X coordinate of ground zero	17
GNDZRY	Y coordinate of ground zero	19

Variable	Description	Word Location
TMLSDK	Time of last nuclear decay assessment	22
XFF	Radiation barrier decay parameter	34
XKF	Radiation barrier decay parameter	35

3. TERRAIN FILE. Data file 3 defines the terrain of the area being gamed. The total number of records in this file is the number of terrain cells in the X direction times the number of cells in the Y direction plus one. There are 10 words to describe the terrain cell per record. The first record of the terrain file is a special record in that it describes the geometry of the gamed area. It consists of:

Variable	Description	Word Location
NX	Number of terrain cells in the X-direction	1
NY	Number of terrain cells in the Y-direction	2
NCELL	Dimension of the terrain cell in meters	3
	Not used	4-10

All other records of the terrain file have the following contents.

RFS	Packed roughness and vegetation, forest and traffic code	1
RV1PNT	Not used	2
RV1NUM	Not used	3
RV2PNT	Not used	4
RV2NUM	Not used	5
	Not used	6-9
IREC	Record number of the terrain cell	10

4. WEATHER FILE. Data file 4 of the DIVWAG data system consists of 3024 records of weather information of the area of play. A weather record consists of nine words of information, and there is a record for each hour of the day. The file is designed to hold a total of 14 days of weather information. The game map may be divided into up to nine different weather zones. Thus, the data file 4 may contain up to nine weather zones, each zone may contain 14 days of weather information, and each day contains 24 hours for a total of 3024 records. Following is a breakdown of the contents of each record.

Variable	Description	Word Location
VIS	Visibility index	1
CLDCOV	Cloud cover	2
TEMP	Temperature (degrees Fahrenheit)	3
PRECIP	Precipitation index	4
TEMPGD	Temperature gradient	5
RELHUM	Relative humidity	6
WNDSPD	Wind velocity (knots)	7
WNDDIR	Wind direction (degrees)	8
FOGIDX	Fog index	9

5. LOGICAL FILE 5. Currently not used.

6. SECONDARY EQUIPMENT FILE. Data file 6 of the DIVWAG data files contains data defining the secondary equipment items associated with primary equipment items. File 6 contains 400 records which are 10 words in length. Records 1-200 are assigned to Blue equipment items; records 201-400 are assigned to Red equipment items. All records have the same contents, described below:

Variable	Description	Word Location
SECEQP (2,5)	Item code and amount for five secondary equipment items	1-10

7. AIRMOBILE DATA FILE. Data file 7 contains the data required by the Airmobile Model. The file is made up of 52 records of 300 words each. The following list describes the contents of the file:

Variable	Description	Location Record	Location Word
ITEMCD (50)	If the Blue equipment item is excluded, the character 1 appears in the corresponding position in this array, considering 4 characters per word.	1	1
MIXTAB (15,10)	Tables describing mixes of transport and escort aircraft and munition types for the Blue force	1	51

Variable	Description	Location Record	Word
FUTD (10)	UTDs of Blue units that may be used as forward rearm and refuel areas	1	201
RAPT (10)	Number of rearm points maintained at each FUTD	1	211
RFDV (10)	Item codes of Blue force refuel devices	1	221
NNRD (10)	Number of nozzles associated with each RFDV	1	231
MTRF	Maneuver times in Blue force refuel queue	1	241
MTRA	Maneuver time in Blue force rearm queue	1	242
(58)	Not used	1	243
Record 2 is the same as record 1 but for Red force		2	
(300)	Not used	3	1
DIVERT	Blue escort divert limit	4	1
RESPND	Blue artillery fire response time	4	2
ESCSUP	Blue suppression time duration after escort attack	4	3
TGASUP	Blue suppression time duration after TACAIR/artillery attack	4	4
MISTM	Time required by escort mission to suppress air defense unit (Blue)	4	5
ESCDT	Escort response time to suppress ADCU (Blue)	4	6
NOREQT	Time after passage of air defense unit beyond which escort will not be sent back to suppress it	4	7
(13)	Not used	4	8
DTAB (60,3)	Detection tables related to AD weapons (Blue)	4	21
PATAB (10,10)	Detection data related to aircraft (Blue)	4	201
TP1 (60)	Description of Blue force air defense weapon type 1	5	1

Variable	Description	Location Record	Location Word
TP25 (60,4)	Description of Blue force air defense weapon types 2-5	5	61
TP610 (60,5)	Description of Blue force air defense weapon types 6-10	6	1
TP1115 (60,5)	Description of Blue force air defense weapon types 11-15	7	1
IWEPNB (20)	Blue force weapon item codes	8	1
IWEPNR (20)	Red force weapon item codes	8	21
(60)	Not used	8	41
CONST (18)	Data constants	8	101
(164)	Not used	8	137
	Records 9, 10, 11, and 12 are the same as records 4, 5, 6, and 7, respectively, but for the Red force		
	Records 13-48 are used as scratch area by the Airmobile Model		
PKMTBR (15,4,5)	Blue missile P_k as a function of miss distance against Red rotary wing aircraft. Twenty arrays for each of up to five missile types and four kill categories. Within each array words 1-11 are P_k at equally spaced miss distances. Word 12 contains interval between miss distance points (feet). Word 13 contains maximum lethal distance (feet). Words 14 and 15 are not used.	49	1
PKMTBF(15,4,5)	Blue missile P_k against Red fixed wing aircraft. Structure as record 49	50	1
PKMTRR(15,4,5)	Red missile P_k against Blue rotary wing aircraft. Structure as record 49	51	1
PKMTRF(15,4,5)	Red missile P_k against Blue fixed wing aircraft. Structure as record 49	52	1

8. SUPPRESSION DATA FILE. Data file 8 of the DIVWAG data files contains all the data required by the Suppression Model. File 8 is loaded by SPRSLD and consists of one 3200 word record. Following is a detailed description of that record.

Variable	Description	Word Location
BSUPGP (1000)	Blue suppression time table pointer corresponding in position to the UTD array	1
RSUPGP (1000)	Red suppression time table pointer corresponding in position to the UTD array	1001
BSUPTM (12,50)	Blue suppression time tables. Twelve words are allowed per table and there is space for 50 tables	2001
RSUPTM (12,50)	Red suppression time tables	2601

9. UTD MOBILITY CATEGORY FILE. Data file 9 contains a part of the data required by the Movement Model and is loaded by the program MOVELD. This file contains five records with 1000 words per record. Following is the contents of the file.

Variable	Description	Location Record	Location Word
BCATL (1000)	Blue force mobility category list by UTD	1	1
RCATL (1000)	Red force mobility category list by UTD	2	1
BEXPT	Pointers to mobility class exclusion records in File 14 for Blue force	3	1
REXPT	Pointers to mobility class exclusion records in File 14 for Red force	4	1
	Not used	5	1
NBAC	Number of Blue force aircraft item codes given fuel consumption rates	5	2
BACEIL (100)	List of equipment item codes of Blue aircraft given fuel consumption rates	5	3
	Not used	5	103
NRAC	Number of Red force aircraft item codes given fuel consumption rates	5	104
RACEIL (100)	List of equipment item codes of Blue aircraft given fuel consumption rates	5	105
(6)	Not used	5	205

Variable	Description	Location Record	Word
BMCLA (200)	Blue force mobility classes by equipment item code	5	211
RMCLA (200)	Red force mobility classes by equipment item code	5	411
(53)	Not used	5	611
LBPRTY	Priority of lowest Blue force decision table loaded	5	663
BDEC (28,6)	Blue force breach/force decision tables	5	664
LRPRTY	Priority of lowest Red force decision table loaded	5	832
RDEC (28,6)	Red force breach/force decision table	5	833

10. LOGICAL FILE 10. Currently not used.

11. COMBAT SERVICE SUPPORT DATA FILE. Data file 11 of the DIVWAG data files contains data for the Combat Service Support Model. This file is established by CSSLD. File 11 is an expandable file containing at least 249 records. Each record is 512 words in length. A breakdown of the file contents is given below.

Variable	Description	Location Record	Word
BO (3)	Backorders of supplies for Blue force. Three words per entry, 170 entries per record,maximum of 1700 entries:	1-10	1-510
(1)	BOUNIT. IUID of unit which issued order		
(2)	BOEOH. Record number of entry on Supply Status File, DF31, which is the type equipment being supplied, type of supply, etc.		
(3)	BOQUAN. Quantity being backordered		
BO (3)	Backorders of supplies for Red force (same structure as for Blue, see above)	11-20	1-510
--	Backorder constraints for Blue force. Each backorder entry has a corresponding	21-23 24	1-512 1-164

Variable	Description	Location Record	Location Word
	constraint factor (priority) stored on File 11. The 1700 possible values are stored consecutively starting in word 1 of record 21 and ending in word 164 of record 24.		
--	Backorder constraints for Red force. (same structure as for Blue, see above)	25-27 28	1-512 1-164
IARRAY (412)	Blue elapsed time transports	29	1-6
IARRAY (1)	Time to load trucks (minutes) - unit distribution		
IARRAY (2)	Time to start trucks (minutes) - supply point		
IARRAY (3)	Time to unload trucks (minutes) - unit distribution		
IARRAY (4)	Time to load trucks (minutes) - supply point		
IARRAY (5)	Time to load aircraft (minutes)		
IARRAY (6)	Time to unload aircraft (minutes)		
IARRAY (7) through IARRAY (206)	Blue EIC/supply class cross reference (200 entries)	29	7-206
IARRAY (207) through IARRAY (212)	Red elapsed time transports (same structure as for Blue, see above)	29	207-212
IARRAY (213) through IARRAY (412)	Red EIC/supply class cross reference (200 entries)	29	213-412
NOEVNT	Number of pending supply action events to be processed	29	425
NEMPTY	Pointer to starting location in supply action file (see record number 249)	29	426
NSIZE	Pointer to ending location of supply action file (see record number 249)	29	427
IFOOD (44)	Blue food consumption rate (pounds per man per day)	29	428

Variable	Description	Location Record	Location Word
IFOOD (45)	Red food consumption rate (pounds per man per day)	29	429
	Blue consumable array, contains 11-word entry for each of the 201 Blue equipment items (11, 201) in consecutive locations. The 11 words are: equipment item code of transport which will haul this consumable (1) Unit distribution first preference (2) Unit distribution second preference (3) Unit distribution third preference (4) Supply point distribution first preference (5) Supply point distribution second preference (6) Supply point distribution third preference (7) Airlift first preference (8) Airlift second preference (9) Airlift third preference (10) Weight of consumables (11) Volume of consumables	30-33 34	1-512 1-163
TRANWV (3,50)	Capacities of Blue transports. A maximum of 50 different transport types may be assigned. The equipment item code, transport weight capacity, and volume capacity are stored for each on File 11.	34	363-512
	Red consumable array. (same structure as for Blue force, see above)	35-38 39	1-512 1-163
TRANWV (3,50)	Capacity of Red transports. A maximum of 50 different transport types may be assigned. The equipment item code, weight capacity, and volume capacity are stored for each.	39	363-512

Variable	Description	Location Record	Location Word
AVAIL(201,14)	Availability of equipment to the Blue force for replacements (includes personnel). Replacements are allocated to the division by day for up to 14 days. These values are stored in consecutive locations.	40-44 45	1-512 1-254
AVAIL(201,14)	Availability of equipment ot the Red force for replacements (includes personnel). Replacements are allocated to the division by day for up to 14 days. These values are stored in consecutive locations.	46-50 51	1-512 1-254
TEMP (201,500)	Individual unit loss array. The number of replacements of personnel and major end items needed by each unit are stored, consecutively, in these locations. This is a temporary storage location used by either the Red or Blue force.	52-248	1-512
EVTAB (7)	Supply action file. This is an expandable area which contains seven-word entries reflecting pending supply actions. A maximum of 70 seven-word entries is stored on each record. The seven-word entries contain: EVTIM. Time entry is due to be updated, TIME=0 denotes empty entry. UNIT1. IUID of unit which generated order RECNO. The supply status file (DF31) record number of the corresponding EIC for this unit (UNIT1) KEOH. EIC of item being ordered or of vehicle being used if EIC is negative QUAN. Quantity of order going after or being shipped. UNIT2. IUID of supply point. INDEX2. Flag indicating type of supply action (1-4 or -2, see description of CSS Model).	249 +	1-490

12. AUTOMATIC EVENT FILE. Data file 12 contains descriptive parameters for all pending automatic events. The events stored on data file 12 are generated by and passed to or between the Intelligence and Control, Suppression, Air Ground Engagement, TACFIRE, Combat Service Support and Airmobile Models. The file contains 3000 records of 35 words. Each record is associated with a corresponding entry in the automatic event table stored in COMMON TWO. The formats of the records are not standard but are prescribed for each particular type of event for which the record may be used.

13. ELEVATION FILE. Data file 13 contains the elevation in meters above sea level of every point on the elevation grid. The number of records and the number of words per record are determined from the following formulas:

$$\text{Number of Records} = \frac{\text{YMAX}}{\text{GRID}} + 1$$

$$\text{Number of Words per Record} = \frac{\text{XMAX}}{\text{GRID}} + 1$$

where:

YMAX = maximum Y-coordinate of interest (meters)

XMAX = maximum X-coordinate of interest (meters)

GRID = elevation grid interval (500 meters is currently used)

Each record contains the elevations of all points on a row of the grid. Record 1 describes the row pertaining to Y = 0. The words on each record contain the elevation of the points along that row. Word 1 is the elevation at X = 0. The elevation of the grid point immediately south and west of point X', Y' is contained in word $\frac{X'}{\text{GRID}} + 1$ of record $\frac{Y'}{\text{GRID}} + 1$.

(All equations used to locate data within this file are accomplished by integer arithmetic, with appropriate truncation.)

14. MOVEMENT DATA. Data file 14 contains part of the data required by the Movement Model. This file is loaded by the program MOVELD and is created with 950 records of 20 words each. Other records may be added if the data quantity is such that it becomes necessary. A detailed description of the file follows.

Variable	Description	Location Record	Location Word
(2)	Not used	1	1
BMCCD (5)	Blue mobility category codes	1	3
RMCLD (5)	Red mobility category codes	1	8
BFDFPT	Pointers to default table of Blue foot rates	1	13
BMDFPT	Pointers to default table of Blue mechanized rates	1	14
RFDFPT	Pointers to default table of Red foot rates	1	15
RMDFPT	Pointers to default table of Red mechanized rates	1	16
LREC14	Last record used in File 14	1	17
LREC19	Last record used in File 19	1	18
(2)	Not used	1	19
BAARCD (20)	Travel mode mnemonics of Blue force	2	1
BCOMB (20,20)	Table of Blue force travel mode mnemonic mobility category combinations	3	1
RRRRCD (20)	Travel mode mnemonics of Red force	23	1
RCOMB (20,20)	Table of Red force travel mode mnemonic-mobility category combinations	24	1
BURD (20,3)	Pointers to Blue force unit road move rate tables	44	1
BUCC (20,3)	Pointers to Blue force unit cross country move rate tables	47	1
RURD (20,3)	Pointers to Red force unit road move rate tables	50	1
RUCC (20,3)	Pointers to Red force unit cross country move rate tables	53	1
BVRDRT (20,36)	Blue force vehicular road move rate table (20 mobility classes X 36 road, weather, light, terrain combinations)	56	1

Variable	Description	Location Record	Word
BVCCRT (20,120)	Blue force vehicular cross country move rate table (20 mobility classes X 120 weather, light, terrain combinations)	92	1
RVRDRT(20,36)	Red force vehicular road move rate table	212	1
RVCCRT (20,120)	Red force vehicular cross country move rate table	248	1
BCLS3A (20,200)	Blue force class 3A consumption rates (8 real words + 4 words not used x 200 item codes)	368	1
RCLS3A (20,200)	Red force class 3A consumption rates	568	1
EXCLU (20,)	Mobility class exclusion data. Each UTD requiring exclusion data is assigned a record. If it has more than 19 words of exclusion data, the list will be continued in another record and that record number will be placed in word 20 of this record. Within the record(s) the travel mode mnemonic(s) and the excluded mobility class(s) associated with them are stored sequentially.	768	1

15. FUEL CONSUMPTION RATES. Data file 15 contains the class 3A consumption rate tables required by the Movement Model. This file is created by the program MOVELD with sixteen 200-word records. A description of the file contents follows.

Variable	Description	Location Record	Word
BCCRT (200)	The fuel consumption rates of Blue force vehicles traveling cross country. The 200 real words per record correspond to the 200 equipment item codes.	1	1
BRART (200)	The fuel consumption rates of Blue force vehicles traveling on asphalt surfaced roads.	2	1
BRGRT (200)	The fuel consumption rates of Blue force vehicles traveling on gravel roads.	3	1
BRDRT (200)	The fuel consumption rates of Blue force vehicles traveling on dirt roads.	4	1
BEGRT1 (200)	The fuel consumption rates of Blue force vehicles engaged in engineering activities if the temperature is less than 9C°.	5	1

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Variable	Description	Location Record	Location Word
BEGRT2(200)	The fuel consumption rates of Blue force vehicles engaged in engineering activities if the termperature is above 90°.	6	1
BSTAY1(200)	The fuel consumption rates of Blue force stationary vehicles or equipment if the temperature is less than 90°.	7	1
BSTAY2(200)	The fuel consumption rates of Blue force stationary vehicles or equipment if the temperature is above 90°.	8	1
	Records 9-16 contain the Red force consumption rate tables. See corresponding Blue force record description.	9	1

16. PERIOD PROCESSOR SCRATCH FILE. Data file 16 is currently being used as a scratch file by the submodels and respective word locations listed below:

Variable	Description	Word Location
INTNUM	No. barriers inside blast radius.	1
OBFLST(150)	Recorded numbers of barriers inside blast area.	2-151
NOTAB(16)	Number of defender targets across boundary.	19204
NOTAB(16)	Number of attacker targets across boundary.	19220
TIMEIT(2)	Duration of engagement iteration.	20552
BIG(8)	Presented area of target systems.	20844
RMAX(16)	Weapon maximum range.	20860
RMIN(16)	Weapon minimum range.	20892
AMAUTH(16)	Authorized ammo supply.	20924
AMINIT(16)	Initial ammo supply.	20956
TAFD(16)	Time to aim, fire, and deliver a round/weapon system.	20988
RATE(16)	Maximum sustainable rate of fire.	21020

Variable	Description	Word Location
NW(16)	Number weapons/type.	21052
S	Front to front separation.	21084
WEAD	Engagement frontage.	21086
ISEP	Separation distance at start of increment.	21088
NWS(8)	No. weapon systems.	21090
NT(8)	No. targets.	21106
TGTD	Target unit depth.	21112
TGTW	Target unit width.	21114
WEAPD	Weapon unit depth.	21116
WEAPW	Weapon unit frontage.	21118
WSPD	Weapon unit velocity.	21120
TSPD	Target unit velocity.	21122
WSPDIT(8)	Weapon element velocity/type.	21124
VATTI(8)	Velocity of up to 8 attacker weapon systems.	21134
TSPDIT(8)	Target element velocity/type.	21140
VDEFI(8)	Velocity of up to 8 defender weapon systems.	21150
PRIOR(128)	Weapon/target priorities.	21156
AMLIM(64)	Ammo supply limitations per priority.	21284
NWT	No. of weapon types.	21348
NWST	No. of weapon system types.	21349
NTT	No. of target types.	21350
ANRNDS(128)	No. attacker rounds fired by weapon type/target type.	21351
DNRNDS(128)	No. defender rounds fired by weapon type/target type.	21351

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Variable	Description	Word Location
CAS(128)	Casualties.	21607
RBAR(4,4)	Range as a function of visibility.	22470
BKGREF(3,3)	Background reflectance.	22502
SKGR(3)	Sky/ground ratios.	22520
ATREF(8)	Attacker weapon system reflectances.	22558
DTREF(8)	Defender weapon system reflectances.	22574
LNKA(16)	Attacker weapon/weapon system link table.	22869
ITYPD(8)	Defender weapon system classification.	22885
LNKD(16)	Defender weapon/weapon system link table.	22964
ITYPA(8)	Attacker weapon system classification.	22980
PRIOR(192)	Weapon/target priorities and ammo to drop levels.	22992
IEOHAS(10)	Item codes of attacker sensors.	23376
IEOHAT(8)	Item codes of attacker targets.	23386
IEOHAW(16)	Item codes of attacker weapons.	23394
IEOHDS(10)	Item codes of defender sensors.	23410
IEOHDT(8)	Item codes of defender targets.	23420
IEOHDW(16)	Item codes of defender weapons.	23428
XA	Attackers X coordinate.	26001
YA	Attackers Y coordinate.	26003
XAP	Attackers objective X coordinate.	26005
YAP	Attackers objective Y coordinate.	26007
XD	Defenders X coordinate.	26009
YD	Defenders Y coordinate.	26011
XDP	Defenders objective X coordinate.	26013

Variable	Description	Word Location
YDP	Defenders objective Y coordinate.	26015
IMSET	Indicator as to whether there are any minefields in this increment.	26020

17. ENGINEER RATE AND TASK CHARACTERISTICS FILE. Data file 17 of the DIVWAG data files contains rate and task characteristic information for the various engineer events played by the model. The file is loaded by ENG17, with the structure for the BUILD, BREACH, and REMOVE records being identical and the FORCE record for minefield tasks being different. The file contains 157 records of 700 words each, with the first 78 records for Blue, the next 78 for Red, and the last a special all-purpose record. The 700th word of every record is reserved for use by ENG17. The contents of the BUILD, BREACH, and REMOVE records are as follows:

Variable	Description	Word Location
MINTRP (60)	Minimum number of troops required for a possible 60 task size increments	1,3,5...119
STDTRP (60)	Standard number of troops required for each of a possible 60 task size increments	2,4,6...120
MINRAT (60)	Minimum rate for this type task for any of the possible 60 task size increments played	121,125...357
STDRAT (60)	Standard rate for any of the possible 60 task size increments for this type task	123,127...359
	Words 361-460 contain a possible 20 five-word sets, corresponding to each of the possible 20 item codes of equipment and supplies. Each of the five words per set are described as follows:	
IDATA(361,...)	Item code for equipment/supplies	361,366,...
IDATA(362,...)	Minimum amount required for tasking	362,367,...
IDATA(363,...)	Standard amount required for minimum size task	363,368,...

Variable	Description	Word Location
IDATA(364,...)	Proportionality ratio used to increase IDATA(363,...) to current task size level	364,369,...
IDATA(365,...)	Item code of vehicle used in transporting equipment (IDATA(461,...)) to and from scene of engineering task	365,370,...
	Words 461-680 are a possible 20 sets, each again corresponding to the possible 20 item codes of equipment available for this task type. Each 11-word combination appears as follows:	
IDATA(461,...)	Item code for equipment/supplies	461,472,...
IDATA(462,...)	One of five possible amounts of this item code, each occurring in ascending order, to which IDATA(463,...) is associated	462,473,...
IDATA(463,...)	A whole number percentage representing the rate modification necessary in tasking if IDATA(462,...) is less than the standard amount needed for this task, but greater than the amount of equipment (IDATA(461,...)) on hand	463,474,...
IDATA(464,...)	Step 1 above IDATA(462,...)	464,475,...
IDATA(465,...)	Rate modifier associated with IDATA(464,...)	465,476,...
IDATA(466,...)	Step 1 above IDATA(464,...)	466,477,...
IDATA(467,...)	Rate modifier associated with IDATA(466,...)	467,478,...
IDATA(468,...)	Step 1 above IDATA(466,...)	468,479,...
IDATA(469,...)	Rate modifier associated with IDATA(468,...)	469,480,...
IDATA(470,...)	Step 1 above IDATA(468,...)	470,481,...
IDATA(471,...)	Rate modifier associated with IDATA(470,...)	471,482,...
IDATA(681)	Modifier for darkness associated with task rate	681
IDATA(682)	Terrain rate modifier for trafficability at task site less than 5	682
IDATA(683)	Terrain rate modifiers for trafficability 5-8	683
IDATA(684)	Terrain rate modifiers for trafficability 9-12	684

Variable	Description	Word Location
IDATA(685)	Terrain rate modifiers for trafficability 13-16	685
IDATA(686)	Terrain rate modifiers for trafficability 17 or above	686

The FORCE record will contain up to a possible 60 sets each corresponding to one of the possible size combinations available, in order from smallest to the largest. Each of these 11-word combinations appears as follows:

Variable	Description	Word Location
IDATA(1,...)	One of a possible five forcing item codes associated with this type task and in decreasing order of preference from left to right	1,12,...
IDATA(2,...)	Casualties associated with forcing this size task with IDATA(1,...)	2,13,...
IDATA(3,...)	Next highest forcing item code preferred	3,14,...
IDATA(4,...)	Casualties associated with IDATA(3,...)	4,15,...
IDATA(5,...)	Third forcing item code	5,16,...
IDATA(6,...)	Casualties associated with IDATA(5,...)	6,17,...
IDATA(7,...)	Fourth forcing item code	7,18,...
IDATA(8,...)	Casualties associated with IDATA(7,...)	8,19,...
IDATA(9,...)	Last possible forcing item code	9,20,...
IDATA(10,...)	Casualties associated with IDATA(9,...)	10,21,...
IDATA (11,...)	Rate at which minefield can be forced	11,22,...

Record 157 contains miscellaneous information concerning engineer tasks. The contents of the record are as follows:

Variable	Description	Word Location
IDATA(1)	Basic size of each of the 25 possible engineer task types.	1

Variable	Description	Word Location
IDATA(26)	Blue contingency level for each of the 200 Blue EOH types	26
IDATA(301)	Red contingency level for each of the 200 Red EOH types	301
IDATA(511)	Twenty-five couplets, each representing one of the possible task types, with the first word the number of size increments played for this task type, the second the number of recessive increments played	511
IDATA(561)	Constricted movement rate associated with crossing breached barriers or existing facilities	561

18. ENGINEER TASK FILE. Data file 18 of the DIVWAG data file contains an order list of all engineer tasks requested but not completed in the course of a game. It is from this ordered file that each task is brought into the system and executed upon. It is a dynamic file which contains 1000 records of six words each. When a task is completed, that record is removed and all other records shifted down one to maintain a monotonically increasing sequence by task priority. The contents of each record are as follows:

Variable	Description	Word Location
TKPRTY	Priority of this task	1
BARREC	Record number on File 2 of barrier associated with this task	2
FEASCH	Blue or Red force to execute	3
IPRTY	Time interval to complete task	4
TMENGR	Time engineer task should begin	5
PTYMAN	Mandatory-Desired task flag	6

19. UNIT MOVEMENT RATE TABLES. Data file 19 contains the unit movement rate tables required by the Movement Model. It is loaded by the program MOVELD and contains 50 records of 120 words each initially. Other records are added as they are needed. The contents of this file are described below.

Variable	Description	Location Record	Location Word
UNITRT (N,120)	Unit movement rate tables. (N force, formation, route type combinations X 120 light, weather, terrain, move type combinations.)	1	1

20. SENSOR DATA. The DIVWAG data file number 20 is for sensor data utilized by the Intelligence and Control Model. This consists of 1000 records, and the record size is 20 words per record. The following is a breakdown of the 1000 records:

Records	Description
1-100	Individual Blue sensor status records
101-200	Individual Red sensor status records.
201-202	Blue light observation helicopter (LOH) TOE table.
203-204	Red LOH TOE table
205-206	Blue fixed wing Army aviation reconnaissance unit TOE table
207-208	Red fixed wing Army aviation reconnaissance unit TOE table
209-212	Sensor type directory table
213-716	Sensor constant data (126 four-record blocks)
717-719	Not used
720-724	Individual Blue sensor directory table
725-729	Individual Red sensor directory table
730-754	Individual sensor range brackets for sensor movement
755-769	Blue sensor load combinations for reconnaissance
770-784	Red sensor load combinations for reconnaissance
785-884	Blue LOH decision matrices
885-984	Red LOH decision matrices

Variable	Description	Word Location
985-1000	UGS field constant data	

The records take various forms in data file 20, defined as follows:

a. Individual Moving Target Indicator (MTI) Radar:

Variable	Description	Word Location
LSENST	Sensor type code	1
IREF	Key to sensor type parameter table	2
IUIDS	IUID of sensors first node unit	3
LSTRPT	Last assigned report number	4
ISTATS	Sensor status flag	5
IXC	Sensor X-coordinate	6
IYC	Sensor Y-coordinate	7
IZC	Sensor Z-coordinate	8
MINR	Minimum range (meters)	9
MAXR	Maximum range (meters)	10
ALPHA	Horizontal orientation (radians from x-axis)	11
THETA	Horizontal search sector (radians)	13
MINVEL	Minimum radial target velocity	15
SCNRAT	Azimuth autoscan rate (milliradians/ centiminutes)	16
RSCAND	Range autoscan depth (meters)	17
	Not used	18-20

b. Individual Air Defense Radar:

Variable	Description	Word Location
LSENST	Sensor type code	1
IREF	Key to sensor type parameter table	2

Variable	Description	Word Location
IUIDS	IUID of sensors first node unit	3
LSTRPT	Last assigned report number	4
ISTATS	Sensor status flag	5
IXC	Sensor X-coordinate	6
IYC	Sensor Y-coordinate	7
IZC	Sensor Z-coordinate	8
MINR	Minimum range (meters)	9
MAXR	Maximum range (meters)	10
ALPHA	Horizontal orientation angle (radians from x-axis)	11
THETA	Horizontal search sector width (radians)	13
BETA	Vertical orientation angle (radians)	15
PHI	Vertical search sector (radians)	17
	Not used	18-20

c. Individual Countermortar/Counterbattery Radar:

Variable	Description	Word Location
LSENST	Sensor type code	1
IREF	Key to sensor type parameter table	2
IUIDS	IUID of sensors first node unit	3
LSTRPT	Last assigned report number	4
ISTATS	Sensor status flag	5
IXC	Sensor X-coordinate	6
IYC	Sensor Y-coordinate	7
ALPHA	Horizontal center azimuth (radians from x-axis)	8
THETA	Horizontal search sector (radians)	9

Variable	Definition	Word Location
BETA	Site mask angle (radians)	10
PHI	Vertical beam separation (radians)	11
	Used by program CCOLLF	12-20

d. Individual Unattended Ground Sensor (UGS) Fields:

Variable	Description	Word Location
LSENST	Sensor type code	1
IREF	Key to sensor type parameter table	2
IUIDS	IUID of sensor first node unit	3
LSTRPT	Last assigned report number	4
ISTATS	Sensor status flag	5
IX1	Coordinates of UGS field corners	6
IY1		7
IX2		8
IY2		9
IX3		10
IY3		11
IX4		12
IY4		13

e. Organization and Equipment. TOEs for LOH or fixed wing Army aviation reconnaissance units (two records).

Variable	Description	Word Location
IAIR	Aircraft equipment item code	1
NOAIR	Number of aircraft (up to sixteen items)	2
IEOH (16)	Remaining equipment (up to eighteen items) required for reconnaissance mission unit alternating equipment item and associated amount of that item	3-38
NOPER	Number of personnel for mission unit	39

Variable	Definition	Word Location
IDELAY	Delay time to prepare for subsequent reconnaissance missions	40

f. Sensor Type Directory Table. These four records are used to store a keyword used as the cross reference to the four record block of constant data. The first keyword references the sensor constant data loaded into records 213-216, the second references the records 217-220, etc. The keyword is computed as follows:

KEYWRD = Sensor type code X 10000 + force code X 1000 + the equipment item code of the sensor.

(Force code = 1 for Blue and = 2 for Red)

g. Sensor Constant Data for MTI Radar:

Variable	Description	Word Location
EOHS	Sensor EOH number	1
NSENST	Sensor type code	2
MAXRS	Maximum range (meters)	3
MINRS	Minimum range (meters)	4
	Not used	5
SCNRAT	Autoscan rate in azimuth (milliradians/centiminute)	6
	Not used	7
RSCAND	Range scan depth (meters)	8
IPDOWN	Time to power down (mintues)	9
IPUP	Time to power up (minutes)	10
MTRKTM	Mean time to track and report (centiminutes)	11
IFAIL	Percent of time of equipment failure	12
ISIGDS	Deflection error standard deviation (milliradians)	13

Variable	Description	Word Location
ISIGRS	Range error standard deviation (meters)	14
RNGPT1	Range point 1 for personnel detection	15
RNGPT2	Range point 2 for personnel detection	16
PDRIMI	Probability of detection, recognition and identification of personnel at minimum range	17
PDRI1	Probability of detection, recognition and identification of personnel at range point 1	18
PDRI2	Probability of detection, recognition and identification of personnel at range point 2	19
PDRIMX	Probability of detection, recognition and identification of personnel at maximum range	20
	Detection probability interpolation points for wheeled vehicles as described in words 15-20.	21-26
	Detection probability interpolation points for tank.	27-32
	Detection probability interpolation points for APCs.	33-38
	Detection probability interpolation points for tube artillery	39-44
	Detection probability interpolation points for artillery missiles	45-50
	Detection probability interpolation points for air defense guns	51-56
	Detection probability interpolation points for air defense missiles	57-62
	Not used	63-65
MINVEL	Minimal radial target velocity	66
	Not used	67-68
IPF	Precipitation factor (%) - none	69
	- light	70
	- heavy	71

Variable	Description	Word Location
IECM (3)	ECM factor (%) - none	72
	- some	73
	- heavy	74
IPFALS	Probability of false alarm (%)	75
IFF(4)	Forestation factor (%) - none	76
	- sparse	77
	- moderate	78
	- heavy	79
	Not used	80

h. Sensor Constant Data for AD Radars. The four record blocks for an AD radar are basically the same as those describing the MTI with the following exceptions.

Variable	Description	Word Location
RNGPT1	Range point 1 for detection of aircraft	15
RNGPT2	Range point 2 for detection of aircraft	16
PDRIMI	Probability of detection, recognition and identification of aircraft at minimum range	17
PDRI1	Probability of detection, recognition and identification of aircraft at range point 1	18
PDRI2	Probability of detection, recognition and identification of aircraft at range point 2	19
PDRIMX	Probability of detection, recognition and identification of aircraft at maximum range	20
	Not used	21-62

i. Sensor Constant Data for Countermortar/Counterbattery Radar (4 Records):

Variable	Description	Word Location
IEOH	Item code of sensor	1
NSENST	Sensor type code	2
	Not used	3

Variable	Description	Word Location
ALFAL	Typical low angle for CEP_L (radians)	4
ALFAH	Typical high angle for CEP_H (radians)	5
CEPL	CEP for low angle fire (meters)	6
CEPH	CEP for high angle fire (meters)	7
ANGCUT	Low angle to high angle cut off (radians)	8
IPDOWN	Mean time to power down (centiminutes)	9
IPUP	Mean time to power up (centiminutes)	10
PDET	Probability of locating beam intercept point or of tracking projectile from pick-up point	11
MTDET	Mean time to strobe points and locate fire unit or to analyze recorder chart data	12
MAXTPP	Maximum time to remain at pick-up point without detecting subsequent rounds	13
PDWNTM	Percent of equipment down time	14
RMAX(1)	Maximum detection range against weapon/munition type A001	15
.	.	.
.	.	.
.	.	.
RMAX (36)	Maximum detection range against weapon/munition type A036	50
ERRMAX	Maximum allowable location error (meters)	51
BTHETA	Horizontal beam width coverage (radians)	52
PHI	Vertical beam separation	53
PHITH	Vertical beam thickness	54
	Not used	55-68
IPF (3)	Precipitation Factor (%) - none	69
	- light	70
	- heavy	71

Variable	Description		Word Location
IECM (3)	ECM factor (%)	- none	72
		- some	73
		- heavy	74
	Not used		75-80

j. Sensor Constant Data for Visual Observers (Four Records):

Item code of observer (set to 0)	1
Sensor type code (11 or 12)	2
Magnification of sensor (enter 1 for visual unaided, sensor type 11)	3
Field of view of sensor (steradians x 10^4) (for sensor type 11 enter 62800)	4
Minimum resolvable solid angle of unaided visual observer (steradians x 10^{10}). Enter 409	5
Mean time to report sighting to FSCC or to node where fire support decision can be obtained (seconds)	6
Mean time for report to be entered into intelligence channels (seconds)	7
Number of resolvable target elements required for 50 percent observer identification threshold (x 10)	8
Variance in number of resolvable target elements required for 50 percent observer identification threshold (x 10)	9
Number of resolvable target elements required for 50 percent observer recognition threshold (x 10)	10
Variance in number of resolvable target elements required for 50 percent observer recognition threshold (x 10)	11
Effective glimpse rate (seconds x 10)	12
Not used	13-15
Target location error expected on 50 percent of the targets identified and reported (meters)	16
Not used	17-29

Description	Word Location
Background vision reflectance RV = 1 unforested (x 1000)	30
Background vision reflectance RV = 1 forested (x 1000)	31
Background vision reflectance RV = 2 unforested (x 1000)	32
Background vision reflectance RV =2 forested (x 1000)	33
Background vision reflectance RV = 3 unforested (x 1000)	34
Background vision reflectance RV = 3 forested (x 1000)	35
Background vision reflectance RV = 4 unforested (x 1000)	36
Background vision reflectance RV = 4 forested (x 1000)	37
Background vision reflectance RV = 5 unforested (x 1000)	38
Background vision reflectance RV = 5 forested (x 1000)	39
Background vision reflectance RV = 6 unforested (x 1000)	40
Background vision reflectance RV = 6 forested (x 1000)	41
Background vision reflectance RV =7 unforested (x 1000)	42
Background vision reflectance RV = 7 forested (x 1000)	43
Background vision reflectance RV = 8 unforested (x 1000)	44
Background vision reflectance RV = 8 forested (x 1000)	45
Background vision reflectance RV = 9 unforested (x 1000)	46
Background vision reflectance RV = 9 forested (x 1000)	47
Background reflectance of concrete road x 1000	48
Background reflectance of gravel road x 1000	49
Background reflectance of dirt road x 1000	50
Visual reflectance of personnel x 1000	51
Visual reflectance of vehicles x 1000	52
Visual reflectance of tanks x 1000	53
Visual reflectance of APCs x 1000	54

Description	Word Location
Visual reflectance of artillery tubes x 1000	55
Visual reflectance of artillery missiles x 1000	56
Visual reflectance of AD guns x 1000	57
Visual reflectance of AD missiles x 1000	58
Visual reflectance of aircraft x 1000	59
Not used	60-65
Personnel mean presented area (m^2 x 10)	66
Tank mean presented area (m^2 x 10)	67
APC mean presented area (m^2 x 10)	68
Artillery tube mean presented area (m^2 x 10)	69
Artillery missile mean presented area (m^2 x 10)	70
AD gun mean presented area (m^2 x 10)	71
AD missile mean presented area (m^2 x 10)	72
Aircraft mean presented area (m^2 x 10)	73
Not used	74-80

k. Sensor Constant Data for Airborne SLAR/MTI Radar (Four Records):

Description	Word Location
Item code of sensor	1
Sensor type code (16)	2
Pulse power transmitted (watts)	3
Pulse repetition frequency (cycles/second)	4
MTI minimum detectable radial velocity (meters/second x 10^2)	5
Maximum antenna gain (db)	6
Radar receiver noise power (watts x 10^{15})	7

Description	Word Location
Radar minimum depression angle (radians x 100)	8
Radar wavelength (meters x 10^5)	9
Receiver signal filtering loss (db)	10
Receiver rain filtering loss (db)	11
Atmospheric absorption loss (db/kilometers x 10^6)	12
Precipitation absorption loss, fog (db/kilometers x 10^6)	13
Precipitation absorption loss, light rain (db/kilometers x 10^6)	14
Precipitation absorption loss, heavy rain (db/kilometers x 10^6)	15
Target location error expected on 50% of targets identified (meters)	16
Mean time to process, interpret, generate sensing report and report to FSCC from GST (seconds)	17
Mean time to process, interpret, generate sensing report and report to division intelligence channel (seconds)	18
Receiver band width(cycles/second x 10^{-3})	19
Delay setting increment of radar (meters)	20
Range interval minimum setting (meters)	21
Range interval next setting (meters)	22
Range interval maximum setting (meters)	23
Effective azimuthal linear resolution of synthetic antenna (meters)	24
Percent of unmasked target missed by image interpreter	25
Signal to noise level for 50 percent target detectability (x 100)	26
Variance in signal to noise level about 50 percent detectability (x 100)	27

Description	Word Location
Number of image interpreters at ground sensor terminal simultaneously analyzing real time SLAR data	28
Not used	29-50
Radar reflectance of personnel targets (x 10^4)	51
Radar reflectance of vehicle targets (x 10^4)	52
Radar reflectance of tank targets (x 10^4)	53
Radar reflectance of APC targets (x 10^4)	54
Radar reflectance of artillery tube targets (x 10^4)	55
Radar reflectance of artillery missile targets (x 10^4)	56
Radar reflectance of AD gun targets (x 10^4)	57
Radar reflectance of AD missile targets (x 10^4)	58
Radar reflectance of aircraft targets (x 10^4)	59
Not used	60-65
Target mean presented areas (m^2 x 10) as described in words 66-73 for visual observers	66-73
Not used	74-80

1. Sensor Constant Data for Aerial Cameras (Four Records):

Description	Word Location
Item code (EOH) of sensor type	1
Sensor type code (21-25 or 31-35)	2
Blank	3
High contrast operational resolution of camera system (millimeters x 10^7)	4
Camera depression angle (degrees x 10)	5
Focal length of camera system (mm)	6
Lateral field of view of camera (degrees x 10)	7

Description	Word Location
Frame rate coefficient (enter 5)	8
Number of image interpreters used to interpret film from this camera	9
Mean time for interpreter to interpret frame (seconds)	10
Variance in the frame interpretation time (seconds)	11
Processing and handling time for film from time of landing to time available for interpretation (seconds)	12
Mean time required to prepare and transmit sensing report of target to intelligence channel node (seconds)	13
Location error expected on 50 percent of targets identified on film (meters)	14
Number of resolvable target elements required for 50 percent identification level	15
Variance in number of resolvable target elements around the 50 percent identification level	16
Percent of unmasked targets missed by photo interpreter (enter percent)	17
Not used	18-29
Same data that was entered in words 30-80 for visual observer	30-80

m. Individual Sensor Directory Table. The five records for each force are used to store keywords used as a cross reference to the individual sensors data loaded in records 1 through 200. The keyword is computed as follows:

KEYWRD = item code x 100000 + first node x 100 + sequence number

n. Individual Sensor Range Brackets for Sensor Movement:

Variable	Description	Word Location
RMINO	Minimum range bracket for offensive operations for sensor in record 213	1

Variable	Description	Word Location
RMAXO	Maximum range bracket for offensive operation for sensor in record 213	2
RMIND	Minimum range bracket for defensive operations for sensor in record 213	3
RMAXD	Maximum range bracket for defensive operations for sensor in record 213	4
	Range bracket for sensor in 217	5-8
	Range brackets for sensor in 221	9-12
	Range brackets for sensor in 225	13-16
	Range brackets for sensor in 229	17-20

This type record is repeated for all ground based sensors (i.e., sensor types 2, 3, 4, 5, 6 and 8) in records 1 through 200.

o. Reconnaissance Sensor Load Combination. This type of record for data file 20 gives the sensor combination for the various reconnaissance type missions. Records 755 through 759 are for LOH or fixed wing observation aircraft sensor combinations. Records 760 through 764 are for the MOHAWK reconnaissance and records 765 through 769 are for the Air Force High Performance reconnaissance. Red has a similar breakdown for records 770 through 784.

p. LOH Decision Matrices:

Variable	Description	Word Location
ITT (15)	Target element thresholds upon which decisions are to be made	1-15
IOPT (5)	The control options conditionals	16-20

q. UGS Field Constant Data:

Variable	Description	Word Location
TGTYP1	Target type = 1 personnel = 2 wheeled vehicles = 3 tracked vehicles	1
RAD1	Sensitive radius for target type	2

Variable	Description	Word Location
TGTYP2	Target type	3
RAD2	Associated sensitive radius	4
TGTYP3	Target type	5
RAD3	Associated sensitive radius	6
IPCTFA	Percent of false alarms	7
	The above seven words are repeated for UGS sensor type 2	8-14
	The above is repeated for UGS sensor type 3	15-21

This process is repeated for the sensor types defined for a force, and may hold up to eight records per force. Records 985 through 992 are for Blue force, and records 993 through 1000 are for Red force UGS.

21. BATTLE RECORDS. Data file 21 of the DIVWAG data files is used to hold data during a ground combat battle increment. File 21 has 105 records which are 256 words in length. Only the first 34 records are currently reserved for use, and each record corresponds to one unit participating in the battle. The contents of these records are as follows:

Variable	Description	Word Location
TOTRL (16)	Total number of rounds lost for 16 ammunition types	1-16
TOTWL (8)	Total number of weapon-system/transports lost for eight weapon-system types	33-40
TOTSL (10)	Total number of sensors lost for ten sensor types	49-58
TOTPL	Total number of personnel lost	69
XDIST	Total distance moved in the X-direction	71
YDIST	Total distance moved in the Y-direction	73
ICNT	Number of movements counted	75
SENSDT (7,17)	Sensor detection data items (enemy unit index (IUID), estimated X-coordinate,	76-194

Variable	Definition	Word Location
	estimated Y-coordinate, common frontage, estinated rate of movement, estimated direction, and number of personnel detected) for 17 possible enemy units	

22. ENGINEER TASK SITE FILE. Data file 22 of the DIVWAG data files contains data relating each barrier to its given location geographically by the quadrature methodology as described in Chapter 14 of Section IV. This file is created by BARLD and contains 20 records of 752 words per record. Each record can be further broken after the first two words into 250 3-word triplets. The first word and one of these 3-word triplets contains the following:

Variable	Description	Word Location
ITOT	Total number of 3-word triplets on this record	1
BLOC	Eight-character quadrature means of locating barrier	3,6,...
IRECNM	Record number on File 2 which BLOC identifies	5,8,...

23. UNIT COMPOSITION DATA. Date file 23 of the DIVWAG data files contains the composition, in terms of component subunits, of a unit which was automatically built by the ECHLON routine. The file contains 200 records of 25 words each. This file is accessed by the DETACH routine of the DIVWAG Period Processor. The following is a breakdown of a record on File 23:

Variable	Description	Word Location
JREC	IUID of unit to which the record pertains	1
UNT1(24)	UNT1(1) contains the UTD of a component unit type, and UNT1(2) contains the number of units of this type Remainder of record is eleven more two-word pairs, defined as UNT1 for different UTD	2

24. AIRMOBILE REARM/REFUEL POINT DATA. Data file 24 is reserved for use by the rearm/refuel submodel of the Airmobile Model. It is created with 25 records of 1212 words each by the routine LOAD7. One record is required for each forward rearm/refuel point played, so records may be added dynamically as needed. A detailed description of a record is as follows:

Variable	Description	Word Location
IUFDMU (20)	IUIDs of mission units requesting servicing	1-20
TIF (20)	Total number of fuel inlets in the mission unit	21-40
TACRA (20)	Total number of aircraft in the mission unit to be rearmed	61-80
READY (20)	Number of aircraft ready to be rearmed in this mission unit	101-120
TAC (20)	Game time rearming of last fragment of this mission unit will be completed	141-160
RFTVI (20)	Time required to refuel one inlet of one aircraft in this mission unit	161-180
RACAT (100)	Rearm capacity availability time. (time fragments finish rearming)	201-300
RACAA (100)	Amount of rearm capacity available at time RACAT(I)	301-400
RFC	Current capacity of this forward refuel/ rearm area (FRRA)	501
RAC	Current rearm capacity of this FRRA	503
QI	Queue index; points to last unit in queue	505
RFP	Refuel pointer; points to position in queue of last unit being refueled	506
RAP	Rearm pointer; points to position in queue of last unit being rearmed	507
	Not used	508
	Not used	509
MTRF	Maneuver time for refueling	510
MTRA	Maneuver time for rearming	511
IREC24	Points to the last record used in File 24	512
FILE12(35,20)	This area is used to store the original data file 12 records of units while they are being resupplied	513-1212

25. TACFIRE DATA. Data file 25 of the DIVWAG data files contains data for the TACFIRE Model. The file is loaded by TACLD and AFMLD. Data file 25 contains one record of 27092 words. The following gives a breakdown of the contents of data file 25.

Variable	Description	Word Location
DIVZON (2,4)	Y-intercepts of the division zones for four divisions (one Blue division and three Red divisions) DIVZON (1,1)=YCEPT1 of Blue division DIVZON (2,1)=YCEPT2 of Blue division DIVZON (1,2), (1,3), (1,4)=YCEPT1s of Red divisions DIVZON (2,2), (2,3), (2,4)=YCEPT2s of Red divisions	1
IDD (4)	Division IUIDs (first one Blue division, next three Red divisions)	17
FUSRCD (1080)	Blue division fire unit status array IUDFU (36). IUID of fire unit IFUMC (36). Fire unit mission (DS=1, REINF=2, GS/REINF=3, GS=4) FUPOC (36). Fire unit pending order code IWEAP (36). Weapon EOH number MAXRG (36). Maximum range (meters) MINRG (36). Minimum range (meters) WMIDX (4,36). Weapon/munition index (for each munition) ASRPC (4,36). ASR priority cutoff (for each munition) ASRA (4,36). ASR authorized (for each munition) ASREX (4,36). ASR expended (for each munition) FUMAC (36). Fire unit mission assignment (0 or report)	21

Variable	Description	Word Location
	NBNVA (36). Number of volleys assigned	
	NBNVF (36). Number of volleys fired	
	NORA (36). Number of rounds per volley	
	WMIDXA (36). Weapon/munition index of assigned mission	
	TFMCMP (36). Time of complete mission	
	XTARG (36). Target X-coordinate	
	YTARG (36). Target Y-coordinate	
TGTLST (816)	Blue division target list	1101
	LMUID (48). IUID of target	
	LRPINO (48). Latest sensing report number	
	LESTX (48). Estimated X-coordinate	
	LESTY (48). Estimated Y-coordinate	
	LMOVRT (48). Estimated rate of movement (meters per minute)	
	LESTDR (48). Estimated movement direction (centiradians from X-axis)	
	LTMDTL (48). Time of last detection (minutes from start of game)	
	LTGTX (48). Target type-size-activity index	
	LLUID (48). Requesting unit code	
	LIUREQ (48). Request code (DIV=1, BDE=2, BN=3)	
	LIDDS (48). IUID of direction support unit	
	LMANID (48). IUID of nearest friendly maneuver unit	
	LTGTPC (48). Target priority code	
	LNEMAS (48). Number of fire missions assigned	

Variable	Description	Word Location
	LOFATK (48). Level of attack unassigned (percent)	
	LTTGTE (48). Time target entered AFTFC1 (minutes from start of game)	
	LESTSZ (48). Estimated size	
FUSRCD (1080)	First Red division fire unit status array (see description above)	1917
TGTLST (816)	First Red division target list (see description above)	2997
FUSRCD (1080)	Second Red division fire unit status array (see description above)	3813
TGTLST (816)	Second Red division target list (see description above)	4893
FUSRCD (1080)	Third Red division fire unit status array (see description above)	5709
TGTLST (816)	Third Red division target list (see description above)	6789
WMNPA (396)	Blue weapon/munition parameters table	7605
	IPMEOH (36). Weapon EOH	
	IPMEOH (36). Munition EOH	
	ITRONE (36). Time to fire first round (seconds)	
	ITRN (36). Time to fire rounds 1-n (seconds)	
	ITRS (36). Time to fire subsequent rounds (seconds)	
	IRNCO (36). Nth round cutoff	
	MPPT (36). Minimum personnel per weapon	
	MUNWT (36). Munition weight (pounds per round)	
	MWRMAX (36). Maximum range	
	MWRMIN (36). Minimum range	

Variable	Description	Word Location
	MWIR (36). Impact radius	
WMNPA (396)	Red weapon/munition parameters table (see description above)	8001
PTYTAB (4,5)	Blue target priority table. Variable repeats for 11 target types, and seven activities	8397-9936
	Contents of target priority table:	
	PTYTAB (I,1). Priority range point 1 for four target sizes where I is the target size index.	
	PTYTAB (I,2). Priority range point 2.	
	PTYTAB (I,3). Target priority from zero to priority range point 1.	
	PTYTAB (I,4). Target priority between priority range point 1 and priority range point 2.	
	PTYTAB (I,5). Target priority beyond priority range point 2.	
PTYTAB (4,5)	Red target priority table (same description as Blue target priority table discussed above)	9937
MATKA (7700)	Blue method of attack table	11477
	MWIND (20). Weapon/munition combination index	
	NVPLT (20). Number of volleys on platoon target	
	NVCO (20). Number of volleys on company target	
	NVBN (20). Number of volleys on battalion target	
	NVBDE (20). Number of volleys on brigade/regiment target	

Variable	Description	Word Location
	(Each for a combination of 11 target types and seven activities)	
MATKA (7700)	Red method of attack table (see description above)	19177
FILE25 (3,36)	Blue munition description table	26877
	APRJ (36). Mean angle of fire	
	PROJL (36). Projectile length	
	PROJC (36). Projectile caliber	
FILE25 (3,36)	Red munition description table (see description above)	26985

26. AIR GROUND ENGAGEMENT DATA FILE. Data file 26 contains all the pertinent input data used by the Air Ground Engagement Model. The file has a fixed word length of 72 words per record and contains 616 records. The 616 records are subdivided into two sections of 308 records each. The first 308 records contain data pertaining to a Blue force air strike against Red, the second 308 records contain data pertinent to a Red force air strike against Blue. Each section of 308 records is further broken down into 16 tables. Table sizes vary depending on the number of records in each table. The 16 tables in each of the two sections are identical in size and format; they differ only in the input data stored in them. The following tables constitute File 26.

Table Number	Table Name	Description	Number of Records Per Table	Physical Records Occupied By Blue	Red
1	ACMMSM	Minimum resources allocation tables for this mission	40	1-40	309-348
2	DACMUM	Maximum resources allocation tables for this mission	40	41-80	349-388
3	PREPT	Mission preparation times	40	81-120	389-428
4	AHENG	Aircraft engagement parameters	40	121-160	429-468
5	ABORT	Aircraft mission abort parameters	40	161-200	469-508
6	FLTSPD	Aircraft flight speeds table	9	201-209	509-517
7	Not Used		9	210-218	518-526

Table Number	Table Name	Description	Number of Records Per Table	Physical Records Occupied By Blue	Red
8	HARD	Aircraft, ammunition, and air defense types table	9	219-227	527-535
9	LANDTM	Aircraft landing times table	9	228-236	536-544
10	AVALTM	Aircraft availability times table	9	237-245	545-553
11	WCHAR	Aircraft weapon characteristics table	20	246-265	554-573
12	TERVEG	Terrain and vegetation degradation factors for air defense weapons	20	266-285	574-593
13	ACAVA	Aircraft average vulnerable areas table	20	286-305	594-613
14	MTSAVE	Mission resources table	1	306	614
15	ACAVL	Item codes for aircraft and aircraft munition types	1	307	615
16	SORTY	Available tactical air sorties	1	308	616

27. ENGAGEMENT RESULT TABLES FILE. Data file 27 is used to determine outcomes of engagements between aerial attackers and ground targets in terms of aircraft losses, munition expenditures, and losses inflicted on the ground target. The data must be prepared pregame from results obtained from high resolution simulation models for engagements under similar conditions. File 27 has a fixed word length of 112 words per record and contains 1000 records. Each record contains the complete engagement results for a specific attack situation. Data contained within each record include:

Variable	Description	Word Location
ENGRES (1)	Aircraft A-kills	1-4
ENGRES (5)	Aircraft B-kills	5-8
ENGRES (9)	Aircraft C-kills	9-12
ENGRES (13)	Aircraft D-kills	13-16
ENGRES (17)	Aerial munitions expended	17-22
ENGRES (23)	Aerial munitions lost	23-28
ENGRES (29)	Enemy tanks killed	29

Variable	Description	Word Location
ENGRES (30)	Enemy APCs killed	30-31
ENGRES (32)	Enemy vehicles killed	32-33
ENGRES (34)	Enemy personnel killed	34
ENGRES (35)	Enemy air defense weapons killed	35-43
ENGRES (44)	Enemy air defense munitions expended	44-52
ENGRES (53)	Number of aircraft flying mission	53
ENGRES (54)	Duration of engagement	54
	Not used	55-112

28. UNIT STRUCTURE AND ITEM DISTRIBUTION DATA. Data file 28 of the DIVWAG data files contains data describing the structure of the units and the distribution of personnel and equipment items within the units. Each record of File 28 is 189 words in length; the number of records is dynamic, depending on the number of unit types defined. The first four records contain the unit-type/record-location directory described as follows:

Variable	Description	Record Location
UTDSB (189)	List of Blue UTDs which have data records	1
RECNB (189)	List of record numbers corresponding to the Blue UTDs in UTDSB	2
UTDSR (189)	List of Red UTDs which have data records	3
RECNR (189)	List of record numbers corresponding to the Red UTDs in UTDSR	4

All records following the first four are records describing the unit structure and item distribution corresponding to a particular unit type. These records have the following contents:

Variable	Description	Word Location
NEOH	Number of items with nonuniform distribution among bands	1
EQPDIR (20)	List of item codes for 20 items with nonuniform distributions	2-21

Variable	Description	Word Location
WIDTH (7)	Unit widths for the seven activities given by the activity index	22-28
DEPTH (7)	Unit depths for the seven activities given by the activity index	29-35
NBAND (7)	Number of bands for the seven activities given by the activity index	36-42
PERSD (7)	Packed words of personnel distribution among bands for the seven activity indexes	43-49
EQPD (7,20)	Equipment item distributions among bands for the seven activity indexes and the 20 items listed in EQPDIR	50-189

29. MUNITION LETHAL AREAS AND DELIVERY DATA. Data file 29 of the DIVWAG data files contains the data for the Area Fire Model, which consists of lethal areas and delivery parameters. File 29 contains 72 records of 216 words each.

Records 1-36 are assigned to Blue weapon/munition combinations; records 37-72 are assigned to Red weapon/munition combinations. The contents of each record are described as follows:

Variable	Description	Word Location
IEICW	Equipment item code of the weapon	1
IEICM	Equipment item code of the munition	2
LAPERS (3,2)	Lethal areas for personnel in three postures (standing, prone, foxhole) and two environments (unforested, forested)	3-8
LAEQP (200)	Lethal areas for 200 equipment items	9-208
MAXRNG	Maximum range of weapon/munition	209
MINRNG	Minimum range of weapon/munition	210
SIGTAB (6)	Error, σ, at six range points between maximum range and minimum range	211-216

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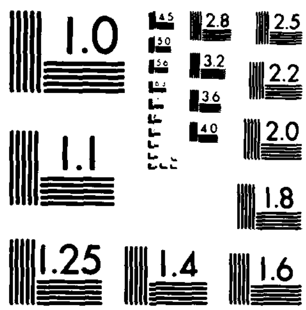

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30. PERSONNEL POSTURE AND PROTECTION DATA AND NUCLEAR DATA. Data file 30 of the DIVWAG data files contains data describing personnel distribution among protective vehicles and unprotected personnel posture breakdowns. For a non-nuclear game, File 30 contains two records, one for Blue and one for Red, of 2149 words. The contents of the records are described below:

Variable	Description	Word Location
UNPRO (7,7)	Posture breakdown of unwarned personnel: standing, prone, foxhole; posture breakdown of warned personnel: standing, prone, foxhole; and time to regain unwarned posture; for seven activity indices	1-49
VEHPRO (3,100,7)	Item code, number of personnel per vehicle, and number of casualties per vehicle lost, for 100 vehicles and seven activity indices	50-2149

File 30 contains 20 records, and each record is 2149 words in length. The first two records are for the Area Fire Model. For a nuclear game, data file 30 of the DIVWAG data files contains data for the Nuclear Assessment Model. The file is loaded by NUCLD. The following is a breakdown for the remaining 18 records of File 30:

Variable	Description	Location Record	Location Word
FAYT (300,7)	The fuze data for nuclear weapons. This record contains data for 300 fuze combinations of the total 1200 combinations	3	1-2100
	FAYT(I,1). Code number for the weapon/munition/fuze combination		
	FAYT(I,2). Impact detonation flag		
	FAYT(I,3). Airburst flag		
	FAYT(I,4). Desired height of burst if the airburst flag is on		
	FAYT(I,5). Probable error in height of burst.		
	FAYT(I,6). Minimum range for this combination		
	FAYT(I,7). Maximum range for this combination		

Variable	Description	Location Record	Location Word
NOBFAC (27)	The array of character codes which link barriers and facilities with the array of pointers to the damage radius affecting them	3	2101-2127
FAYT (300,7)	The second group of data for the fuze combinations. The breakdown is the same as in record 3.	4	1-2100
NOBFPT (27)	The array of pointers which links each barrier or facility to a damage radius	4	2101
FAYT (300,7)	Same as in record 3	5	1-2100
RT (10)	Soil modifiers	5	2101-2110
FAYT (300,7)	Same as in record 3	6	1-2100
WWNAME (1200)	The array of nuclear weapon/munition combination names which have been defined for this team (four characters each)	7	1-1200
WWSTAT (100,9)	The array of statistics associated with each weapon/warhead combination. These data are independent of the fuze used	7	1201-2100
	WWSTAT(I,1). Code number for the combination, used for indexing the array		
	WWSTAT(I,2). EOH index number for the weapon		
	WWSTAT(I,3). EOH index number for the warhead		
	WWSTAT(I,4). Standard deviation in range for the weapon/warhead combination		
	WWSTAT(I,5). Standard deviation in deflection for the weapon/warhead combination		
	WWSTAT(I,6). Index number of the FAYT array containing the first fuze entry for this weapon/warhead combination		
	WWSTAT(I,7). Incoming angle of the round		

Variable	Description	Location Record	Location Word
	WWSTAT(I,8). Velocity of the round (meters/minute)		
	WWSTAT(I,9). Time required to deliver the round with the unit in state of readiness one (minutes)		
YDRHOB (241,8)	The table associating with each yield, four height of burst and damage radii choices for each of the 30 final damage radii. This record contains data for the first eight yields	8	1
	YDRHOB(1,I). Actual yield of the round		
	YDRHOB(2,I). First height of burst for this damage radius		
	YDRHOB(3,I). Radius of damage for this yield with the first height of burst (HOB)		
	YDRHOB(4,I). Second HOB for this radius		
	YDRHOB(5,I). Radius of damage for second HOB		
	YDRHOB(6,I). Third HOB for this radius		
	YDRHOB(7,I). Radius of damage for third HOB		
	YDRHOB(8,I). Fourth HOB for this radius		
	YDRHOB(9,I). Radius of damage for fourth HOB		
	YDRHOB(10,I) - (17,I). Same as (2,I) - (9,I) except it is for the second damage radius		
	YDRHOB(241,I).		
EOHLEA(200)	The array of links from each EOH item in the air to a specific damage radius of an enemy nuclear weapon	8	1929
YDRHOB(241,8)	The table of yield data for the second eight yields. Breakdown is the same as in record 8.	9	1

Variable	Description	Location Record	Location Word
EOHLFA (200)	The array of links from each EOH item in the air to a specific damage radius of a friendly nuclear weapon	9	1929
YDRHOB (241,8)	The table of yield data for the third eight yields. Breakdown is the same as in record 8	10	1
PEPFLG (200)	The table of flags to indicate if the EOH item is to be assessed, not only under its primary damage radius, but also under another radius which may cause casualties to passengers and crew without destroying the item	10	1929
YDRHOB (241,6)	The table of yield data for the last six possible yields. Breakdown is the same as in record 8	11	1
CCYD (30)	The numerical code for the yields in the YDRHOB array	11	1447
UNPRO (7)	The array of distributions of unprotected personnel in a nuclear environment. There are four sets of data for units in a stay and one set per activity for units in any of six other modes.	11	1477

UNPRO (1). Personnel exposed (unwarned)

UNPRO (2). Personnel in open foxholes (unwarned)

UNPRO (3). Personnel in earth shelters (unwarned)

UNPRO (4). Personnel exposed (warned)

UNPRO (5). Personnel in open foxholes (warned)

UNPRO (6). Personnel in earth shelters (warned)

UNPRO (7). Time to revert to unwarned state

The above array repeats for 10 activity types.

Variable	Description	Location Record	Location Word
EOHLEG (200)	The array of links from each EOH item on the ground to a specific damage radius of an enemy nuclear weapon	11	1547
EOHLFG (200)	The array of links from each item on the ground to a specific damage radius of a friendly nuclear weapon	11	1747
RSTRAN (200)	The array of residual transmission factors for each EOH item	11	1947

Records 12 through 20 are the same as records 3 through 11 except they contain data for Red forces instead of Blue.

31. SUPPLY STATUS FILE. Data file 31 of the DIVWAG data files contains data for the Combat Service Support Model. This file is established by ECHLON. It may be modified by the TRFR functions, JOIN or DETACH, or the Combat Service Support function, SUPFIL. Data file 31 contains a 10-word record for every equipment item that is to be resupplied for every resolution unit. The File 31 starting and ending record numbers for each resolution unit are maintained on the unit's status record in locations UMAIN (317) and UMAIN (318). The following is a breakdown of the file's contents:

Variable		Description	Word Location
SUPREC (10)			
	(1)	JEOH. Equipment item code (1-201)	1
	(2)	ACV. Authorized equipment level on combat vehicles	2
	(3)	AOHT. Authorized equipment level on hand hand in trains	3
	(4)	OHT. Current equipment amount on hand in trains	4
	(5)	RATUSE. Current usage rate (biased by 1000)	5
	(6)	SIGMA. Standard deviation in usage rate (biased by 100)	6
	(7)	INDEX2. Flag indicating preferred distribution method (1=unit distribution, 2=supply point)	7

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Variable	Description	Word Location
(8)	ASR. Number of major end items or personnel replacements	8
(9)	CONST. Backorder constraint factor which reflects level of demand for this item (biased by 100)	9
(10)	Not used.	10

32. DATA FILE 32. Not used.

33. DATA FILE 33. Not used.

34. DATA FILE 34. Not used.

35. DATA FILE 35. Not used.

36. COMMON STORAGE FILE. Data file 36 contains 1 record of 20100 words. The file is composed of both constant and dynamic data. The dynamic data represents mostly common areas and scratch areas used by a few submodels. Intelligence data and OPERINS control parameters contribute to the constant data areas.

Variable	Description	Word Location
IFNT(56,3)	The file name table. The logical directory for the DIVWAG input/output package.	1
XYZONE(9,4)	X, Y coordinates of weather sectors gamed.	169
UMAIN(500)	Unit status file record of main unit.	205
UCOOP(500)	Unit status file record of cooperating unit.	705
TERAIN(10)	Terrain file record (see data file 3 description).	1205
WEATHER(9)	Weather file record (see data file 4 description).	1215
ETTAB(2)	Order event table entry (event code and time).	1224
IOUT(256)	History tape output record.	1226
FORCAL	Contains the last time the "force order" scenario was searched.	1482

Variable	Description	Word Location
TCLOCK	Current game time (centiminutes)	1483
XEVCOD	Index code of the last event.	1484
XNORD	Index of the last order number.	1485
NTERR	Terrain cell size.	1486
IER	I/O error code.	1487
NXTC	No. terrain cells in X direction.	1488
NYTC	No. terrain cells in Y direction.	1489
IBFOOD	Blue force food consumption rate (pounds/man/day).	1490
IRFOOD	Red force food consumption rate.	1491
BTMM(20)	Blue force travel mode mnemonics.	1492
RTMM(20)	Red force travel mode mnemonics.	1512
BFTMRT	Pointer to Blue force dismounted infantry default table.	1532
BMCMRT	Pointer to Blue force mechanized unit default table.	1533
RFTMRT	Pointer to Red force dismounted infantry default table.	1534
RMCMRT	Pointer to Red force mechanized unit default table.	1535
BMPRTY	Pointer to lowest Blue move priority table.	1536
RMPRTY	Pointer to lowest Red move priority table.	1537
BMNT	Begin morning nautical twilight.	1538
EENT	End of evening nautical twilight.	1539
SUNRIS	Sun rise	1540
SUNSET	Sun set	1541

Variable	Description	Word Location
BPTEMP	Fuel consumption rate break point temperature (32° or 90°).	1542
KMIN	Minute of previous clock update.	1543
RNDSED	Random number generator seed.	1544
SWITCH(4)	Simulated sense switches for output printing.	1545
BPOINT	Lowest Blue IUID.	1549
RPOINT	Lowest Red IUID.	1550
ISKORE	Next available File 44 record.	1551
RSTIME	Restart dump interval (minutes).	1552
SPTUID	IUID of unit created in a transfer event.	1553
DAY	Currect game day.	1554
HOUR	Current game hour.	1555
MINUTE	Current game minute.	1556
LGTPER	Period length.	1557
CMPRNT	Computer run cut-off time (minutes).	1558
INTFLG	Initialization: 1=period, 2=restart, 3=game.	1559
SNAPHR(4)	Time for snap dumps of all unit status records (hours).	1560
EVTBLE(4000)	Event table, one word for each unit (1000 wds) and event time for each model scheduled events (3000 wds).	1564
UIDTAB(2, 1000)	UID cross-reference table, list of UID by IUID. Word (1,i) is first four characters of unit i, word (2, i) is second four characters.	5564
UTDTAB (1000)	List of unit type designators by IUID.	7564
UNTLOC(2, 1000)	Unit locations. Current X and Y coordinate by IUID. The X location of unit i in word (1,i), and the Y location in word (2,i).	8564

Variable	Description	Word Location
SENSLO(2, 200)	X and Y location of sensors. X location in word (1,i), and Y location in word (2,i). i=1-100 for Blue sensors and 101-200 for Red sensors.	10564
ENGDAT(1000)	Engineer dynamic data to include quadrature codes.	11001
EQPTYP(100)	Equipment type codes (1-50 for blue, 51-100 for red). Each word contains 4 characters (left justified) for four equipment codes/word.	12001
ZONDAT(200)	Contains battlefield geometry and leading units.	12101
BNTHRH(5,10)	Blue battalion information flow threshold matrix.	12301
BDRGTH(5,10)	Blue brigade information flow threshold matrix.	12351
DVTHRH(5,10)	Blue division information flow threshold matrix.	12401
FLOWDT(5,5)	Blue information flow delay times.	12451
BNTHRH(5,10)	Same as above for Red.	12476
BDRGTH(5,10)	Same as above for Red.	12526
DVTHRH(5,5)	Same as above for Red.	12576
FLOWDT(5,5)	Same as above for Red.	12626
PDTB(50)	Blue processing delay time table.	12651
UTDTB(50)	Blue UTD table per delay times.	12701
DDTB	Blue decision delay time table.	12751
URTB(11,7)	Red unit radius estimate table.	12801
PDTR(50)	Red processing delay time table.	12901
UTDTR(50)	Red UTD table for delay times.	12951
DDTR(50)	Red decision delay time table.	13001

Variable	Description	Word Location
URTR(11,7)	Blue unit radius estimate table.	13051
USETB(7,22)	Red unit size estimate table.	13151
USETR(7,22)	Blue unit size estimate table.	13305
RDAFSL	DAFS range limit (Blue).	13461
RARTYL	ARTY range limit (Blue).	13462
DTDAFS	Delay time to request DAFS mission (Blue)	13463
DTCAS	Delay time to request CAS mission (Blue).	13464
DTARTY	Delay time to request ARTY mission (Blue).	13465
RDAFSL	DAFS range limit (Red).	13466
RARTYL	ARTY range limit (Red).	13467
DTDAFS	Delay time to request DAFS mission (Red).	13468
DTCAS	Delay time to request CAS mission (Red).	13469
DTARTY	Delay time to request ARTY mission (Red).	13470
BNSRPT(10,20)	Blue battalion sensor report numbers.	13471
BRSRPT(20,5)	Blue brigade sensor report numbers.	13671
DVSRPT(100)	Blue division sensor report numbers.	13771
BNSRPT(10,64)	Red battalion sensor report numbers.	13871
BRSRPT(20,16)	Red brigade sensor report numbers.	14511
DVSRPT(100,3)	Red division sensor report numbers.	14831
INDXX	Index of the next available record on the redundant target file.	15131
ITGTID(24)	Array of targets upon which aerial fire support has been requested.	15132

Variable	Description	Word Location
LSTRPT(10)	Last report sequence number for intelligence from all battlefield sources.	15165
ISNRPTB(50)	Blue artillery sensing report numbers.	15175
ISNRPTR(50)	Red artillery sensing report numbers.	15225

37. ENGINEER EQUIPMENT FILE. Data file 37 of the DIVWAG data files is a dynamic file used by the Engineer Model to indicate which two units have contributed supplies and equipment for a particular task, should they need to be returned, and to indicate a running total of every engineer-related unit currently at the task site. (This could be any number from 1-5.) This file contains 1500 records, each of 60 words in length. The contents of each record are as follows:

Variable	Description	Word Location
IARRAY (1 to 5)	Each unit, up to 5, is placed in words 1-5 as it arrives at the tasking site, and cleared when it leaves	1-5
IARRAY (16)	Lowest level echelon unit supplying equipment and/or supplies for the mission	16
IARRAY (17)	Up to 20 possible item code amounts corresponding in position to the File 17 listing of equipment/supplies for this task type from COIUID1	17-36
IARRAY (37)	Highest level echelon unit supplying equipment and/or supplies for the mission	37
IARRAY (38)	Up to 20 possible item code amounts supplied by COIUID2 corresponding to the File 12 record for task type	38-57

38. DATA FILE 38. Not used.

39. GROUND COMBAT MODEL DATA. Data file 39 of the DIVWAG data files contains data for the Ground Combat Model. The file is loaded by GCMLD. Data file 39 contains two records, and each record is 14258 words in length. The Ground Combat Model data are entirely oriented toward attacker-defender pairs, with the first record on File 39 containing a complete set of data for the situation where the attacker is a Blue unit and the defender is a Red unit. The second record on File 39 contains a complete set of data for the alternative situation where the attacker is a Red unit and the defender is a Blue unit. The following is a breakdown, applicable to each of the two records, of the contents of File 39:

Variable	Description	Word Location
AZAP (16,6)	NATO hit probability for each attacking weapon/ammunition combination for six range values	1

Variable	Definition	Word Location
ASLOPE (16,8)	Slope of the $P_{K/H}$ line for attacking weapons against defending targets	193
ACEPT (16,8)	Y-intercept of the $P_{K/H}$ line for attacking weapons against defending targets	449
DZAP (16,6)	NATO hit probability for each defending weapon/ammunition combination for six range values	1057
DSLOPE (16,8)	Slope of the $P_{K/H}$ line for defending weapons against attacking targets	1249
DCEPT (16,8)	Y-intercept of the $P_{K/H}$ line for defending weapons against attacking targets	1505
ADSEN (8,10)	Distribution of sensor types among attacking transports	1793
ASPP (10,4)	Sensor performance parameters for attacking sensors	1953
PPIND (8)	Probability of defending transports disclosing their position by firing a single round (pinpoint probability)	2033
DDSEN (8,10)	Distribution of sensor types among defending transports	2087
DSPP (10,4)	Sensor performance parameters for defending sensors	2247
PPINA (8)	Probability of attacking transports disclosing their position by firing a single round (pinpoint probability).	2327
DBIG (8)	Presented area of defending transports	2345
ARMAX (16)	Maximum range of attacking weapons	2361
ARMIN (16)	Minimum range of attacking weapons	2393
-(64)	Not used	2425
ATAFD (16)	Time to aim, fire, and deliver a round for attacking weapons	2489
ARATE (16)	Maximum rate of fire for attacking weapons	2521
ABIG (8)	Presented area of attacking transports	2667
DRMAX (16)	Maximum range of defending weapons	2683

Variable	Description	Word Location
DRMIN (16)	Minimum range of defending weapons	2715
DTAFD (16)	Time to aim, fire, and deliver a round for defending weapons	2811
DRATE (16)	Maximum rate of fire for defending weapons	2843
RBAR (16)	Line of sight parameters	3971
BKGREF (9)	Background reflectance data	4003
SKGR (3)	Sky-ground ratio data	4021
ANPERS (8)	Number of personnel lost with attacking transports	4027
DNPERS (8)	Number of personnel lost with defending transports	4043
ATREF (8)	Reflectance of attacking transports	4059
DTREF (8)	Reflectance of defending transports	4075
ASENTP (10)	Sensor type (day/night) for attacking sensors	4349
DSENTP (10)	Sensor type (day/night) for defending sensors	4359
NSENTA	Number of attacking sensor types	4369
LNKA (16)	Attacking weapon to transport links	4370
ITYPD (8)	Defending transport types (i.e., tank, APC)	4386
NSENTD	Number of defending sensor types	4464
LNKD (16)	Defending weapon to transport links	4465
ITYPA (8)	Attacking transport types (i.e, tank, APC)	4481
NWTA	Number of attacking weapon types	4489
NWSTA	Number of attacking transport types	4490
NWSTD	Number of defending transport types	4491
NWTD	Number of defending weapon types	4492

Variable	Definition	Word Location
APRIOR (16,8)	Attacking weapon/defending target priorities	4493
AMLIMA (16,4)	Attacking ammunition supply conditionals	4621
DPRIOR (16,8)	Defending weapon/attacking target priorities	4685
AMLIMD (16,4)	Defending ammunition supply conditionals	4813
IEOHAS (10)	Attacking sensor item codes	4877
IEOHAT (8)	Attacking transport item codes	4887
IEOHAW (16)	Attacking weapon item codes	4895
IEOHDS (10)	Defending sensor item codes	4911
IEOHDT (8)	Defending transport item codes	4921
IEOHDW (16)	Defending weapon item codes	4929
LABEL (80)	Data load identification	4945

40. DATA FILE 40. Not used.

41. BATTALION TARGET INFORMATION FILE. Data file 41 of the DIVWAG data files contains intelligence information on enemy targets generated, processed, and communicated through the Intelligence and Control (INC) Model. This file contains only battalion-level intelligence files. The file consists of a total of 84 records, the first 20 are for Blue battalions and the last 64 are for Red battalions. The record size of the file is 340 words per record. (Each battalion may have intelligence information on ten enemy units, and there are 34 words of intelligence data on each target unit.) The following is a breakdown of the 34 words of intelligence data on each target unit.

Variable	Description	Word Location
RPTNO	Sensing report number	1
MUID	IUID of the unit sensed	2
ESTX	Estimated X-coordinate	3
ESTY	Estimated Y-coordinate	4
ESTSZE	Estimated size	5

Variable	Description	Word Location
ESTYPE	Estimated type	6
ESTACT	Estimated activity	7
MOVRAT	Estimated movement rate if moving	8
ESTDIR	Estimated direction of movement if moving	9
NOPERS	Estimated number of personnel detected	10
NOVEH	Estimated number of vehicles detected	11
NOTNKS	Estimated number of tanks detected	12
NOAPCS	Estimated number of APCs detected	13
NOATBS	Estimated number of artillery tubes detected	14
NOAMIS	Estimated number of artillery missles detected	15
NOADGN	Estimated number of ADA guns detected	16
NOADMS	Estimated number of ADA missles detected	17
NOACFT	Estimated number of aircraft detected	18
TMDTLS	Time of last detection	19
IDSENS	ID of the sensor system sensing	20
LPRIOR	Priority based on area of responsibility	21
ISENST	Sensor type	22
NUID	IUID of last unit to detect	23
NOIUID	Number of units having detected this target	24
CONFID	Confidence in the information	25
NORPT1	Redundant sensing report number (1)	26
NORPT2	Redundant sensing report number (2)	27
NORPT3	Redundant sensing report number (3)	28
	Currently not used	29-34

42. BRIGADE/REGIMENT TARGET INFORMATION FILE. Data file 42 of the DIVWAG data file consists of the intelligence information file of a brigade/regiment level maneuver unit which is developed within the INC Model. This file consists of 21 records, and each record is 680 words in length. Each brigade/regiment unit may have up to 20 enemy units upon its intelligence information file, and each of the intelligence records consists of 34 words; thus, the record size of 680 words. The description of the 34 words that make up the intelligence record is given in the discussion of File 41.

43. DIVISION TARGET INFORMATION FILE. Data file 43 of the DIVWAG data file is the division target information file. It is a file that contains intelligence information on enemy units for which the division has received intelligence through the INC Model. This file contains four records, which are 3400 words in size. Each division unit may have up to 100 enemy units in its intelligence file, and there are 34 words of intelligence data on each enemy target unit. These 34 words are described in the discussion of File 41. The four records of this file are broken down as follows: one Blue division as the first record and three Red divisions as records 2 through 4.

44. REDUNDANT TARGET FILE. Data file 44 is the redundant target file of the DIVWAG data files, developed and utilized by the INC Model. This redundant target file retains information on targets that are considered redundant one with the other by the creative processing submodel of the INC Model. Its primary purpose is to make sure all qualifying units receive redundant target information. This file consists of 500 records, and each record is 100 words in length. Following is the breakdown of the 100 words records:

Variable	Description	Word Location
NORPT1	Redundant sensing report number (1)	1
NORPT2	Redundant sensing report number (2)	2
NORPT3	Redundant sensing report number (3)	3
RPTNO	Sensing report number	4
JUID (96)	IUIDs of the maneuver units that have been communicated this redundant report	5-100

45. CAMERA DETECTIONS FILE. Data file 45 of the DIVWAG data files is used as a holding file for aerial camera sensing reports until the aircraft lands. File 45 contains 4002 records of 35 words each. Records 1-2000 are reserved in blocks of 200 for 10 Blue aerial camera missions; records 2001-4000 are reserved in blocks of 200 for 10 Red aerial camera missions. The first 4000 records are identical to the 35-word INC sensing report. Records 4001-4002 are reserved for the mission-unit/block-location directory described below:

Variable	Description
ISRDIR (2,10,2)	The unit index (IUID) and number of sensing reports for the 10 camera mission units for the two forces

46. DATA FILE 46. Not used.

47. DATA FILE 47. Not used.

48. SCORE BOARD FILE. Data file 48 contains the cumulative losses for each unit within a game period. The score boards are cleared at the beginning of each period and counters are incremented throughout the period by routine SCORE. The file contains 1212 word record for every unit receiving losses from Ground Combat, Area Fire, Air Ground Engagement, TACAIR, and Nuclear Assessment. Each record is divided into six 202 word subrecords as described below.

Subrecord	Words
Area Fire	1-202
Nuclear Assessment	203-404
Air Defense	405-606
Ground Combat	607-808
TACAIR	809-1010
DAFS	1011-1212

Each subrecord contains the following quantities:

Contents	Units	Words
Amount of fire	Number of rounds, sorties or centiminutes of ground combat	1
Personnel losses	Hundredths	2
Equipment losses	Quantity of each equipment item lost	3-202 (by item code)

49. DATA FILE 49. Not used.

50. AUTHORIZED STRENGTH DATA. Date file 50 of the DIVWAG data file contains authorized personnel and equipment for a unit. The file is loaded by ECHLON. File 50 contains 1000 records, each of 202 words. The record number for a

unit's record on File 50 is the same as the unit's IUID or record number on the Unit Status File (File 1). Contents of a record on File 50 are:

Variable	Description	Word Location
AUTEOH (200)	Authorized level of 200 items	1
AUTPER	Authorized personnel	201
	Not used	202

51. UTD DIRECTORY. Data file 51 of the DIVWAG data file is the unit type designator (UTD) directory. This file contains two records of 1000 words each and is loaded by LDTOE.

a. The first record functions as a directory or index to data files 52 and 53 whereby the location of a UTD within File 51 points to an associated record on Files 52 and 53. If a UTD is located at word N, ($1 \leq N \leq 250$) then records N and N+250 of File 52 describe that UTD. If a UTD is located at word M ($251 \leq M \leq 1000$) then record M-250 of File 53 describes that UTD.

b. The second record of data file 51 contains a count of type units authorized within the total force described by the LDTOE data, word N on the second record being the number of units of the type found at word N of the first record. This record is used by ECHLON to check that the number of units of each type defined to LDTOE is actually used in the force Task Organization.

52. BASIC UNIT DESCRIPTIONS. Data file 52 of the DIVWAG data files contains basic unit TOE descriptions. The file is loaded by LDTOE and contains 500 records of 202 words each. Records N and N+250 describe a given unit type, where the UTD is defined by its position within data file 51.

a. Records 1 through 250 contain, in the first 200 words, authorized amounts of 200 items of equipment. Word 201 contains authorized personnel, and word 202 is not used.

b. Records 251 through 500 contain, in the first 200 words, authorized amounts of 200 items to be treated as available in bulk to the unit. The values are positive if the item is to be supplied to this type unit by unit distribution and negative for supply point distribution. Words 201 and 202 are not used.

53. UNIT TYPE COMPOSITION. Data file 53 of the DIVWAG data file contains type unit compositions where a type unit is made up of several type subordinate units. This file is loaded by LDTOE and used by ECHLON. The file contains 750 records of 24 words each, where record N contains the composition of a type unit having the UTD found in word N+250 of File 51. Each record contains 12 word pairs where the first word of a pair is a UTD and the second word is the number of units of that type authorized to the type unit being described.

54. DATA FILE 54. Not used.

55. DSL ORDERS TABLE. Data file 55 contains the tables of orders generated by the DIVWAG scenario language (DSL) compiler and other information stored by the compiler. The file is created with 5000 records of 21 words each. Other records may be added if they are needed.

Variable	Description	Location Record	Location Word
PERDAY	Day period begins	1	1
PERHR	Hour period begins	1	2
PERMIN	Minute period begins	1	3
	Length of period in centiminutes	1	4
	Not used	1	5
	Start of period/start of game indicator	1	6
UNTPT	Pointer to last unit stored in unit battle directory table (UBT)	1	11
BATPT	Pointer to last battle stored in UBT	1	12
UBT (4,1023)	Unit battle directory table (UBT)	2	1
LABEL, OARY	The remaining records are used to store the labels associated with unit scenarios and battle paragraphs. These records are allocated dynamically with the UBT containing the pointers to the records used and the number of records used by each unit scenario or battle paragraph. The five records preceding a unit scenario contain the labels associated with it.	197	1

CHAPTER 3

DIVWAG INPUT/OUTPUT PACKAGE

1. INTRODUCTION. A programmer has full control over creation, access, modification, and removal of logical files and records to the DIVWAG data file through the DIVWAG data file input/output package. The DIVWAG data file input/output package is described in detail in Appendix B to this chapter. The file formats and contents of various files as used in the DIVWAG system are detailed in Appendix A to Chapter 2 of this section.

2. DIVWAG DATA FILE LOGICAL LAYOUT. The DIVWAG data file contains a maximum of 55 logical files, the logical definition of which may vary for each file. As each logical file is allocated through a call to the routine CREATE, the logical record size for that file is specified. The DIVWAG input/output package allows the logical record size to vary for every file used, and yet allocates the entire physical file with no interrecord gaps, thus minimizing the amount of unused disk space.

a. File Name Table:

(1) The file name table (IFNT) is the logical file directory for the DIVWAG input/output package. It is used for the management of all of the operations on the DIVWAG data file. The file name table is a double subscripted array containing allocation information on each assigned file of the DIVWAG data system. The size of the table is IFNT(56,3), which is broken down to 56 independent files available to the DIVWAG system (actually only 55 files are available for user utilization as file number 56 is used for internal requirements of the input/output package).

(2) The file name table contains, for each logical file, three words to describe the file system: first, actual disk word location of the first word of the file; second, the number of words per record for this particular file; third, the number of records for this file.

(3) The file name table resides in the first 168 words of the disk file TAPE1, and always reflects the current status of the DIVWAG data system. Each time the logical structure of the DIVWAG data system is changed (through calls to CREATE, REMOVE, ADDRCD, SUBRCD, ADDWRD, or SUBWRD), the IFNT is updated. Once updated, the file name table is placed back onto disk so that the current file information is always reflected in the disk resident IFNT.

(4) For the DIVWAG I/O package to operate, the file name table (IFNT (56,3)) must be in computer memory. It is assigned the first 168 words of common ONE as its core residence. Prior to any call to any of the DIVWAG I/O routines, IFNT must have been brought in from disk to computer memory. The following call must be the first executed I/O routine within any DIVWAG subsystem to bring in IFNT.

CALL GETFLE(4HKEYS,IFNT,IER)

b. File Operation. The DIVWAG I/O package provides a broad range of functions for manipulating DIVWAG logical data files. The I/O package can be called to allocate a file, to reserve additional storage for a file, to remove a file from the system, or to change the file itself.

(1) Creation or Removal of a File:

(a) The routine CREATE when called will allocate an area of storage on the disk file for the logical file specified. It does this by making an entry into the file name table for the specified file according to the size and number of records designated in the calling sequence of CREATE.

(b) A logical file can be released from the DIVWAG data system through a call to the routine REMOVE. The routine physically moves the data information below the designated file up to cover the storage area occupied by the file. It also deletes the entry from the file name table for the logical file removed.

(2) Modification of a File. A file may be modified through calls to several different routines within the DIVWAG I/O package. A short discussion of each of the modifying routines follows.

(a) ADDRCD modifies a file by the addition of a number of records to the specified file. The only restriction to this routine is that the record size must be the same as that specified in the allocation of the file. Any number of records may be added, and they can be added anywhere within the file.

(b) ADDWRD modifies a file by the addition of a number of words to each record within the specialized file. Any number of words may be added to each record, and they may be added anywhere within each record.

(c) SUBRCD modifies a file by removing a number of records from a file. The requirements and restrictions of ADDRCD also apply here.

(d) SUBWRD modifies a file by the removal of a number of words from each record of the specified file. Again, any number of words may be removed from each record, and they may be removed from anywhere within the record.

(3) Usage of the Files. This functional group of routines is utilized to transmit the desired data between the storage media and the computer's memory for processing. These routines are:

(a) GETWRD brings in a group of words from a specified record of a specified file on the disk into computer memory.

(b) PUTWRD puts out from computer memory to the disk pack a number of words to a specified record on a specified file.

(c) GETRCD brings into computer memory from the disk a number of records from a specified file.

(d) PUTRCD puts a group of records out to a specified file from memory to the disk.

(e) GETFLE gets in from disk the entire specified file.

(f) PUTFLE puts out to the disk from computer memory the entire specified file.

(4) Data Transmission To/From Disk. The physical transmission of data to and from the disk file is actually performed by the GETPUT, TRANSMT, and MASSIO routines. The routine GETPUT calculates the word locations and physical record units where the desired data reside or are to reside. The routine TRNSMT, by calls to the entry points--READMS and REWRIT--in the COMPASS routine MASSIO, performs the reading or writing of the data requested for the DIVWAG input/output package.

APPENDIX A

INPUT REQUIREMENTS FOR INPUT/OUTPUT PACKAGE

The input required by the Input/Output Package is of two types:

- Parameters passed by the calling routine which specify the nature of the operation to be performed. Refer to the descriptions of the calling routines for an explanation of these data in each case.

- Data on disk to be transferred to core or data in core to be transferred to disk. These data compose the DIVWAG data files and are described in detail in Appendix A to Chapter 2 of this section.

APPENDIX B

DIVWAG INPUT AND OUTPUT PACKAGE PROGRAM DESCRIPTIONS

1. INTRODUCTION. The DIVWAG input and output (I/O) package, I06500, performs input and output operations on the DIVWAG data files. The functions of the routines described in this appendix are as follows:

a. Allocation or Removal of a File:

- CREATE
- REMOVE

b. Modification of a File:

. ADDRCD	. SUBRCD
. ADDWRD	. SUBWRD

c. File Usage:

. GETFLE	. GETRCD	. GETWRD
. PUTFLE	. PUTRCD	. PUTRCD
. FILE	. RECORD	. WORD

d. Input and Output Processing:

. GETPUT	. FSL	. ILLEGL	. OPENMS
. TRNSMT	. SHFTDN	. NCOMP	. MASSIO

2. ROUTINE CREATE:

a. Purpose. CREATE allocates an area of mass storage for a specified DIVWAG data file. Allocated space is not zeroed.

b. Input Variables:

Name	Source	Contents
NAME	Call	File ordinal reference.
NREC	Call	Total number of records in file name.
LREC	Call	Length of records in file name (in words).
ISTCK	Call	Unit status check indicator for I/O routines: 1 = check, 0 = do not check.

c. Output Variables:

Name	Destination	Contents
IFNT(56,3)	Disk and ONE	Updated file name table.

Name	Destination	Contents
ISTCK	Call	Error code of requested I/O operation.

d. Logical Flow (Figure VII-3-B-1):

(1) Block 1. Initialize DIVWAG data system parameters (e.g., physical block size, number of available files).

(2) Block L10. If the requested file ordinal is not from one to less than or equal to 55, control goes to block L100.

(3) Block L20. If this file has been created, control goes to block L150.

(4) Block L30. Get the last file to be created from the last word in the file name table (IFNT).

(5) Block 2. If this is nonzero, control goes to block L50.

(6) Block L40. If it is zero, the last file created is unknown and a call to routine NCOMP will determine the last file created.

(7) Block L50. If this file is not data file 1, control goes to block L51.

(8) Block 4. Calculate spacer words to put the first word of data file 1 at the beginning of a physical block.

(9) Block L51. Compute the first word location of this file as the first word of last file created plus its record size multiplied by its number of records plus any spacer words.

(10) Block 5. Compute the last word location of this file as this file's first word location plus its record size multiplied by its number of records.

(11) Block 6. If the addition of this file causes the DIVWAG data system to exceed the maximum file size, control goes to block L200.

(12) Block L60. Load the record size and total number of records of the created file into their appropriate file name table locations.

(13) Block 7. If this is not the first file to be created, control goes to block L80.

(14) Block L70. Set the first word location of this file to beginning of fifth block.

(15) Block L80. Set created file name into last file created variable on file name table.

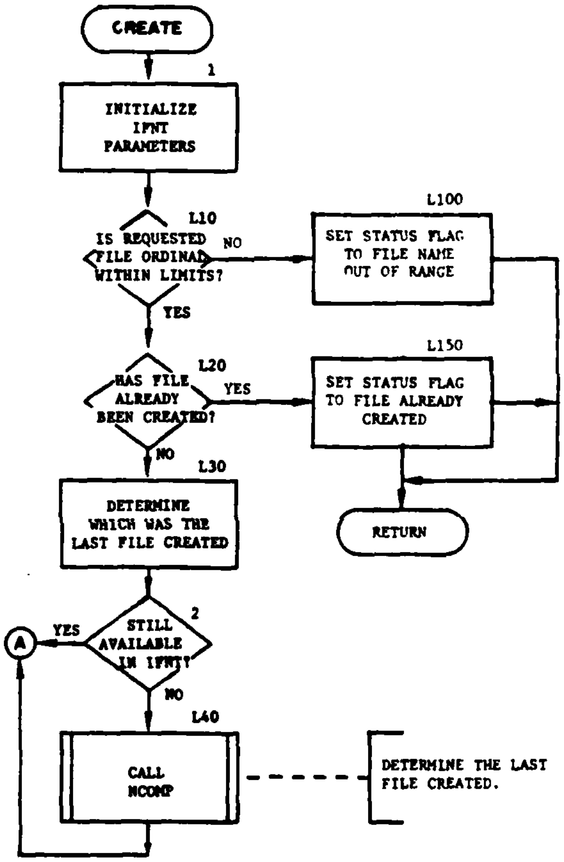


Figure VII-3-B-1. Routine CREATE (Continued on Next Page)

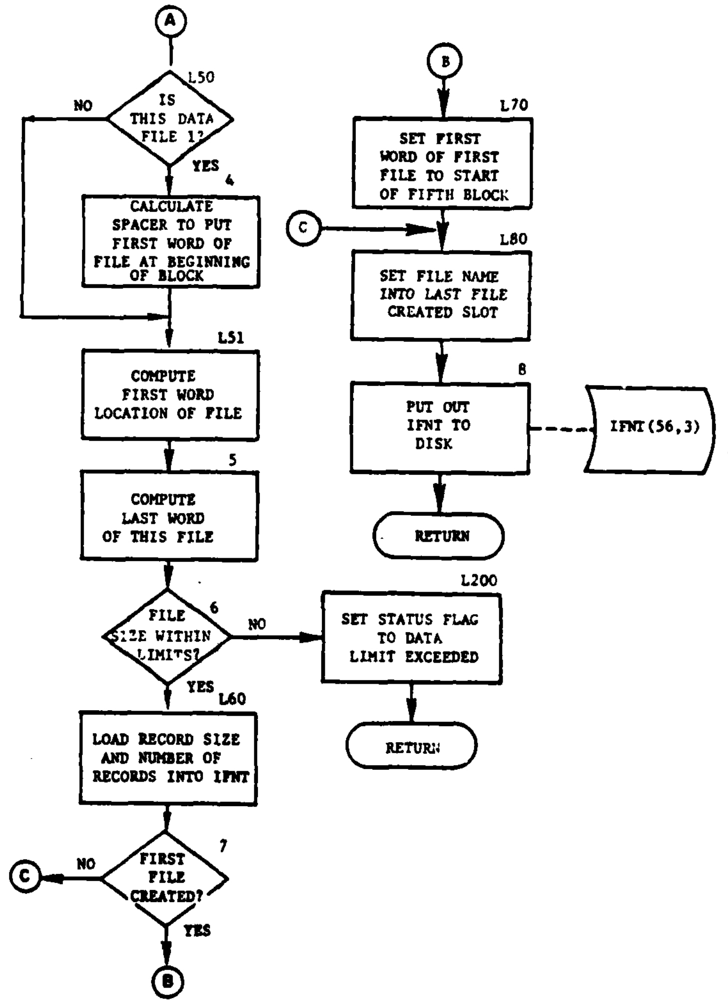


Figure VII-3-B-1. Routine CREATE (Concluded)

(16) Block 8. Put out updated file name table (IFNT) to disk and return control to the calling routine.

(17) Block L100. Set status code to indicate file name is out of range, and return control to the calling routine.

(18) Block L150. Set status flag to indicate file is already created, and return control to the calling routine.

(19) Block L200. Set status code to indicate DIVWAG data system limit is exceeded, and return control to the calling routine.

3. ROUTINE REMOVE:

a. Purpose. Routine REMOVE removes a file from the DIVWAG data system.

b. Input Variables:

Name	Source	Contents
IFNT(56,3)	ONE	File name table.
NAME	Call	File ordinal reference.
ISTCK	Call	Unit status check indicator for I/O routines: 1 = check, 0 = do not check.

c. Output Variables:

Name	Destination	Contents
IFNT(56,3)	Disk and ONE	Updated file name table.
ISTCK	Call	Error code of requested I/O operation.

d. Logical Flow (Figure VII-3-B-2):

(1) Block 1. Call ILLEGL to determine if the file ordinal requested to be removed is legitimate and if the file currently exists.

(2) Block 2. If the file name is illegal or the file is nonexistent, control goes to block L250.

(3) Block 3. Determine the last file created. If the value in IFNT is zero, call NCOMP to determine the file name. If this file that was requested to be removed was not the last file created, control goes to block L180.

(4) Block L175. Zero the value of the last file created variable in IFNT, and transfer control to block L190.

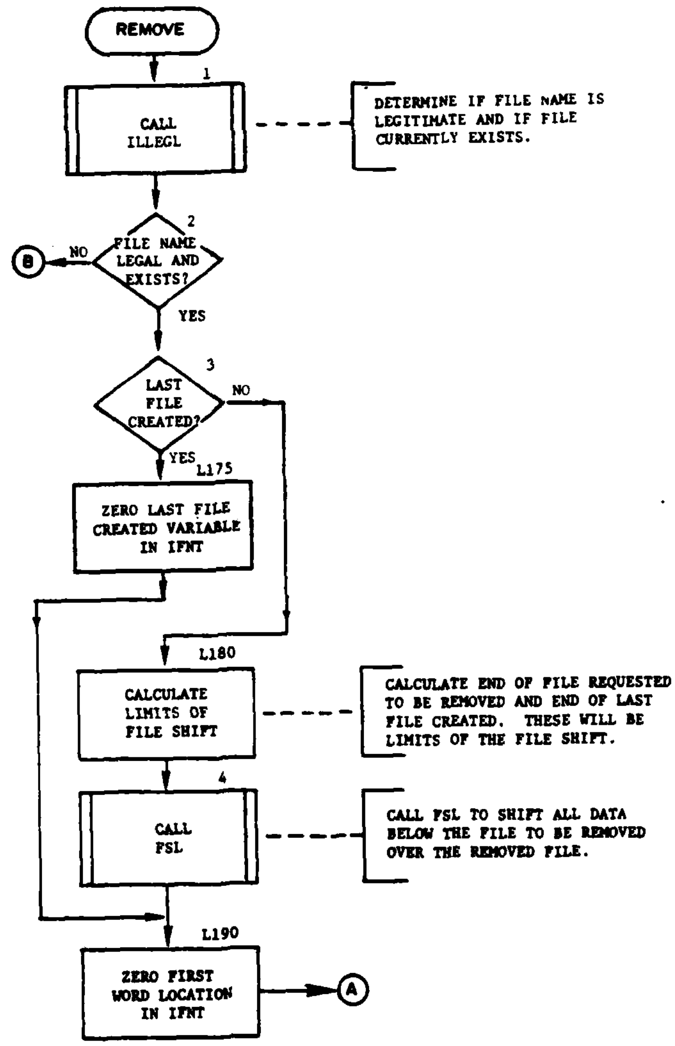


Figure VII-3-B-2. Routine REMOVE (Continued on Next Page)

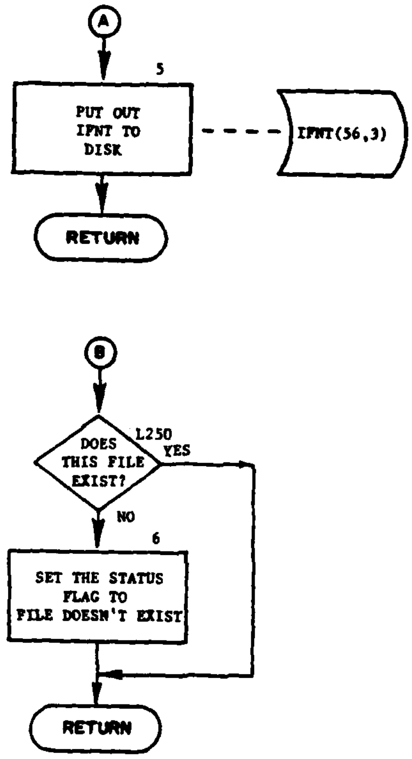


Figure VII-3-B-2. Routine REMOVE (Concluded)

(5) Block L180. Compute the last word of file requested to be removed and calculate the last word of the last file created. These values will be the limits of the file shift.

(6) Block 4. Call FSL to shift the data below the removal requested file up to the first word location of the file to be removed.

(7) Block L190. Zero the first word location for this file in the file name table.

(8) Block 5. Put out the updated file name table (IFNT) to the disk and return control to the calling routine.

(9) Block L250. If this is an illegal file name, return control to the calling routine.

(10) Block 6. If the file is nonexistent, set the status code to file does not exist, and return control to the calling routine.

4. ROUTINE ADDRCD:

a. Purpose. The purpose of ADDRCD is to add a record or a number of records to an existing file.

b. Input Variables:

Name	Source	Contents
IFNT(56,3)	ONE	File name table.
NAME	Call	File ordinal reference.
JREC	Call	Record number where added record(s) are to begin. NOTE: To add record(s) before existing record number one, set JREC equal to one.
NREC	Call	Number of records to be added.
IVEC	Call	An array in core containing data for record(s) to be added. If data are unavailable but it is desirable to set aside the required space on the disk, set IVEC(1) equal to 4HZERO.
ISTCK	Call	Unit status check indicator for I/O routines: 1 = check, 0 = do not check.

c. Output Variables:

Name	Destination	Contents
IFNT(56,3)	Disk and ONE	Updated file name table.

Name	Destination	Contents
ISTCK	Call	Error code of requested I/O operation.
IVEC( )	DF(Name)	New record(s) put out to disk file (name).

d. Logical Flow (VII-3-B-3):

(1) Block 1. If file having records added is not the last file to be created, transfer control to block L90.

(2) Blocks 2 and 3. Update the file name table by adding the total number of records to be added to the total number of records the file has in the file name table; call routine PUTFLE to place the new file name table on disk.

(3) Block L130. Compute the total number of words in the records to be added and the beginning and ending disk word address where the insertion records are to be located.

(4) Block 4. If the file having records added is the last file to be created, transfer control to block L140.

(5) Block 5. Call the routine SHFTDN to shift down all the data of the DIVWAG data file that reside below the record where the new records are to be inserted.

(6) Block 6. If ther were errors in SHFTDN, control returns to the calling routine.

(7) Block L140. If there are no data available for the new records, transfer control to block L160.

(8) Block L150. Call the routine GETPUT to initilize the actual transmission of the data for the new records.

(9) Block 7. If there were errors in GETPUT, control returns to the calling routine.

(10) Block L240. If the file having records added was the last file created, return control to the calling routine.

(11) Blocks 8 and 9. Update the total number of records in the file name table for the file having records added. Update the file starting word in file name table for those files starting beyond file having records added. Call routine PUTFLE to update file name table, and return control to the calling routine.

(12) Blocks L90 and 10. Call routine ILLEGL to determine if file being modified is a legitimate file. If not, control returns to the calling routine.

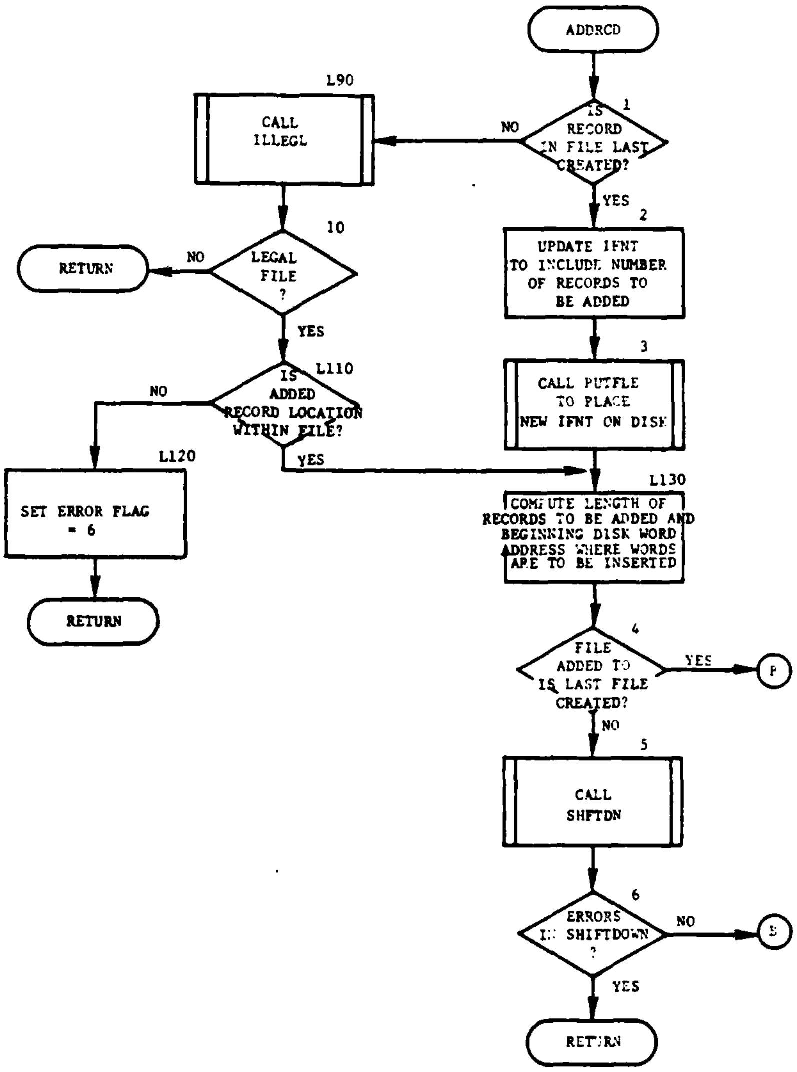


Figure VII-3-B-3. Routine ADDRCD (Continued on Next Page)

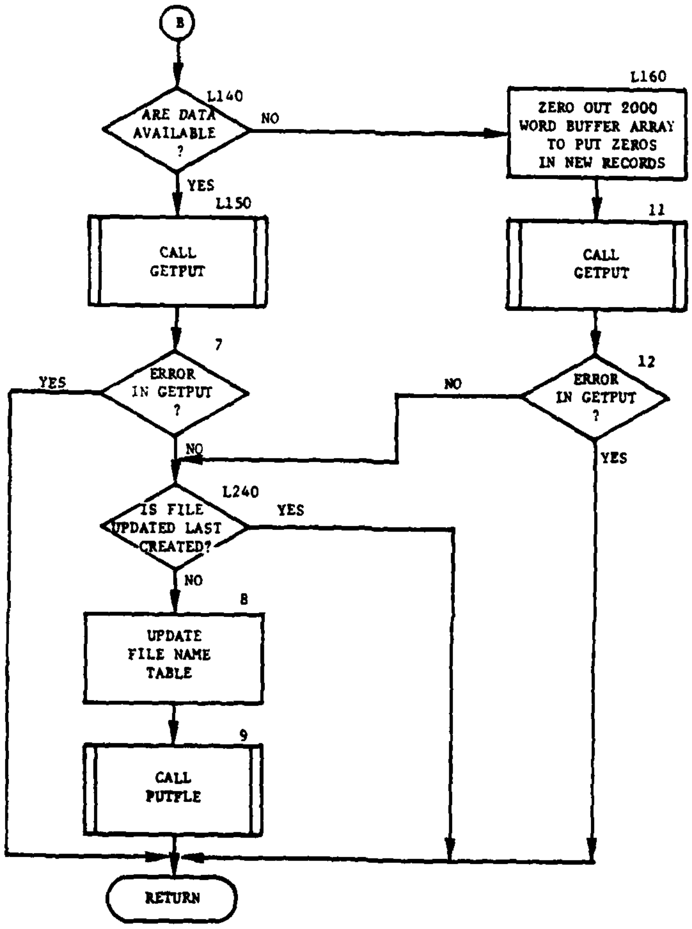


Figure VII-3-B-3. Routine ADDRCD (Concluded)

(13) Block L110. If location where the insertion is to begin is within the file, transfer control to block L130.

(14) Block L120. Set the error flag equal to six and return control to the calling routine.

(15) Blocks L160 and 11. Zero out a 2000-word array to put out zeros to the new records, and call routine GETPUT to initialize the transmission of the zero records.

(16) Block 12. If there were no errors encountered in GETPUT, control returns to the calling routine.

5. ROUTINE ADDWRD:

a. Purpose. ADDWRD adds a word or a number of words to each record of the requested file ordinal. Basically, it is a routine to expand the record size of a file.

b. Input Variables:

Name	Source	Contents
NAME	Call	File ordinal reference.
JWRD	Call	Word number where added word(s) are to begin.
NWRD	Call	Total number of words to be added.
IVEC	Call	An array in core containing data for word(s) to be added. If data are not available, but is desirable to set aside the required space on the disk, IVEC(1) equal to 4HZERO.
ISTCK	Call	Unit status check indicator for I/O routines: 1 = check, 0 = do not check.
IFNT(56,3)	ONE	File name table.

c. Output Variables:

Name	Destination	Contents
IFNT(56,3)	Disk and ONE	Updated file name table.
ISTCK	Call	Error code of requested I/O operation.
IVEC( )	DF(Name)	New word (or words) put out to each record of data file (name).

d. Logical Flow (Figure VII-3-B-4):

(1) Block 1. Call the routine ILLEGL to determine if the file upon which modifications have been requested is a legitimate file ordinal.

(2) Block 2. If this is not a legal file name, return control to the calling routine.

(3) Block L110. If the word where the insertion or modification is to begin is within the record size, control goes to block L130; if not, control goes to block L120.

(4) Block L120. Set the status code to an error indicating that the requested word is outside the record and return control to the calling routine.

(5) Block L130. Compute the last word location of the requested file as the beginning limit for the shift down of data below the requested file. The ending limit is the beginning limit plus the total length (in words) of the new words added.

(6) Block 3. Call the routine SHFTDN to shift down all the data of the DIVWAG data system that resides below the file where the new words are to be inserted.

(7) Block L140. Set up the limits for shifting each record to properly insert the requested words into each record of the file.

(8) Block 4. Call GETPUT to bring in from disk each record properly separated at the word where the new word(s) are to be inserted.

(9) Block 5. Call GETPUT to put out the partial record shifted in such a way that the new insertion words may be put into the requested location. Cycle blocks L140, 4, and 5 until each record has been shifted to its proper position for the insertion of the new word(s) into each file.

(10) Block 6. If there are no data available for the new word(s), control goes to block L300.

(11) Block L290. Call routine GETPUT to initialize the actual transmission of the data for the new word(s) to the disk. Control goes to block 8.

(12) Block L300. Zero out a 2000-word buffer array to put out zeroes in the new word(s) since no data are available.

(13) Block 7. Call GETPUT to initialize the transmission of the zero word(s) using the same limits computed in blocks L140, 4, and 5.

(14) Block 8. Update the file name table by changing the record size of the requested file and adding the total length in words of the new addition to the first word location to each file located below the requested file.

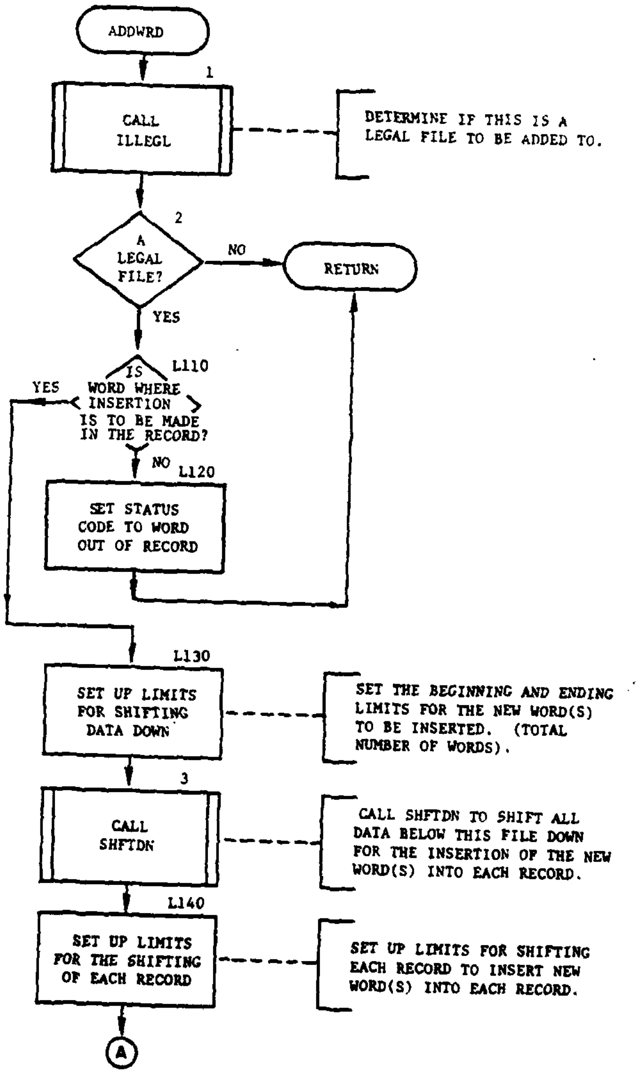


Figure VII-3-B-4. Routine ADDWRD (Continued on Next Page)

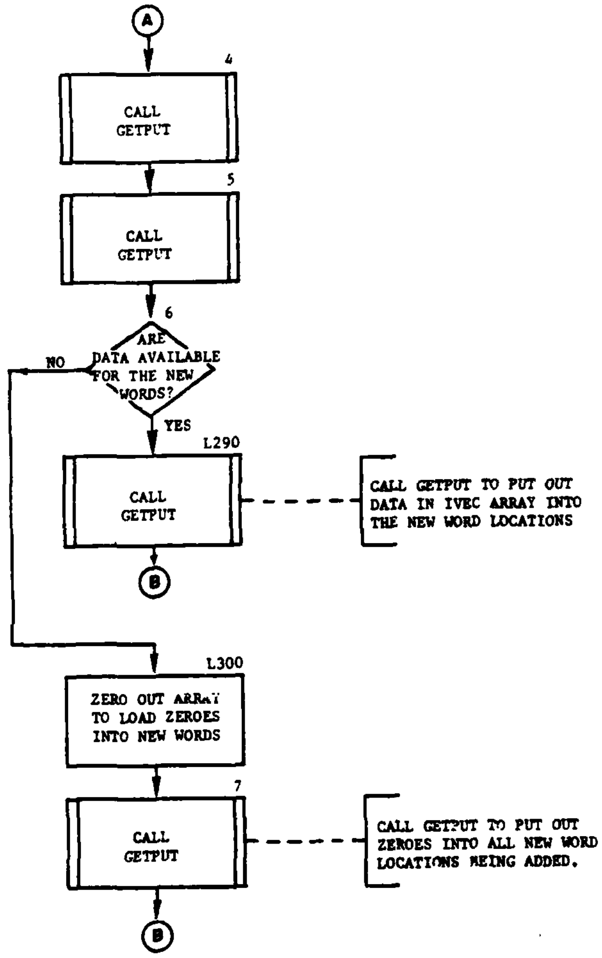


Figure VII-3-B-4. Routine ADDWRD (Continued)

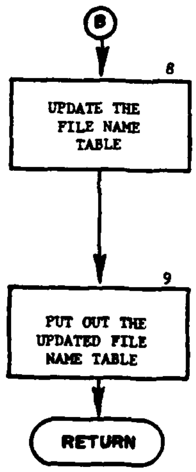


Figure VII-3-B-4. Routine ADDWRD (Concluded)

(15) Block 9. Put out the updated file name table (IFNT) to the disk.

6. ROUTINE SUBRCD:

a. Purpose. SUBRCD reduces the number of records allocated to the requested file ordinal.

b. Input Variables:

Name	Source	Contents
IFNT(56,3)	ONE	File name table.
NAME	Call	File ordinal number.
JREC	Call	Pointer to the first record in file name to be deleted.
NREC	Call	Number of records, starting at JREC of file name to be removed.
ISTCK	Call	Unit status check indicator fro I/O routines: 1 = check, 0 = do not check.

c. Output Variables:

Name	Destination	Contents
IFNT(56,3)	Disk and ONE	Updated file name table.
ISTCK	Call	Error code of requested I/O operation.

d. Logical Flow (Figure VII-3-B-5):

(1) Block 1. Call the routine ILLEGL to determine if the file upon which modifications have been requested is a legitimate file ordinal.

(2) Block 2. If this is not a legal file name, return control to the calling routine.

(3) Block L10. If the record where the deletion or modification is to begin is not within the currently defined file, transfer control to block L150.

(4) Block 3. If the number of records requested to be removed is beyond the defined number of records on the file, control goes to block L250.

(5) Block 4. Determine the beginning and ending word locations of the records to be removed from this file.

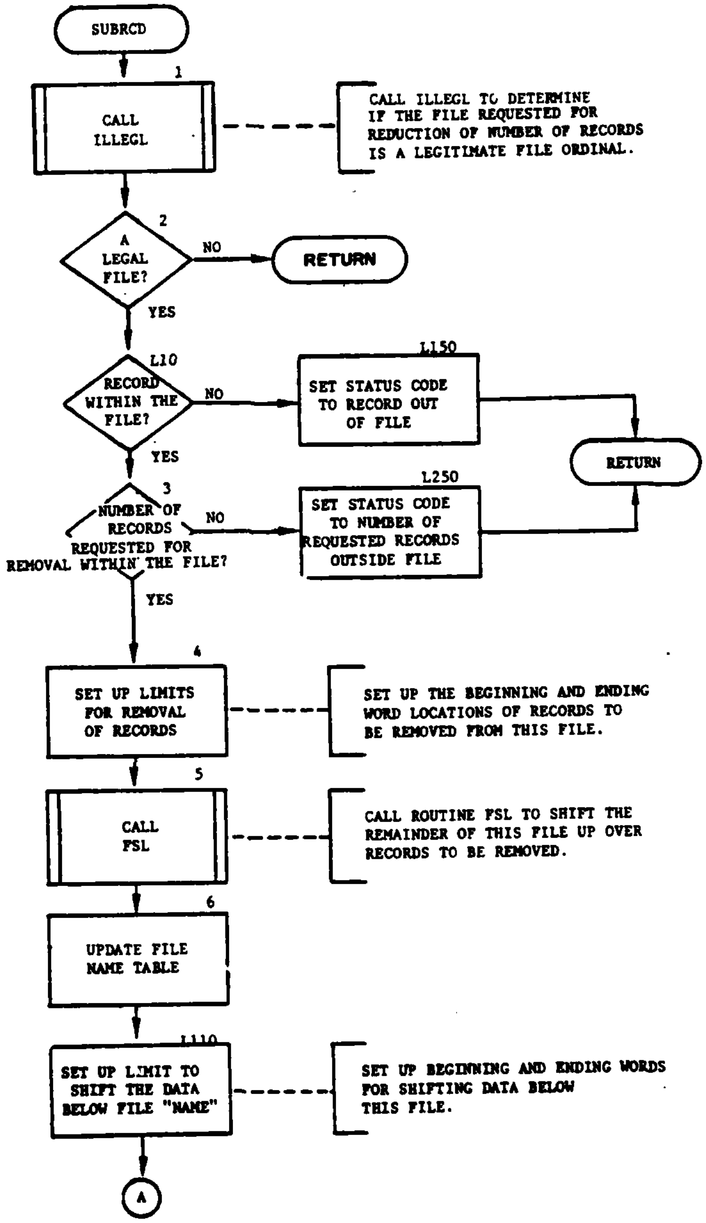


Figure VII-3-B-5. Routine SUBRCD (Continued on Next Page)

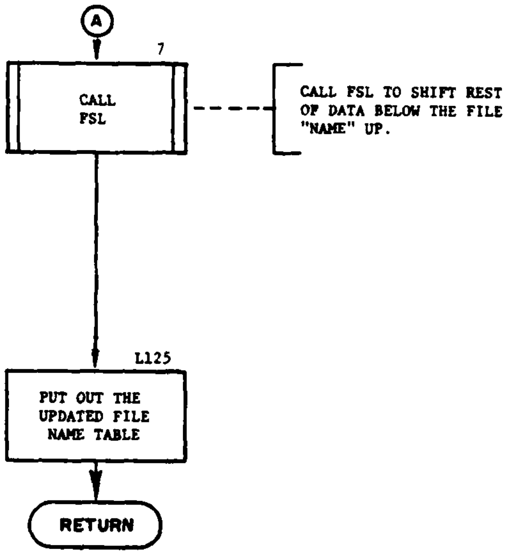


Figure VII-3-B-5. Routine SUBRCD (Concluded)

(6) Block 5. Call the routine FSL to shift the remaining records of this file over the records requested to be removed.

(7) Block 6. Update the file name table (IFNT) by reducing the number of records on the requested file and reducing the first word location of each file below this file name.

(8) Block L110. Determine the beginning and ending word locations for shifting the rest of the DIVWAG data loaded below this file.

(9) Block 7. Call the routine FSL to shift the rest of the data below the file name upward.

(10) Block L125. Put out the updated file name table (IFNT) to the disk, and return control to the calling routine.

(11) Block L150. Set the error status code to record out of file and return control to the calling routine.

(12) Block L250. Set status flag to indicate that the number of records requested is outside of the defined file and return control to the calling routine.

7. ROUTINE SUBWRD:

a. Purpose. Routine SUBWRD reduces the size of the records of the requested file ordinal.

b. Input Variables:

Name	Source	Contents
IFNT(56,3)	ONE	File name table.
NAME	Call	File ordinal reference.
JWRD	Call	Pointer to the first word to be removed.
NWRD	Call	A word or number of words to be removed.
ISTCK	Call	Unit status check indicator for I/O routines: 1 = check, 0 = do not check.

c. Output Variables:

Name	Destination	Contents
IFNT(56,3)	Disk and ONE	Updated file name table.
ISTCK	Call	Error code of requested I/O operation.

d. Logical Flow (Figure VII-3-B-6):

(1) Block 1. If the pointer to the first word to be removed is not within the file, transfer control to block L250.

(2) Block L5. Call the routine ILLEGL to determine if the file upon which modifications have been requested is a legitimate file ordinal.

(3) Block 2. If this is not a legal file name, then return control to the calling routine.

(4) Block L10. If the word where the deletion or modification is to begin is not within the currently defined record, control goes to block L250.

(5) Block 3. If the number of words requested to be removed goes beyond the defined record size of the file, control goes to block L200.

(6) Block 4. Determine the beginning and ending word locations of the words to be removed from each record.

(7) Block 5. Call the routine FSL to shift the remaining words of each record over the words requested to be removed.

(8) Block 6. If all records have not been shifted, control goes to block 5.

(9) Block L60. Update the file name table (IFNT) by reducing the size of each record on the requested file and reducing the first word location of each file below this file name.

(10) Block 7. If all records have been shifted, determine the beginning and ending word locations for shifting the rest of the DIVWAG data loaded below this file.

(11) Block 8. Call the routine FSL to shift the remaining data below the file name upward.

(12) Block 9. Put out the updated file name table (IFNT) to the disk.

(13) Block L250. Set the error status code to word out of record and return control to the calling routine.

(14) Block L200. Set status flag to indicate that the number of words requested is outside of the defined record size and return control to the calling routine.

8. ROUTINE GETFLE:

a. Purpose. Routine GETFLE calls routine FILE with the appropriate parameters to retrieve the requested file from the disk.

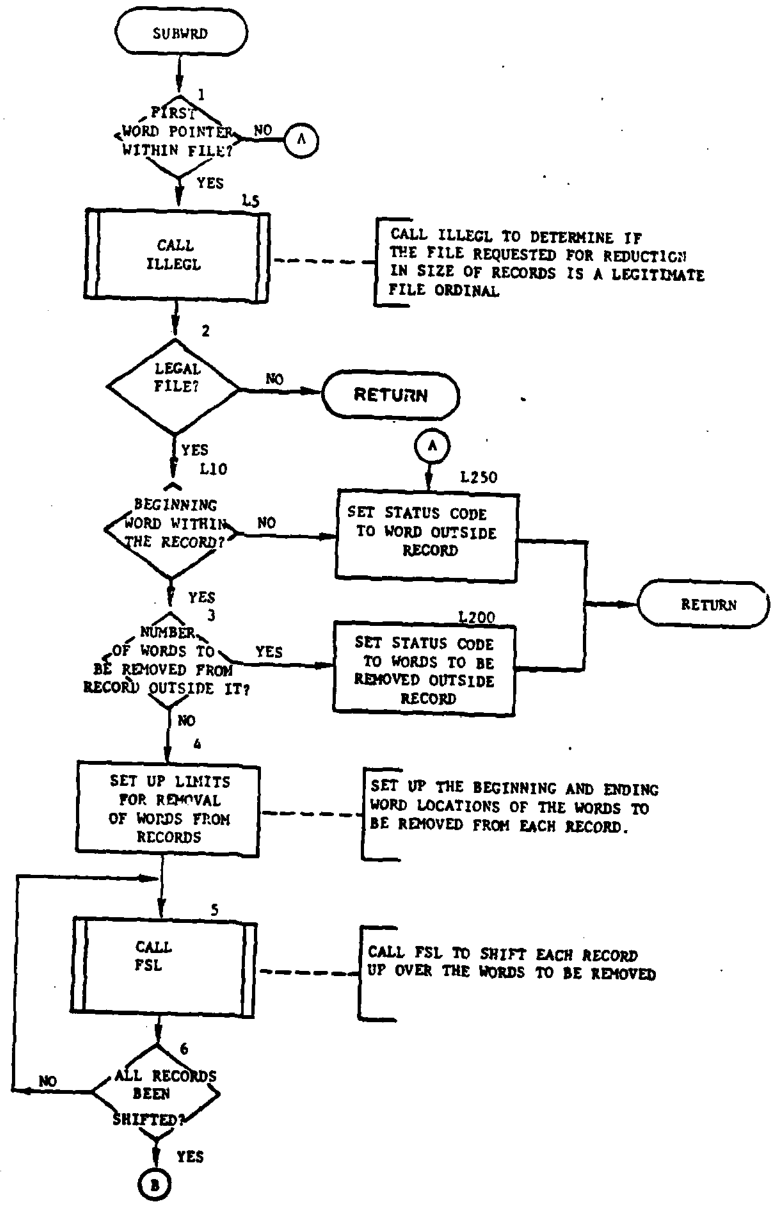


Figure VII-3-B-6. Routine SUBWRD (Continued on Next Page)

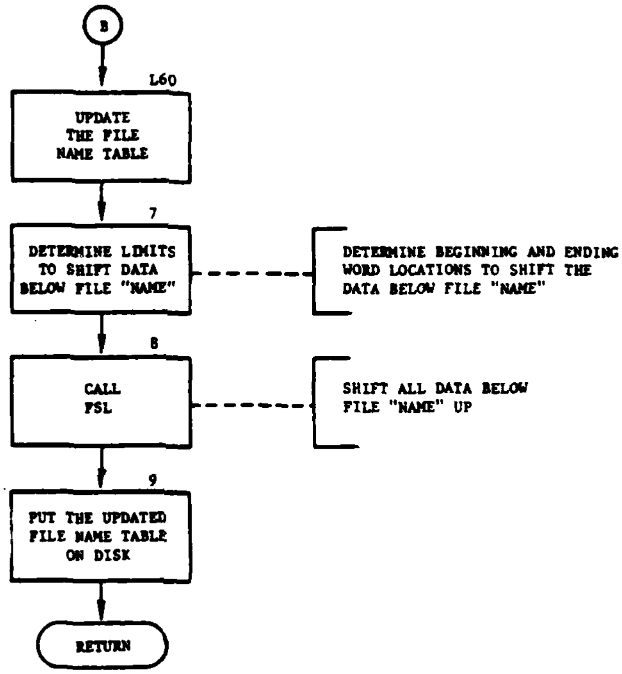


Figure VII-3-B-6. Routine SUBWRD (Concluded)

b. Input Variables:

Name	Source	Contents
NAME	Call	File ordinal reference.
IVEC	Call	An array where the retrieved data will be stored.
ISTCK	Call	Unit status check indicator for I/O routines: 1 = check, 0 = do not check.

c. Output Variables:

Name	Destination	Contents
IVEC	Call	An array where the retrieved data will be stored.
ISTCK	Call	Error code of requested I/O operation.

d. Logical Flow. The input/output flag is set to input and routine FILE is called. Control returns to the calling routine.

9. ROUTINE PUTFLE:

a. Purpose. Routine PUTFLE calls routine FILE with the appropriate parameters to place the requested file on the disk.

b. Input Variables:

Name	Source	Contents
NAME	Call	File ordinal reference
IVEC	Call	An array where the data to be transmitted are stored.
ISTCK	Call	Unit status check indicator for I/O routines: 1 - check, 0 = do not check.

c. Output Variables:

Name	Destination	Contents
IVEC	Call	An array where the data to be transmitted are stored.
ISTCK	Call	Error code of requested I/O operation.

d. Logical Flow. The input/output flag is set to output and routine FILE is called. Control returns to the calling routine.

10. ROUTINE FILE:

a. Purpose. Routine FILE gets from or puts out to the disk an entire DIVWAG data file. This routine is called by one of two routines, GETFLE or PUTFLE. The first is for getting data in from the disk, and the second is for putting information out to the disk.

b. Input Variables:

Name	Source	Contents
IFNT(56,3)	ONE	File name table.
NAME	Call	File ordinal reference.
IVEC( )	Call	An array in core from which data are transferred to the disk by PUTFLE.
ISTCK	Call	Unit status check indicator for I/O routines: 1 = check, 0 = do not check.
IO	Call	I/O indicator: 0 = pass data from disk to core. 1 = place data from core to disk.

c. Output Variables:

Name	Destination	Contents
IVEC( )	Call	An array in core into which the requested data are transferred from disk by GETFLE.
ISTCK	Call	Error code of the requested I/O operation.

d. Logical Flow (Figure VII-3-B-7):

(1) Block 1. If this is not a request to retrieve or place the file name table, transfer control to block L130.

(2) Block L100. Call routine GETPUT to bring in or place the file name table on the disk file.

(3) Blocks L120 and 4. Check if last file created is legitimate. If it is not, write an error message and return control to the calling routine.

(4) Blocks L130 and 5. Call routine ILLEGL to determine if file ordinal number is legitimate. If not return control to the calling routine.

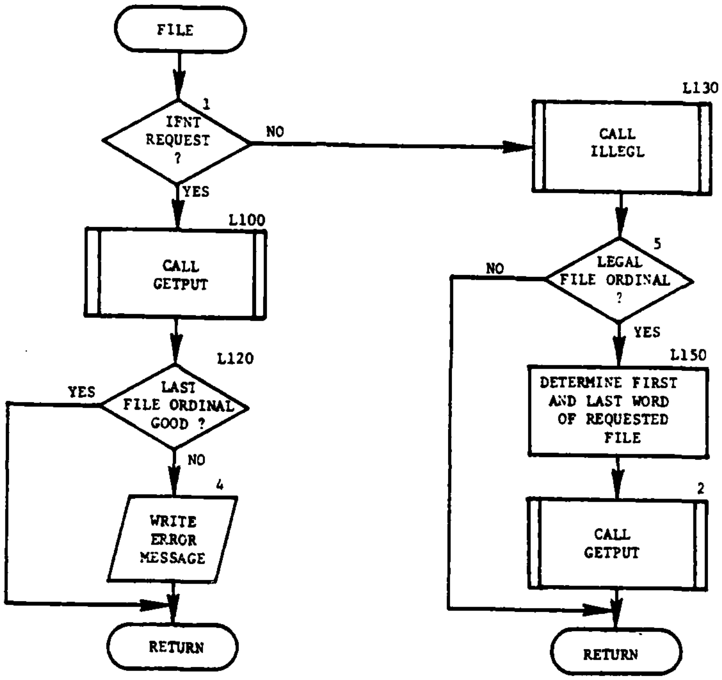


Figure VII-3-B-7. Routine FILE

(5) Block L150. Determine the first and last words of the requested file.

(6) Block 2. Call routine GETPUT to bring in or put out to disk according to the input/output flag. Return control to the calling routine.

11. ROUTINE GETRCD:

a. Purpose. The purpose of routine GETRCD is to call routine RECORD with the appropriate parameters to retrieve the requested record.

b. Input Variables:

Name	Source	Contents
NAME	Call	File ordinal reference.
IREC	Call	Record number of first record to be retrieved.
NREC	Call	Number of records to be retrieved.
ISTCK	Call	Unit status check indicator for I/O routines: 1 = check, 0 = do not check.

c. Output Variables:

Name	Destination	Contents
IVEC	Call	An array which holds the retrieved record.
ISTCK	Call	Error code of requested I/O operation.

d. Logical Flow. The input/output flag is set to input and routine RECORD is called. Control returns to the calling routine.

12. ROUTINE PUTRCD:

a. Purpose. The purpose of routine PUTRCD is to call routine RECORD with the appropriate parameters to place the requested record on the disk file.

b. Input Variables:

Name	Source	Contents
NAME	Call	File ordinal reference.
IREC	Call	Record number of first record to be transmitted.
NREC	Call	Number of records to be transmitted.
IVEC	Call	An array which holds the data to be transmitted.

c. Output Variables:

Name	Destination	Contents
ISTCK	Call	Error code of requested I/O operation

d. Logical Flow. The input/output flag is set to output and routine RECORD is called. Control returns to the calling routine.

13. ROUTINE RECORD:

a. Purpose. Routine RECORD gets in from or puts out to the disk a record (or a number of records) of data file (name).

b. Input Variables:

Name	Source	Contents
IFNT(56,3)	ONE	File name table.
MSTBL(2)	MSTBL	Mass storage index.
NAME	Call	File ordinal reference.
IREC	Call	Record number of first record to be transmitted.
NREC	Call	Number of records to be transmitted.
IVEC( )	Call	An array in core from which the data are transferred to the disk by PURTCD.
ISTCK	Call	Unit status check indicator for I/O routines: 1 = check, 0 = do not check.

c. Output Variables:

Name	Destination	Contents
IVEC( )	Call	An array in core into which the requested data are transferred from disk by GETRCD.
ISTCK	Call	Error code of the requested I/O operation.

d. Logical Flow (Figure VII-3-B-8):

(1) Block 1. If IO equals zero, this is a retrieval request; transfer control to block L1.

(2) Blocks 2 and 3. If this request is for a record of data file 1 and the record number does not equal the IUID, the error flag is set equal to 20 and control returns to the calling routine.

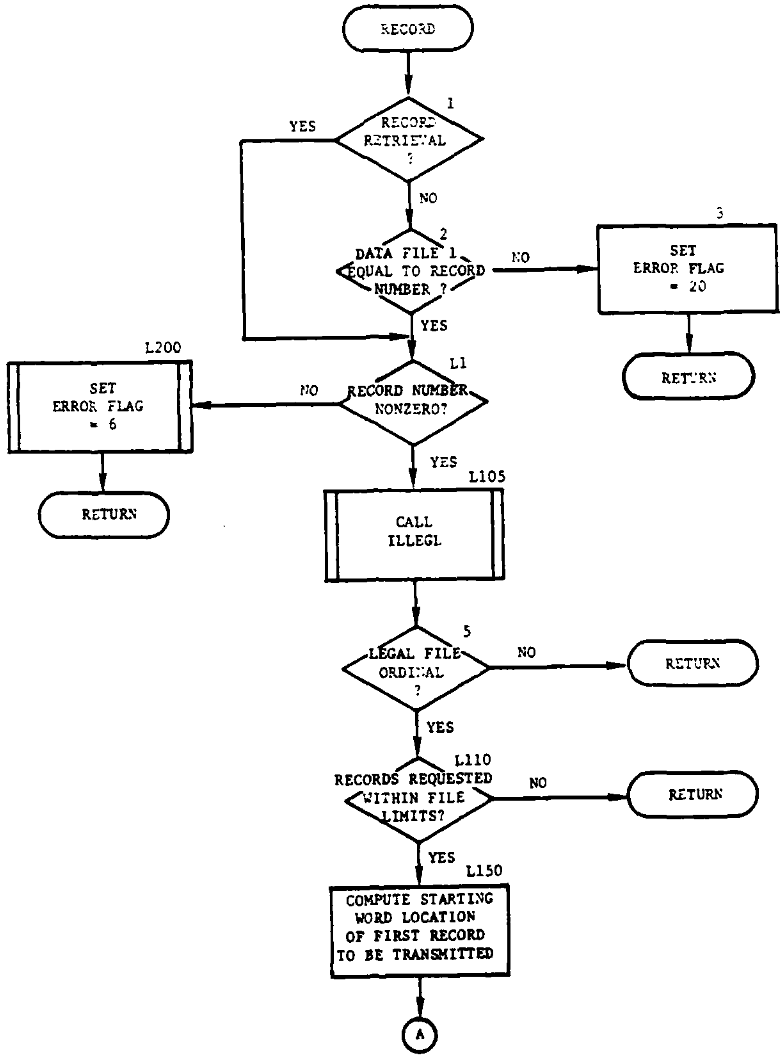


Figure VII-3-B-8. Routine RECORD (Continued on Next Page)

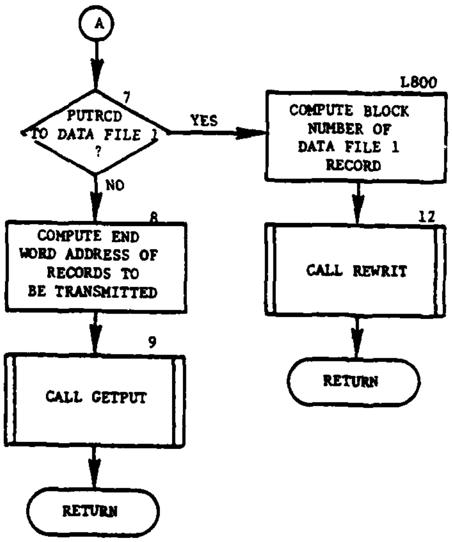


Figure VII-3-B-8. Routine RECORD (Concluded)

(3) Block L1. If the record number of the record to be transmitted is zero, transfer control to block L200.

(4) Block L105. Call ILLEGL to determine if the file of the requested record operation is a legitimate file ordinal.

(5) Block 5. If the file ordinal is not legal, return control to the calling routine.

(6) Block L110. If the requested record is not within the file, set the error flag equal to six and return control to the calling routine.

(7) Block L150. Compute the starting word location of first record to be transmitted.

(8) Block 7. If this is a request to place a record in data file 1, transfer control to block L800.

(9) Block 8. Compute end word address of records to be transmitted.

(10) Block 9. Call routine GETPUT to get or put out the number of records from the file according to the IO flag setting, and return control to the calling routine.

(11) Block L200. Set the error flag equal to six and return control to the calling routine.

(12) Blocks L800 and 12. Compute the starting record block number, call routine REWRIT to rewrite in place the data file 1 data and return control to the calling routine.

14. ROUTINE GETWRD:

a. Purpose. The purpose of routine GETWRD is to call routine WORD with the appropriate parameters to retrieve the requested number of words from the record of the requested file.

b. Input Variables:

Name	Source	Contents
NAME	Call	File ordinal.
IREC	Call	Record number from which words are to be retrieved.
IWRD	Call	Word number of the first word to be retrieved.
NWRD	Call	Number of words to be retrieved.
ISTCK	Call	Unit status check indicator for I/O routines: 1 = check, 0 = do not check.

c. Output Variables:

Name	Destination	Contents
IVEC	Call	An array into which the retrieved words are stored.
ISTCK	Call	Error code of requested I/O operation.

d. Logical Flow. The input/output flag is set to input and routine WORD is called. Control returns to the calling routine.

15. ROUTINE PUTWRD:

a. Purpose. The purpose of routine PUTWRD is to call routine WORD with the appropriate parameters to place the required data in the requested record and word locations of the requested file.

b. Input Variables:

Name	Source	Contents
NAME	Call	File ordinal.
IREC	Call	Record number into which words are to be placed.
IWRD	Call	Word number of the first word to be placed.
NWRD	Call	Number of words to be placed.
IVEC	Call	An array where the words to be placed are stored.
ISTCK	Call	Unit status check indicator for I/O routines: 1 = check, 0 = do not check.

c. Output Variables:

Name	Destination	Contents
ISTCK	Call	Error code of requested I/O operation.

d. Logical Flow. The input/output flag is set to output and routine WORD is called. Control returns to the calling routine.

16. ROUTINE WORD:

a. Purpose. WORD gets from or puts out to the disk a number of words from a record of the data file (name). There are two routines, GETWRD and PUTWRD that call WORD. The first, GETWRD, is to bring in from disk a group of words of a record. The next, PUTWRD, is to put out to the disk a group of words from a specified record of data file (name).

b. Input Variables:

Name	Source	Contents
IFNT(56,3)	ONE	File name table.
NAME	Call	File ordinal reference.
IREC	Call	Record number from/into which word(s) are to be transmitted.
IWRD	Call	Word number of the first word to be transmitted.
NWRD	Call	Number of words to be transmitted.
IVEC	Call	An array in core from which the words are stored onto the disk by PUTWRD.
ISTCK	Call	Unit status check indicator for I/O routines: 0 = do not check, 1 = check.

c. Output Variables:

Name	Destination	Contents
IVEC( )	Call	An array in core into which requested words of the specified record of data file (name) are stored from disk by GETWRD.
ISTCK	Call	Error code of the requested I/O operation.

d. Logical Flow (Figure VII-3-B-9):

(1) Block 1. Call ILLEGL to determine if the file of the requested operation is a legitimate file ordinal.

(2) Block 3. If the file ordinal is not legal, return control to the calling routine.

(3) Block L110. If the requested record is within the file, control goes to block L130.

(4) Block L120. Set the error status code to indicate that the record is outside the file and return control to the calling routine.

(5) Block L130. If the word where the transmission is to begin is within the requested record, control goes to block L150.

(6) Block L140. Set the status code to indicate the beginning word of the transmission is outside the record and return control to the calling routine.

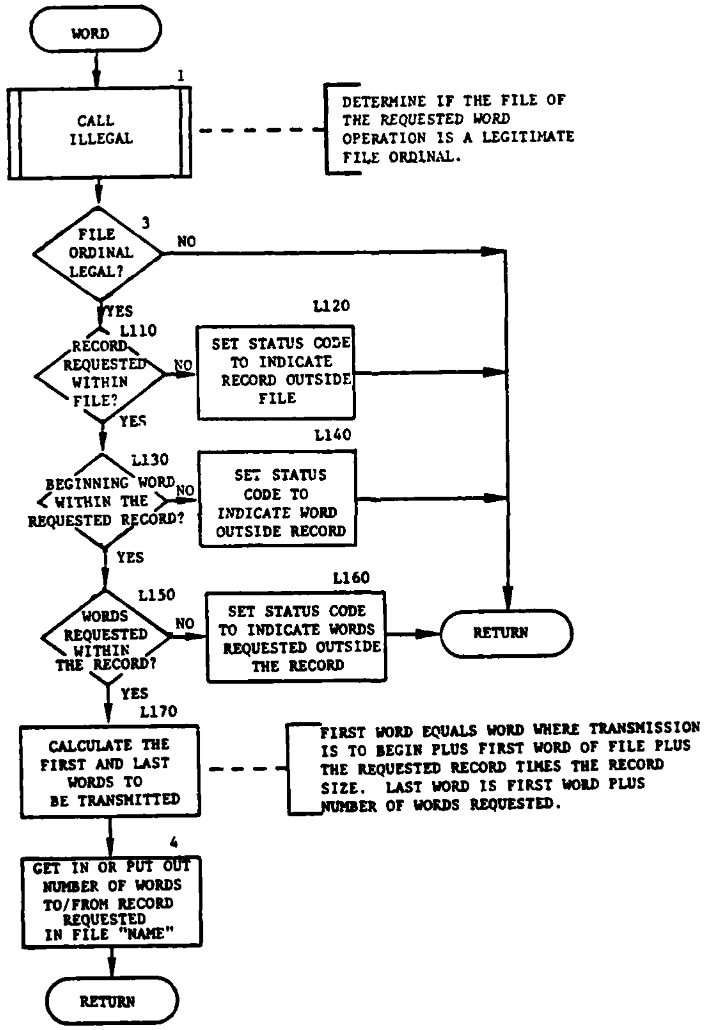


Figure VII-3-B-9. Routine WORD

(7) Block L150. If the number of words requested does not cause the transmission beyond the record limit, control goes to block L170.

(8) Block L160. Set the status code to indicate that the number of words requested are beyond the record limit and return control to the calling routine.

(9) Block L170. Calculate the first and last word disk locations for this transmission. The first word is the word where the transmission is to begin plus the first word of the file plus the product of the record requested less one and the record size less one. The last word equals the first word of the transmission plus the number of words requested less one.

(10) Block 4. Call routine GETPUT to transfer the desired words from disk to IVEC or from IVEC to disk as indicated by the IO flag. Return control to the calling routine.

17. ROUTINE GETPUT:

a. Purpose. Routine GETPUT initializes the parameters required for the actual transmission of data information to/from the disk. Some of these parameters are: first block and last block of transmission, number of blocks, and first and last words in array.

b. Input Variables:

Name	Source	Contents
IP1	Call	First word to be transmitted to or from a disk.
IP2	Call	Last word to be transmitted to or from a disk.
IVEC	Call	An array in core into/from which the data are to be transferred.
ISTCK	Call	Unit status check indicator for I/O routines: 1 = check, 0 = do not check.
IO	Call	Input/output indicator: 0 = obtain information from disk. 1 = place information onto disk.

c. Output Variables:

Name	Destination	Contents
IVEC( )	Call	An array in core into which the requested data are transferred from disk.
ISTCK	Call	Error code of the requested I/O operation.

d. Logical Flow (Figure VII-3-B-10):

(1) Block L15. Initialize parameters for the transmission of data by computing the first block and last block of data using the first and last word locations on disk sent by calling routine. Knowing first and last blocks, the number of physical blocks to be transmitted is determined. Compute the word locations in array IVEC, where data to or from first and last blocks are to go.

(2) Block 1. If there are more than 10 physical blocks to be transmitted, control goes to block L300.

(3) Block L500. Call routine TRNSMT to transmit a maximum of 10 blocks of data into/from the array IVEC; return control to the calling routine.

(4) Block L300. Call routine TRNSMT to transmit the first block of data into IVEC.

(5) Block L100. If this is an input request, control goes to block L120.

(6) Block L101. Call routine TRNSMT to transmit the last block of data on the disk into the later portion of array IVEC.

(7) Block L120. Set up the parameters for the transmission of the rest of the blocks by computing the number of blocks remaining and setting the words in array IVEC to indicate that the remaining data are to be transmitted to or from.

(8) Block L121. If there are more blocks to be transmitted, control goes to block L122; otherwise, control returns to the calling routine.

(9) Block L122. Call routine TRNSMT to transmit the remaining blocks to or from the array IVEC, and return control to the calling routine.

18. ROUTINE TRNSMT:

a. Purpose. Routine TRNSMT performs the reading or writing of the data requested for the DIVWAG input/output package.

b. Input Variables:

Name	Source	Contents
IBLK	Call	Physical record unit (PRU) on disk to locate read/write head.
IW1	Call	First word to be transmitted.
IW2	Call	Last word to be transmitted.
IVEC	Call	An array in core from which data are to be transferred to the disk.

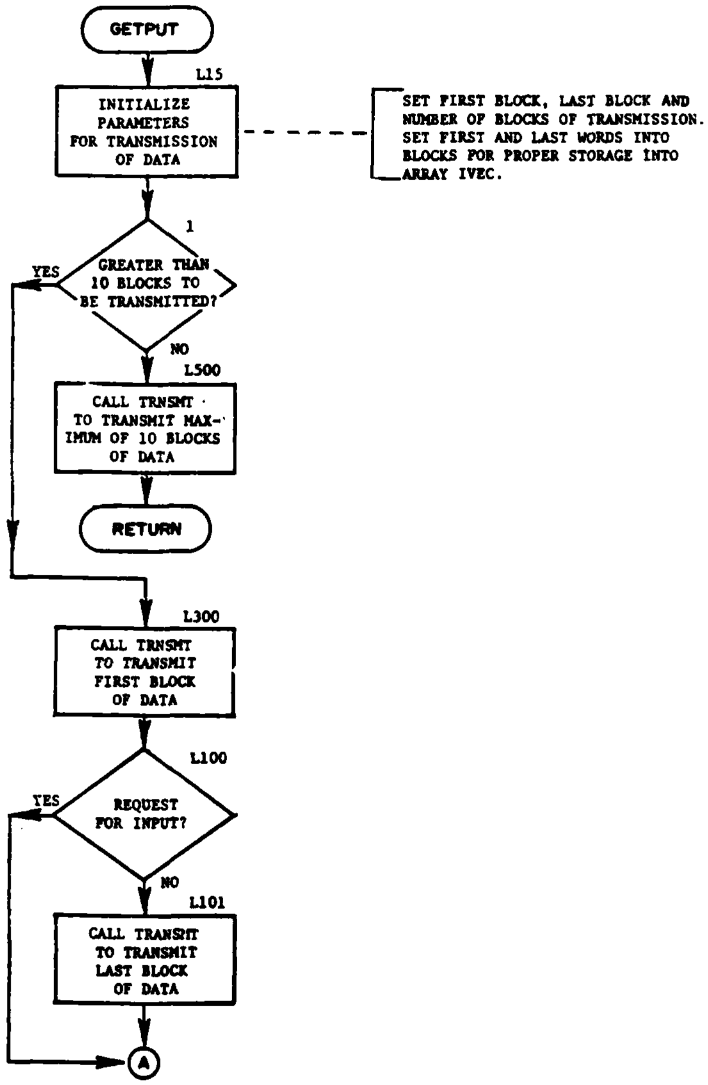


Figure VII-3-B-10. Routine GETPUT (Continued on Next Page)

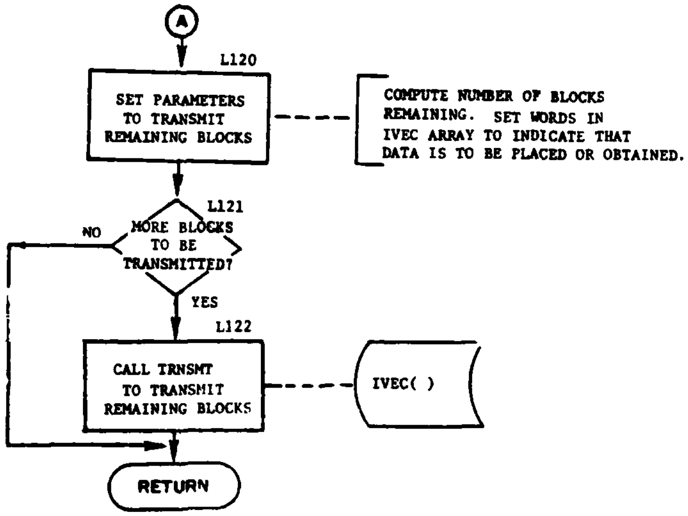


Figure VII-3-B-10. Routine GETPUT (Concluded)

Name	Source	Contents
ISTCK	Call	Unit status check indicator for I/O routines: 1 = check, 0 = do not check.
IO	Call	Input/output indicator: 0 = obtain information from disk (READMS). 1 = place information onto disk (REWRIT).
IN	Call	PRU indicator: 1 = first PRU of information. 2 = last PRU of information 3 = middle PRUs of information. 4 = fewer than 10 PRUs of information.

c. Output Variables:

Name	Destination	Contents
IVEC( )	Call	An array in core into which the requested data are transferred from disk.
ISTCK	Call	Error code of the requested I/O operation.

d. Logical Flow (Figure VII-3-B-11):

(1) Block 1. If this is a request for output, control goes to block L500.

(2) Block L100. If IN equals one, control goes to block L110. If IN equals two, control returns to the calling routine. If IN equals three, control goes to block L300. If IN equals four, control goes to block L800.

(3) Block L110. Set PRU index to locate the disk read/write head to the first PRU.

(4) Block L130. Read the first PRU into working array, IWORD.

(5) Block L180. Move the requested data from the work array into the first portion of the array IVEC, and return control to the calling routine.

(6) Block L300. Set PRU index to locate the disk read/write head to the second PRU.

(7) Block L1009. Read from the disk the remaining requested data. Data transfer starts at the second PRU and goes in the array IVEC where the transfer of the first PRU ended. Return control to the calling routine.

(8) Block L500. If IN equals one, control goes to block L510. If IN equals two, control goes to block L600. If IN equals three, control goes to block L700. If IN equals four, control goes to block L800.

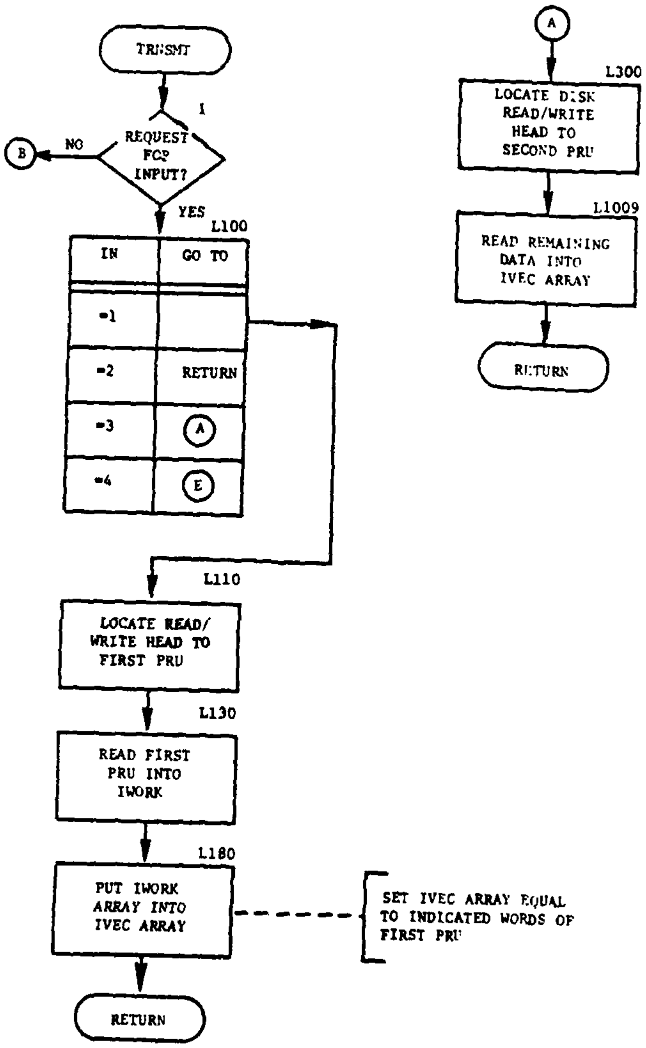


Figure VII-3-B-11. Routine TRNSMT (Continued on Next Page)

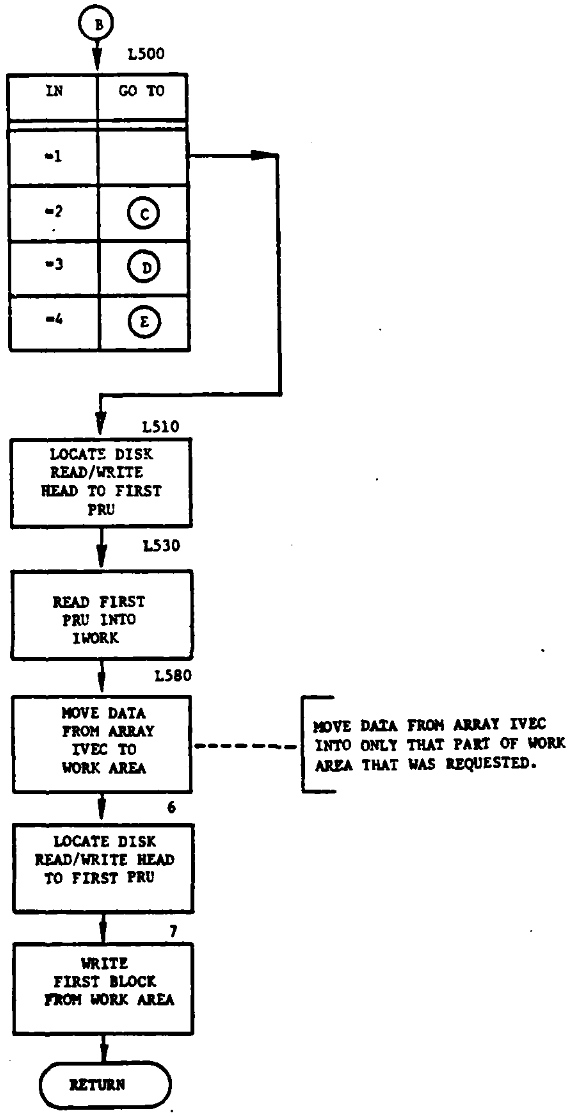


Figure VII-3-B-11. Routine TRNSMT (Continued)

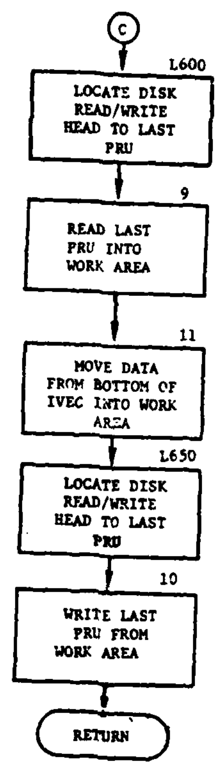


Figure VII-3-B-11. Routine TRNSMT (Continued)

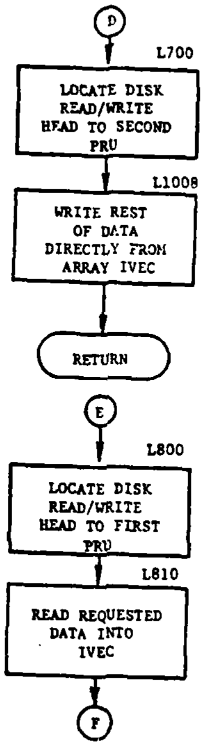


Figure VII-3-B-43. Routine TRNSMT (Continued)

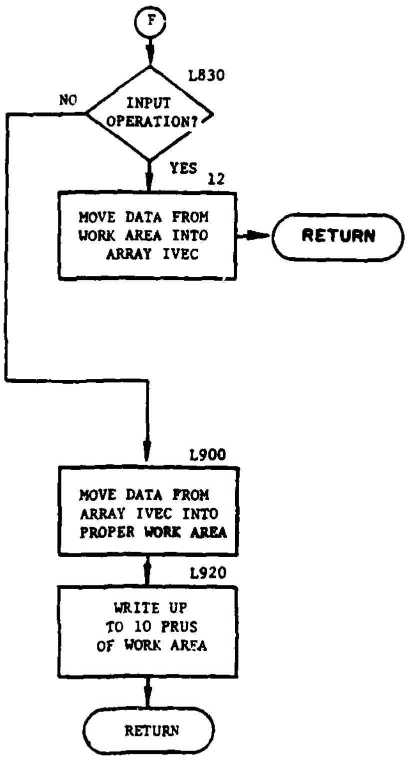


Figure VII-3-B-11. Routine TRNSMT (Concluded)

(9) Block L510. Set the PRU index to locate the disk read/write head to the first PRU.

(10) Block L530. Read the first PRU into the working array, IWORK.

(11) Block L580. Move data from input array IVEC into the working array.

(12) Block 6. Set PRU index to locate the disk read/write head to the first PRU.

(13) Block 7. Write the first block from the working area and return control to the calling routine.

(14) Block L600. Locate the disk read/write head to the last PRU by setting the PRU index.

(15) Block 9. Read the last PRU from the disk into the working array, IWORK.

(16) Block 11. Move the input data from IVEC into last block (i.e., IWORK).

(17) Block 650. Set PRU index to locate the disk read/write head to the last PRU.

(18) Block 10. Write the last block from the work array IWORK and return control to the calling routine.

(19) Block L700. Set the PRU index to locate the disk read/write head to the second PRU.

(20) Block L1008. Write the remaining data from the input array IVEC, and return control to the calling routine.

(21) Block L800. Locate the disk read/write head to the first PRU by setting the PRU index.

(22) Block L810. Read the requested data into IWORK. (The amount can be any number of PRUs not exceeding 10).

(23) Block L830. If this is an output operation, control goes to block L900.

(24) Block 12. Move the requested data from the working array into the output array IVEC and return control to the calling routine.

(25) Block L900. Move the input data from the array IVEC into the working array. The input data will start in the first PRU of the working array.

(26) Block L920. Write the appropriate number of PRUs of the work area, IWORK, and return control to the calling routine.

19. ROUTINE FSL:

a. Purpose. Routine FSL moves data within the data file upward a specified number of words.

b. Input Variables:

Name	Source	Contents
NAME	Call	File ordinal reference.
NBEG	Call	A pointer to the new location, after shift.
NEND	Call	A pointer to the first word of a group of words that are to be shifted.
IDELTA	Call	The number of words to decrement each file location pointer (IFNT (name,1)) that is greater than the file location of the current file ordinal; if IDELTA equals zero, IFNT is is not updated.
LMAX	Call	The maximum location of input/output.

c. Output Variables:

Name	Destination	Contents
IFNT(56,3)	Disk and ONE	Updated file name table.
ISTAT	Call	Error code of requested I/O operation.

d. Logical Flow (Figure VII-3-B-12):

(1) Block 1. Determine the last words of the transmission (i.e., last word of new area and last word of current area). This is done by adding 2000 (limit on buffer area) to the beginning of the new area and the beginning of the current area.

(2) Block L10. If the last word of the current area is not greater than the limit of the transmission, control goes to block L20.

(3) Block 2. Recalculate the last words within the limit and move the data upward to the limit. Set the flag to indicate that all data have been moved.

(4) Block L20. Call the routine GETPUT to bring the data to be moved into the working area buffer using limits calculated in block 1 or block 5.

(5) Block 3. Call GETPUT ot move the data in the working area buffer back to disk in its new location using limits calculated in block 1 or block 5.

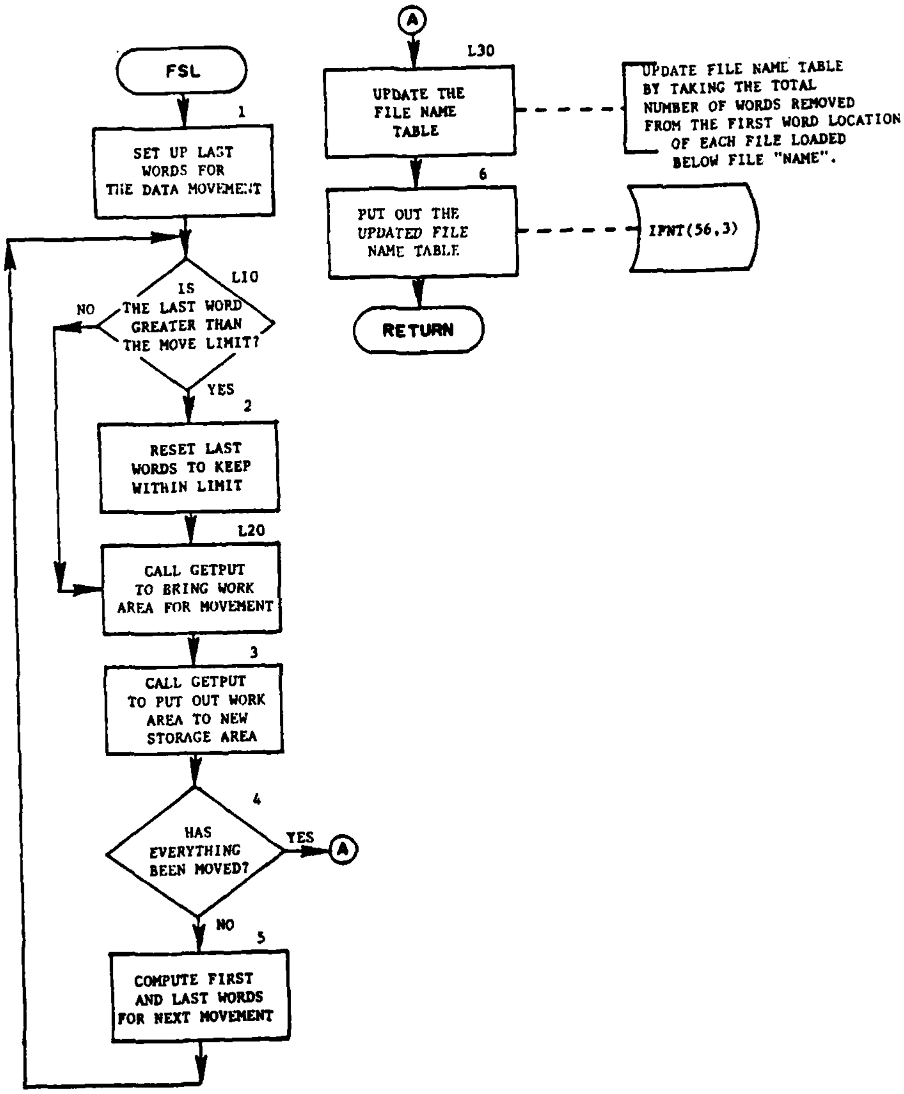


Figure VII-3-B-12. Routine FSL

(6) Block 4. If everything has been moved, control goes to block L30

(7) Block 5. Compute the first and last words of both the old and new areas for the next move by adding 2000 to the current values; then, transfer control to block L10.

(8) Block L30. Update the file name table (IFNT) by subtacting the total number of words removed from the first word location of each data file loaded below data file (name).

(9) Block 6. Put out the updated file name table (IFNT) to the disk, and return control to the calling routine.

20. ROUTINE SHFTDN:

a. Purpose. SHFTDN moves disk information down to make space for words or records to be added.

b. Input Variables:

Name	Source	Contents
NBEG	Call	Word number for beginning of shift down.
NEND	Call	Word number for end of shift down.
IBUFF	Call	An array in core from which data are transferred to and from the disk.

c. Output Variables:

Name	Destination	Contents
ISTCK	Call	Error status code of the I/O operation.

d. Logical Flow (Figure VII-3-B-13):

(1) Blocks 1, 2, and 3. Initialize the parameters required by the routine. If the last file allocated is unknown, call routine NCOMP to determine the file name.

(2) Blocks 4 and 5. Calculate the current limit of stored data from the last file allocated; then, calculate the new limit of stored data.

(3) Block L135. Calculate the beginning and ending word addresses of the data to be shifted.

(4) Block L140. If all data have not been shifted, transfer control to block L146.

(5) Block L142. Reset the beginning and ending word addresses of the data to be shifted.

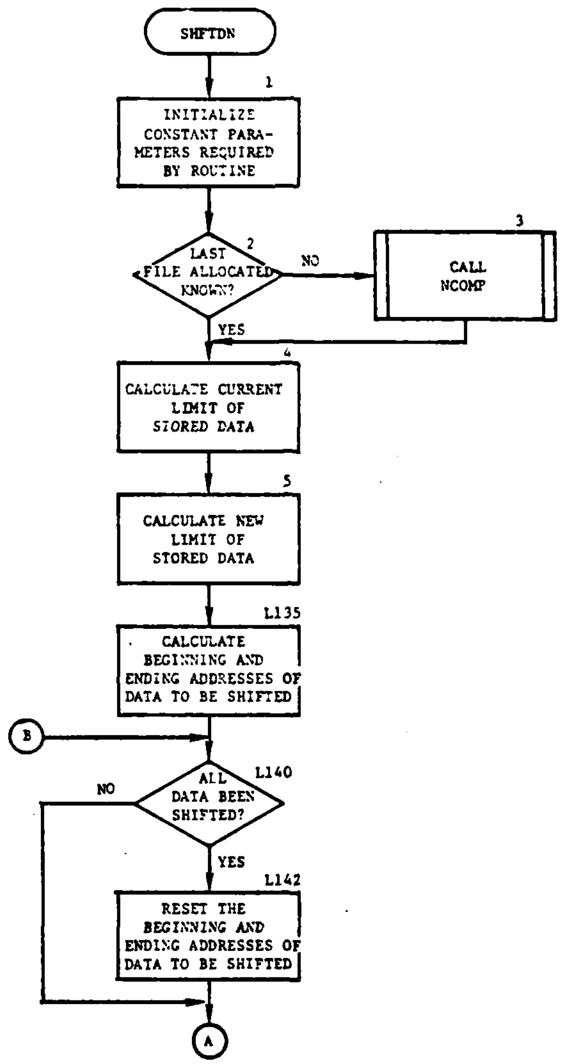


Figure VII-3-B-13. Routine SHFTDN (Continued on Next Page)

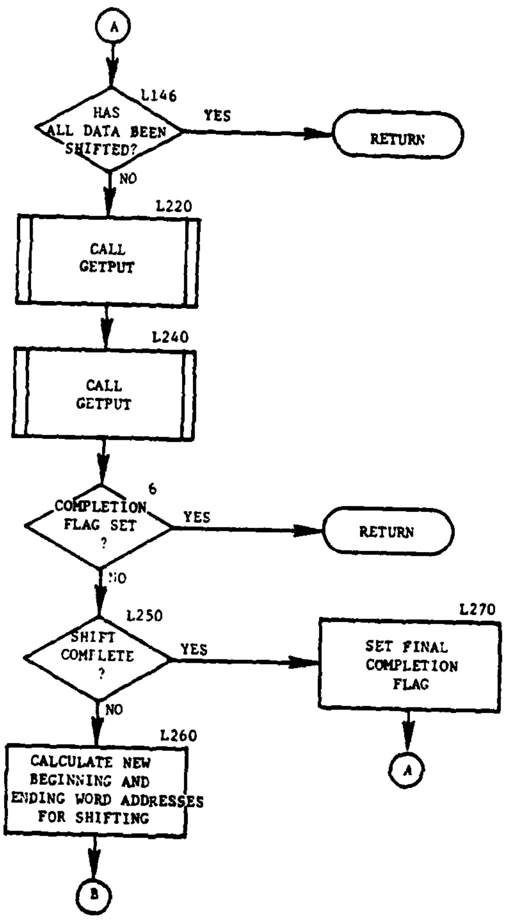


Figure VII-3-B-13. Routine SHFTDN (Concluded)

(6) Block L146. If all data have been shifted, return control to the calling routine.

(7) Blocks L220 and L240. By separate calls to GETPUT, move the data from the disk to a working array; then, move the data from the working array back to the disk file at its newly assigned location.

(8) Block 6. If the shift completion flag has been set, return control to the calling routine.

(9) Block L250. If the shift is complete, transfer control to block L270.

(10) Block L260. Calculate the new beginning and ending word addresses for the shift and transfer control to block L140.

(11) Block L270. Set the final shift completion flag and transfer control to block L146.

21. ROUTINE ILLEGL:

a. Purpose. The purpose of the routine ILLEGL is to check the file ordinal (name) to assure that it is legitimate (i.e., in the number range of 1 to 55) and that the file exists.

b. Input Variables:

Name	Source	Contents
IFNT(56,3)	ONE	File name table.
NAME	Call	File ordinal reference.

c. Output Variables:

Name	Destination	Contents
ILLEGL	Call	File legality indicator: 1 = file ordinal (name) is legitimate and it does exist. 2 = file ordinal (name) is not legitimate or the file does not exist.
ISTCK	Call	Error status flag: 5 = name not within range. 13 = file is nonexistent.

d. Processing Description. The file ordinal is checked to determine if it is legitimate. The file name table is checked to verify that the named file exists. Appropriate codes are set to indicate the results of the checks and control returns to the calling routine.

22. ROUTINE NCOMP:

a. Purpose. The purpose of the routine NCOMP is to determine the last file ordinal allocated storage area within the DIVWAG data system.

b. Input Variables:

Name	Source	Contents
IFNT(56,3)	ONE	File name table.

c. Output Variables:

Name	Destination	Contents
N	Call	File ordinal reference number of the file last allocated storage space on the disk.

d. Processing Description. The file name table is searched for the file with the maximum starting location.

23. ROUTINE OPENMS. The routine OPENMS is the Control Data Corporation FORTRAN extended object-time system routine (INITMS$) that has been modified to allow a sequentially generated mass storage file to be opened for random access. The function of OPENMS is to open the file through a SCOPE operating system call, to insure that the file resides on a valid mass storage device, and to initialize the SCOPE operating system file access parameters. The routine is accessed through the FORTRAN statement CALL OPENMS. Further information and description of the routine OPENMS can be obtained from Control Data Corporation publications.

24. ROUTINE MASSIO:

a. Purpose. Routine MASSIO is the DIVWAG system interface to the SCOPE operating system for random disk read or write access. MASSIO contains two entry points; READMS for random read, and REWRIT for random rewriting.

b. Input Variables:

Name	Source	Contents
LU	Call	Logical unit number.
IRAY	Call	Input/output array.
LNTH	Call	Number of words to be transmitted.
IPIR	Call	A pointer to an index array. The word pointed to contains the sector address at which the data transmission is to begin.

c. Output Variables:

Name	Destination	Contents
IRAY	Call or Disk	Requested data transferred from or to disk.

d. Logical Flow (Figure VII-3-B-14):

(1) Block 1. Set up READMS exit address.

(2) Block 2. Set up CIO read code of 12B.

(3) Block 3. Set up REWRIT exit address.

(4) Block 4. Set up CIO rewrite code of 216B.

(5) Block MSIO. Store preset routine exit address.

(6) Block 5. Pickup first word address of array and add length to first word address, giving the last word address plus one.

(7) Block 6. Call SCOPE system routine GETBA to get the address of the file environment table (FET) of the requested logical unit.

(8) Block 7. If no FET exists for this unit, control goes to ERR1.

(9) Block 8. Save current FET contents for subsequent restoration.

(10) Block 9. Set new pointers into FET using the IRAY first and last word addresses as input/output pointers.

(11) Block 10. Find the address of the index cell containing the requested sector address.

(12) Block 11. If the index cell address is not within the index area specified when the file was opened, control goes to ERR2.

(13) Block 12. Read the requested sector address from the index and store it into FET.

(14) Block 13. Issue a system I/O request using the READ or REWRITE code preset by block READMS or REWRIT.

(15) Block 14. Restore the initial FET pointer contents, setting them to indicate an empty buffer. Return control to the calling routine.

(16) Block ERR1. Prepare error message "MASSIO-FILE NOT FOUND;" then, control goes to ERR3.

(17) Block ERR2. Prepare error message "MASSIO-INDEX ORDINAL OUT OF RANGE;" then control goes to ERR3.

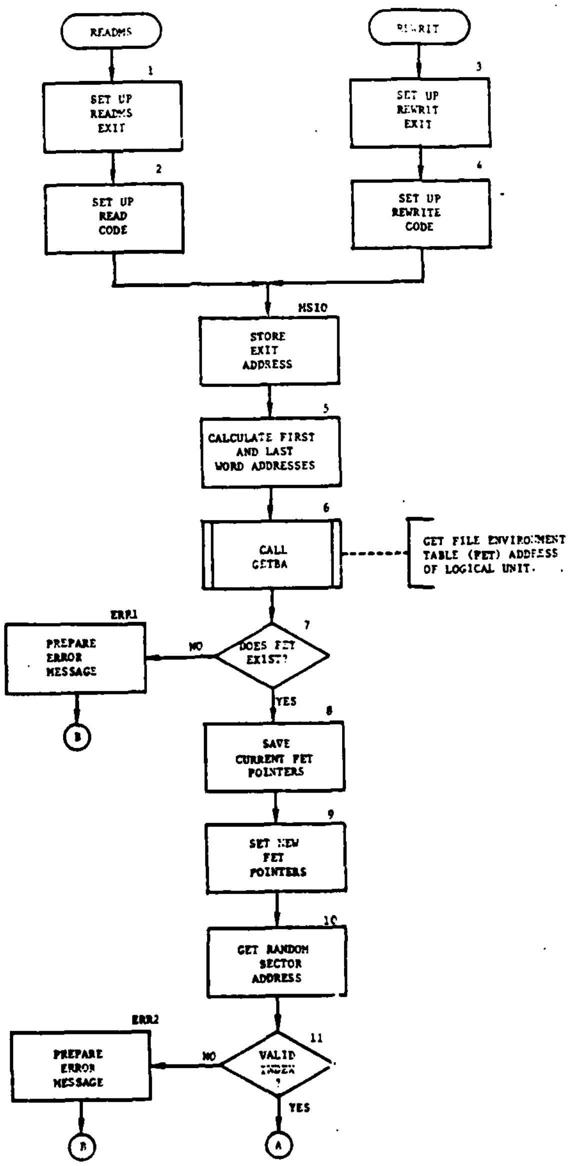


Figure VII-3-B-14. Routine MASSIO (Continued on Next Page)

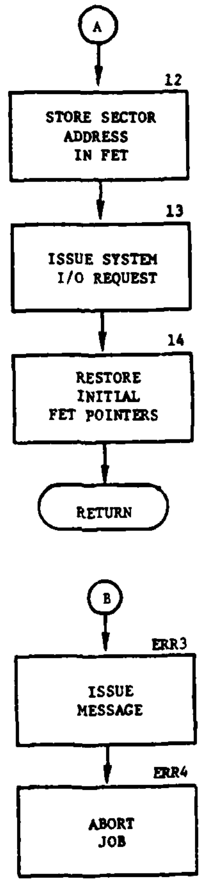


Figure VII-3-B-14. Routine MASSIO (Concluded)

(18) Block ERR3. Issue error message.

(19) Block ERR4. Abort job.

APPENDIX C

OUTPUT DESCRIPTIONS FOR INPUT/OUTPUT PACKAGE

The output from the Input/Output Package consists of data retrieved from the DIVWAG data files and passed to the calling routine or data passed from the calling routine and placed onto the DIVWAG data files. These data are described in detail in Appendix A to Chapter 2 of this section. An error code may also be passed to the calling routine which is described in Chapter 7 of Section VIII.

APPENDIX D

SOURCE LISTINGS FOR DIVWAG SYSTEM UTILITY PACKAGES DIVWAG INPUT/OUTPUT PACKAGE

(AVAILABLE UNDER SEPARATE COVER)

CHAPTER 4

UTILITY LOAD AND DUMP PROGRAMS

1. INTRODUCTION. The two utility load and dump programs, UTILLD and UTILDP, are used to transfer the DIVWAG data file from disk to tape or from tape to disk. These routines are described in Appendix B to this chapter.

2. LOAD. The utility load program, UTILLD, transfers the contents of a DIVWAG dump tape written by UTILDP to a disk file. It is specifically designed to utilize the input/output described in Chapter 3 and prepares a data file compatible with that package.

3. DUMP. The utility dump program, UTILDP, transfers the contents of the DIVWAG data file to a dump tape. This routine may only be used in conjunction with the input/output package described in Chapter 3.

APPENDIX A

INPUT REQUIREMENTS FOR UTILITY LOAD AND DUMP PROGRAMS

1. UTILDP. The only input required for the UTILDP program is the DIVWAG data file on TAPE1. The first 168 words must contain a valid file name table.

2. UTILLD. The input required by the UTILLD program is a DIVWAG dump tape written by UTILDP and mounted on TAPE21. The first 168 words must contain a valid file name table and the file must end with an end-of-file mark.

APPENDIX B

DIVWAG INPUT AND OUTPUT UTILITY PROGRAM DESCRIPTIONS

1. INTRODUCTION. This appendix contains descriptions of four routines that serve as utility routines to the DIVWAG input and output package or for specialized access of the DIVWAG data files. The routines are as follows:

- IOTERN
- IOWETH
- UTILLD
- UTILDP

2. ROUTINE IOTERN:

a. Purpose. The purpose of the routine IOTERN is to select the proper terrain record corresponding to the X,Y coordinate and appropriately input or output it on data file 3.

b. Input Variables:

Name	Source	Contents
JARRAY(4)	DF3	Array containing the number of cells in the X and Y direction and the cell size of the map being gamed.
IOP	Call	Operations code: 1 = input, 2 = output.
X	Call	X coordinate in meters.
Y	Call	Y coordinate in meters.
IARRAY(10)	DF3	An array describing the terrain cell.

c. Output Variables:

Name	Destination	Contents
IARRAY	Call	An array describing the terrain cell.

d. Logical Flow (Figure VII-4-B-1):

(1) Block 1. If the X,Y coordinate is nonzero, control goes to block L39.

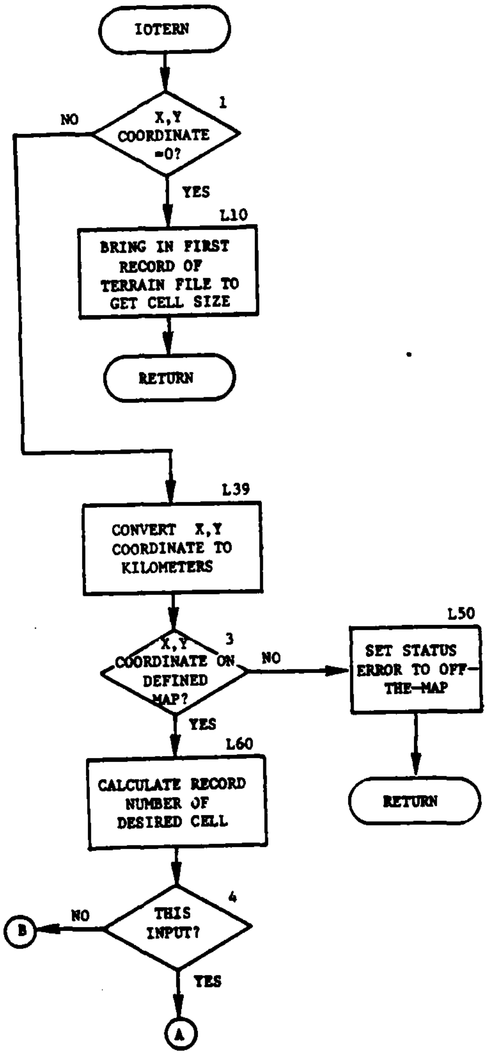


Figure VII-4-B-1. Routine IOTERN (Continued on Next Page)

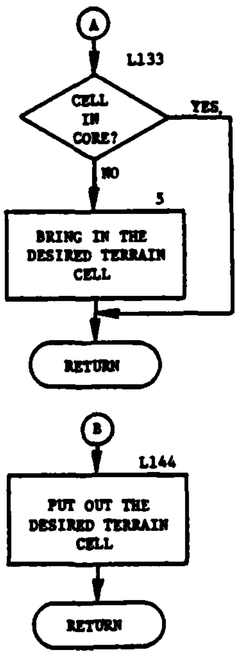


Figure VII-4-B-1. Routine IOTERN (Concluded)

(2) Block L10. By a call to GETWRD, the first four words of the first record of data file 3 are brought in. These words contain number of cells in X direction, number of cells in Y direction, and the size of each cell. Control returns to the calling routine.

(3) Block L39. Convert the X,Y coordinate to its X and Y cell location.

(4) Block 3. If the X cell location is greater than zero and less than or equal to the number of cells in the X direction, and if the Y cell location is greater than zero and less than or equal to the number of cells in the Y direction, control goes to block L60.

(5) Block L50. Set the error status code indicating that the X,Y coordinate is beyond the gamed map area, and return control to the calling routine.

(6) Block L60. Calculate the desired record number as the number of cells in the X direction multiplied by the converted Y cell location plus the X cell location plus two.

(7) Block 4. If this is a request to output a terrain record, control goes to block L144.

(8) Block L133. If the terrain record is in core, return control to the calling routine.

(9) Block 5. Bring the desired terrain record into IARRAY through a call to GETRCD and return control to the calling routine.

(10) Block L144. Through a call to PUTRCD, put out the terrain record to disk from the array IARRAY, and return control to the calling routine.

3. ROUTINE IOWETH:

a. Purpose. The purpose of the routine IOWETH is to get a weather record from data file 4 for a particular area and a particular time of day.

b. Input Variables:

Name	Source	Contents
X	Call	X coordinate of the area of the desired weather.
Y	Call	Y coordinate of the area of the desired weather.
IHR	Call	Hour of the day of the desired weather.
IDAY	Call	Day of the desired weather.
JARRAY	DF4	An array describing the desired weather.

c. Output Variables:

Name	Destination	Contents
JARRAY	Call	An array describing the weather of the desired area and time.
ISECT	Call	Weather sector of the desired area.
IER	Call	Status code of the input and output operation.

d. Logical Flow (Figure VII-4-B-2):

(1) Block 1. If the area for which the weather is desired is in one of the nine possible weather zones, control goes to block L30.

(2) Block 2. Set the error status code indicating that the area is not within the weather sectors, and return control to the calling routine.

(3) Block L30. Calculate the record number of the desired weather record as the weather sector number less one multiplied by 336 plus the day number less one multiplied by 24 plus the hour number plus one.

(4) Block 3. If this desired weather record is in core, return control to the calling routine.

(5) Block L40. Bring the desired weather record from data file 4 into core and return control to the calling routine.

4. ROUTINE UTILLD:

a. Purpose. The purpose of the routine UTILLD is to load the DIVWAG data file, TAPE1, from magnetic tape.

b. Input Variables. Input to UTILLD is the magnetic tape (TAPE21) from which the disk file (TAPE1) will be loaded in blocks of seven disk sectors per magnetic tape record. The following variable is the input variable:

Name	Source	Contents
IBUF(448)	TAPE21	Data stored on tape to be loaded to disk in blocks of seven sectors.

c. Output Variables. The output of UTILLD is the disk file (TAPE1) loaded from magnetic tape (TAPE21). The output variable is:

Name	Destination	Contents
IBUF(448)	TAPE1	Seven sectors of data read from magnetic tape, TAPE21.

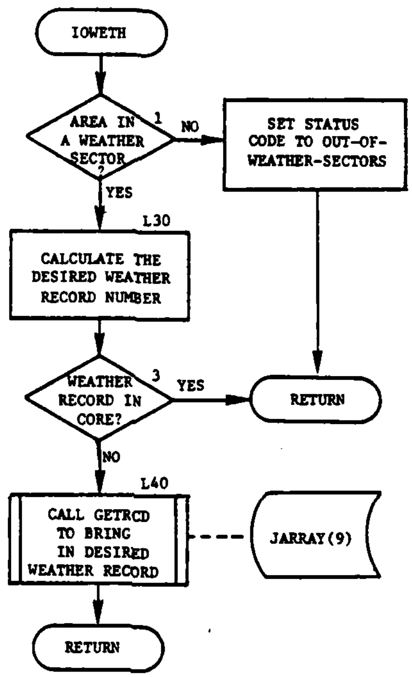


Figure VII-4-B-2. Routine IOWETH

d. Logical Flow (Figure VII-4-B-3):

(1) Block 1. The data and time of the start of the loading process are printed.

(2) Block 2. The first record contains the DIVWAG file name table and is read from magnetic tape.

(3) Block 3. A check is made to insure that the DIVWAG file name table contains a valid last file parameter. If so, control passes to block 4.

(4) Block L200. If the DIVWAG file name table does not appear valid, a diagnostic message is printed, a flag is set, and control is passed to block L300.

(5) Block 4. If the size of the data file is within the range zero to three million words, control passes to block 6.

(6) Block 5. The file size is set to a default value of three million words.

(7) Block 6. Calculate the number of sectors to be read from tape.

(8) Block 7. One record of seven sectors is read from TAPE21.

(9) Block 8. If an end of file has been read on TAPE21, control goes to block L120.

(10) Block L60. Seven sectors are written to disk, TAPE1.

(11) Block L100. If all records have been read from TAPE21, control goes to block L120; otherwise control transfers to block 7.

(12) Block L120. If the file has been filled to maximum size, control goes to block L90.

(13) Block 9. The file is filled with zeroes to maximum size.

(14) Block L90. If the maximum file size was initially provided in the third sector loaded from TAPE21, control goes to block L110.

(15) Block 10. The maximum file size is inserted in the forty-first word of the third sector of disk TAPE1.

(16) Block L110. The total number of sectors loaded from tape is printed.

(17) Block L300. The ending time of the loading process is printed.

(18) Block 11. If the flag has been set to indicate an erroneous DIVWAG file name table, force a job abort by executing an invalid computed GO TO or terminate execution of the program.

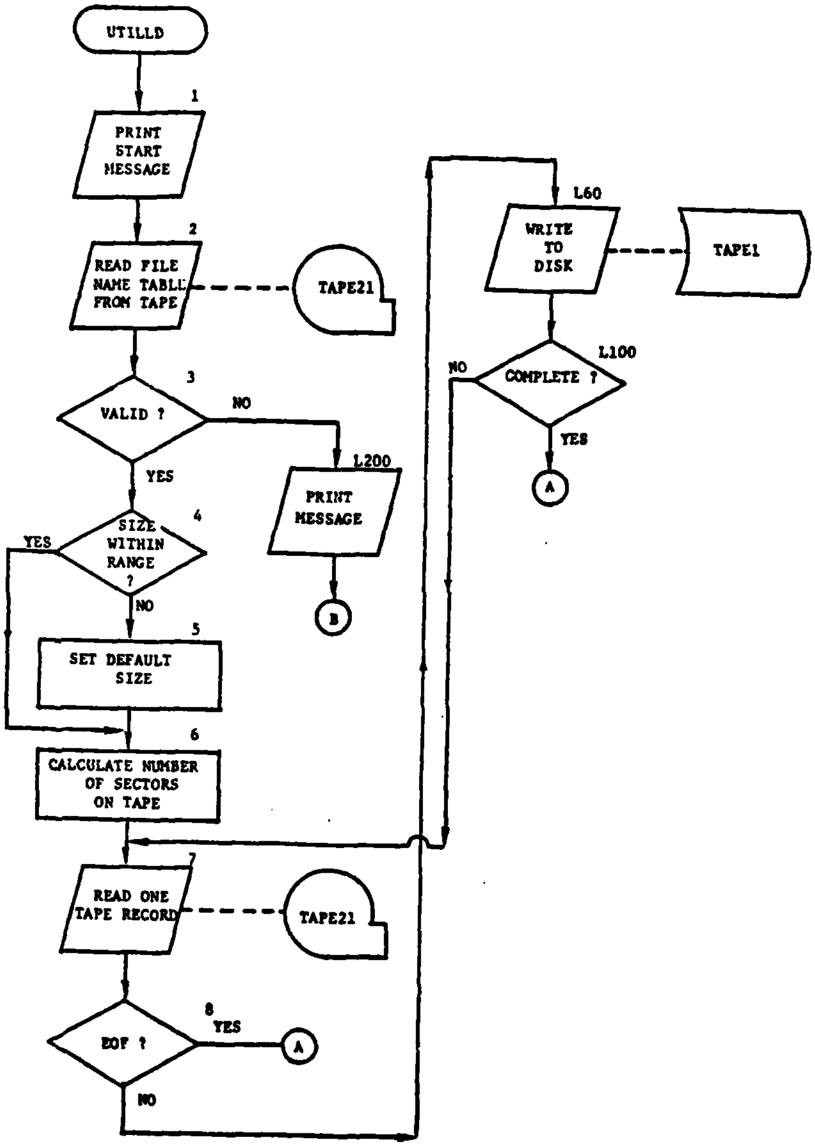


Figure VII-4-B-3. Routine UTILLD (Continued on Next Page)

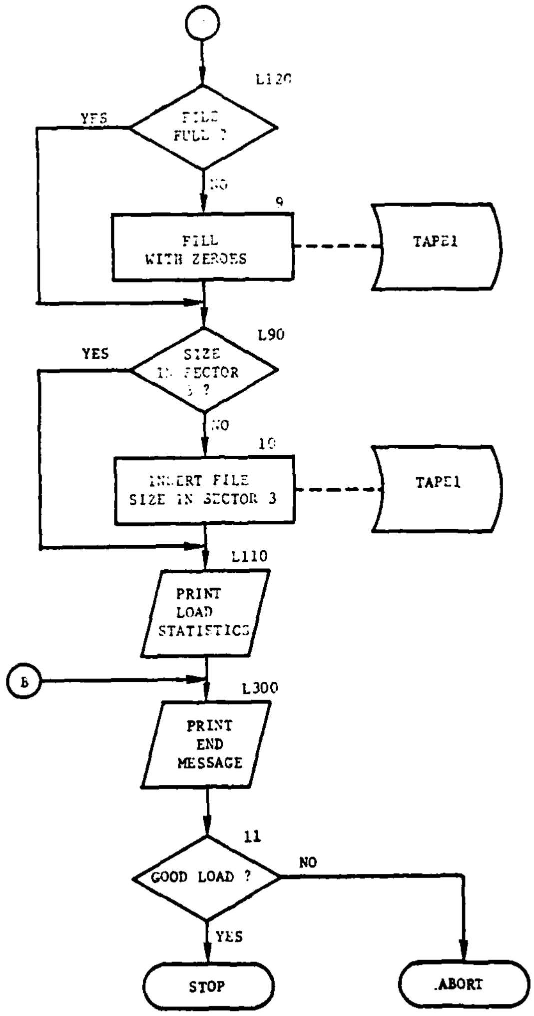


Figure VII-4-B-3. Routine UTILLD (Concluded)

5. ROUTINE UTILDP:

a. Purpose. The purpose of the routine UTILDP is to dump the DIVWAG data file, TAPE1, to magnetic tape.

b. Input Variables. Input to UTILDP is the DIVWAG disk file (TAPE1) from which data are dumped to magnetic tape (TAPE41) in records of seven disk sectors. The input variables are:

Name	Source	Contents
IBUFF(448)	TAPE1	Data stored on disk file TAPE1 to be dumped to magnetic tape TAPE41.
IDUM(4102)	TWO	Circular buffer area to be used by SCOPE Operating System.

c. Output Variables. The output of UTILDP are data from disk file TAPE1 dumped to magnetic tape TAPE1 in records consisting of seven disk sectors. The following output area is used to move the data from disk to tape:

Name	Destination	Contents
IBUFF(448)	TAPE41	Data read from disk file TAPE1 to be written to magnetic tape TAPE41.

d. Logical Flow (Figure VII-4-B-4):

(1) Block 1. Print time and date of start of dump.

(2) Block 2. Read the DIVWAG file name table from disk.

(3) Block 3. If the ordinal of the last data file is greater than zero and less than or equal to 55, control goes to block 4.

(4) Block L200. Print diagnostic message, set bad dump flag, and transfer control to block L300.

(5) Block 4. The size of the active portion of the file is computed from data within the file name table (IFNT).

(6) Block 5. If the maximum size of the file is not defined within the third sector of the file, the default value of three million words is used for maximum file size.

(7) Block 6. If the size of the active file is less than maximum, control goes to block 8.

(8) Block 7. Reset active file size to maximum.

(9) Block L100. Dump the active portion of the DIVWAG data file TAPE1 to magnetic tape TAPE41.

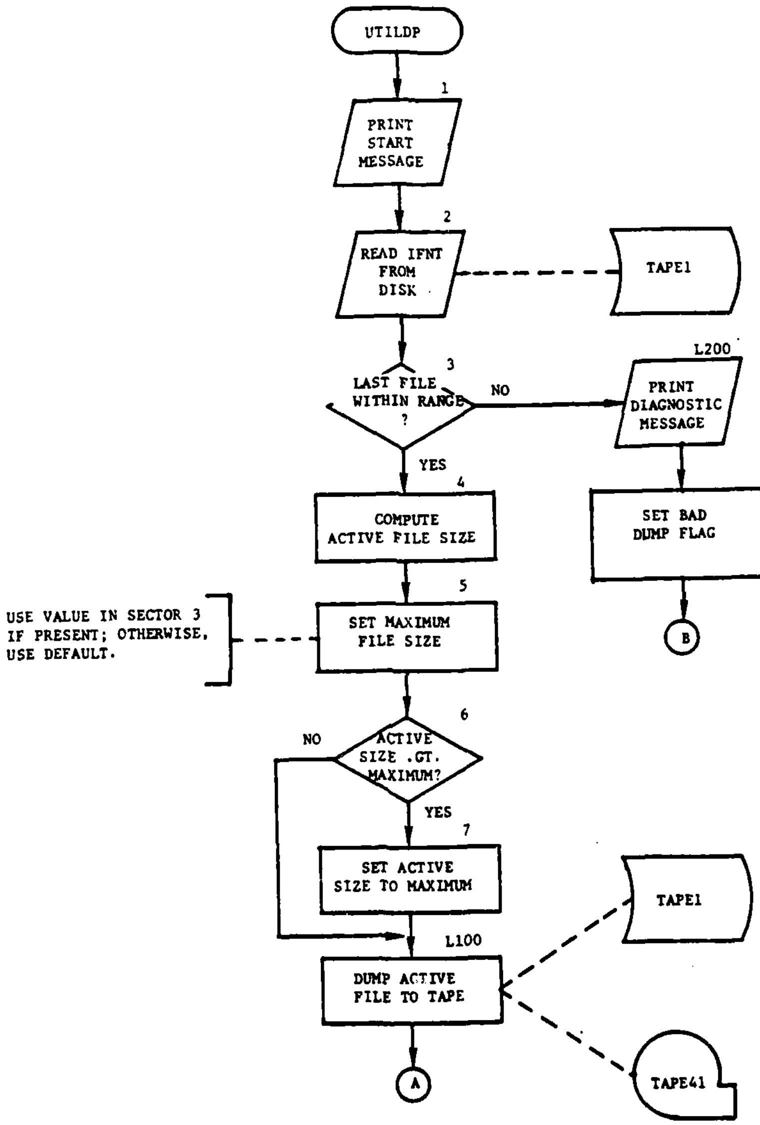


Figure VII-4-B-4. Routine UTILDP (Continued on Next Page)

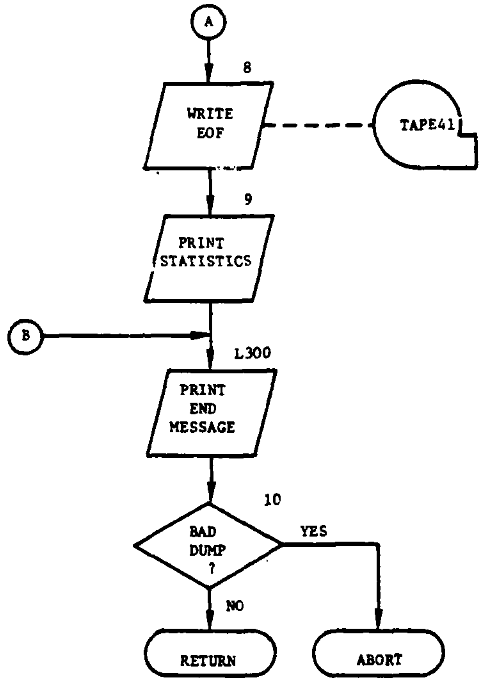
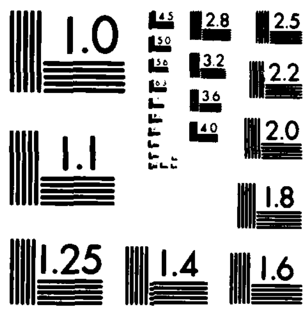


Figure VII-4-B-4. Routine UTILDP (Concluded)

AD-A112 654   ARMY COMBINED ARMS COMBAT DEVELOPMENTS ACTIVITY FORT--ETC   F/G 15/7
DIVWAG MODEL DOCUMENTATION. VOLUME II. PROGRAMMER/ANALYST MANUA--ETC(U)
JUL 76
UNCLASSIFIED   CACDA-TR-8-76-VOL-2-PT-5   NL

6 of 6

END
DATE
FILMED
4 82
DTIC


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

(10) Block 8. Write an end of file on TAPE41.

(11) Block 9. Print dump statistics.

(12) Block L300. Print clock time of end of UTILDP.

(13) Block 10. If erroneous load flag is not set, return control to the calling routine; otherwise, force an abort by executing an invalid computed GO TO.

APPENDIX C

OUTPUT DESCRIPTIONS FOR UTILITY LOAD AND DUMP PROGRAMS

1. INTRODUCTION. This appendix contains samples and detailed descriptions of printed output from the load and dump routines of the DIVWAG system utility package. A figure depicts the format of each routine printout. In the figure an alphabetical character (descriptor) designates an appropriate line, group of lines, or column that is explained in the following paragraphs.

2. ROUTINE UTILLD. Figure VII-4-C-1 shows the printed output of the utility load routine UTILLD described as follows.

Output Descriptor	Explanation
A	START UTILLD: The start message is printed to inform the user that the utility load program has started execution. The time of day and current date are included in this line of print.
B	Load Statistics: The ORDINAL OF LAST FILE created on the DIVWAG data file that is being loaded from magnetic tape is printed, followed on the next line by the starting word, the number of words per record and the number of records that the last file contains. The COMPUTED FILE LENGTH is the last word used in the DIVWAG data file on the file being loaded. The NUMBER OF PRUS LOADED will print when the load program completes loading the DIVWAG data file from tape. The number of PRUS OF PADDING ADDED at the end of the DIVWAG data file is printed. The padding is words of zeros that are created so the DIVWAG data file can have files, records, or words added by the DIVWAG system I/O Package routines. The number of TOTAL PRUS used by the DIVWAG data file at the end of the loading are printed.
C	END UTILLD: The end message is printed to inform the user that the utility load program has completed loading. The time of day is included in this line of print.

3. ROUTINE UTILDP. Figure VII-4-C-2 shows the printed output of the utility dump routine UTILDP described as follows.

Output Descriptor	Explanation
A	START UTILDP: The start message is printed to inform the user that the utility dump program has started execution. The time of day and current date are included in this line of print.

```
A ── START UTILLD.        23.04.17.      03/13/73
       ┌ ORDINAL OF LAST FILE   =             48
       │ FILE NAME TABLE (44)   =        2712691              1212              50
  B ───┤ COMPUTED FILE LENGTH   =        2773290 WORDS.
       │ NUMBER OF PRUS LOADED  =          43333
       │ PRUS OF PADDING ADDED  =           3542
       └ TOTAL PRUS WRITTEN     =          46875
C ── END UTILLD.          23.23.06.
```

Figure VII-4-C-1. Utility LOAD Routine Printed Output Sample

```
A ── START UTILOP.        23.45.23.      03/13/73
       ┌ ORDINAL OF LAST FILE   =             30
  B ───┤ FILE NAME TABLE (30)   =        2728162              2149              23
       │ COMPUTED FILE LENGTH   =        2777588 WORDS.
       └ NUMBER OF PRUS DUMPED  =          43400
C ── END UTILD.           23.53.55.
```

Figure VII-4-C-2. Utility DUMP Routine Printed Output Sample

Output Descriptor	Explanation
B	Dump Statistics: The ORDINAL OF LAST FILE created on the DIVWAG data file that is being dumped to magnetic tape from the disk is printed, followed on the next line by the starting word, the number of words per record, and the number of records that the last file contains. The COMPUTED FILE LENGTH is the last word used in the DIVWAG data file that is being dumped to tape. The NUMBER OF PRUS DUMPED will print when the dump program completes the dumping of the DIVWAG data file to the last word used. It does not dump the padded words from last word used to end of DIVWAG data file.
C	END UTILDP: The end message is printed to inform the user that the utility dump program has completed dumping. The time of day is included in this line of print.

APPENDIX D

SOURCE LISTINGS FOR DIVWAG SYSTEM UTILITY PACKAGES UTILITY LOAD AND DUMP PROGRAMS

(AVAILABLE UNDER SEPARATE COVER)

CHAPTER 5

OTHER UTILITY ROUTINES

1. INTRODUCTION. This chapter contains descriptions of other small utility routines used in more than one processor. These routines are primarily to accomplish specialized packing and unpacking of data.

2. CHARACTER PACKING. Routine MVCHAR transfers a specified number of characters from and into specified portions of words. It is currently designed for words containing 10 six-bit characters but is easily adaptable to other common word sizes. Routine KHAR selects a single character from within a word and returns that character in a word left justified and blank filled.

3. SIX-BIT PACK. Routine PACK28 packs one to four integers of six bits each into a word of at least 24 bits. It also performs the unpacking operation. This routine is specifically designed to access the distribution tables contained on data file 28.

4. INTEGER/CHARACTER CONVERSION. Routine INTCHR converts small integers to display codes and, conversely, digit display codes to integers.

5. AIR GROUND ENGAGEMENT DATA. The arrays stored on data file 26 are packed to provide optional use of the disk space and to facilitate access to specific tables. That data file is accessed by using routine SNATCH.

APPENDIX A

INPUT REQUIREMENTS FOR OTHER UTILITY ROUTINES

Input to the other utility routines is passed through the call or, for routine SNATCH, through data file 26. No special input data are required. Refer to the descriptions of the calling routines for sources of data.

APPENDIX B

OTHER UTILITY PROGRAM DESCRIPTIONS

1. INTRODUCTION. The routines described in this appendix -- MVCHAR, KHAR, PACK28, INTCHR, and SNATCH -- are utilized by more than one processor. The routines are considered "other" routines that are in addition to the DIVWAG System utility packages described in Chapters 2, 3, and 4 of Section VII.

2. ROUTINE MVCHAR:

a. Purpose. This routine is designed to move N characters from word A, beginning with character I, to word B, beginning with character J. This is accomplished by defining the number of bits per character, the number of characters per word, and transferring the requested characters by performing appropriate shifting and masking operations. The shifting is an end-around left shift.

b. Input Variables:

Name	Source	Contents
NC	Call	Total number of characters to be moved.
A	Call	Word location from where characters are moved.
CA	Call	First character, relative to A, to be moved.
B	Call	Word location to where characters are moved.
CB	Call	First character location, relative to B, where characters are moved.

c. Output Variables:

Name	Destination	Contents
B	Call	Word address to where characters are moved.
CB	Call	First character position, relative to B, where characters are moved.

d. Logical Flow (Figure VII-4-B-1):

(1) Block L100. Characters are moved one-at-a-time. This block determines the word location that the characters are to be moved from, stores it in S1, determines the word location that characters are to be moved to, stores it in S2, and determines the number of characters that are to be moved (N) during this pass.

(2) Block L500. The number of characters (N) is used to select the correct mask from the mask array (MSK). The mask (MASK) selected is shifted,

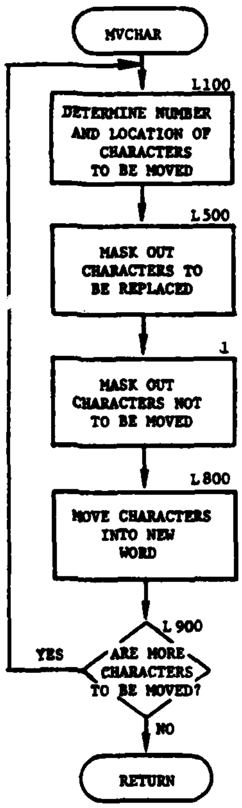


Figure VII-5-B-1. Routine MVCHAR

if necessary, so zeroes are aligned with the characters to be replaced. A logical AND is performed on MASK and S2, and the result is stored in R1.

(3) Block 1. The characters in S1 are shifted to align with the S2 position where they are to be moved. N is used to select a mask from MSK. This mask (MASK) is shifted so zeroes are aligned with the characters that are not to be moved. A logical AND is performed on MASK and S1, and the result is stored in R2.

(4) Block L800. A logical OR is used to combine R1 and R2. The result is stored in the appropriate word of the B array.

(5) Block L900. If more characters are to be moved, control is transferred to block L100; otherwise, control returns to the calling routine.

3. ROUTINE KHAR:

a. Purpose. This routine returns character number N from variable LOC. The result is left justified with blank fill.

b. Input Variables.

Name	Source	Contents
LOC	Call	Word containing character information.
N	Call	Character position to be extracted.

c. Output Variables.

Name	Destination	Contents
KHAR	Call	Character in position 1 with blank fill.

d. Logical Flow (Figure VII-5-B-2):

(1) Block 1. Set variable BLANKS equal to all blanks using data statement.

(2) Block 2. Set KHAR equal to BLANKS.

(3) Block 3. Call routine MVCHAR to move character N in variable LOC to position 1 in KHAR and return control to the calling routine.

4. ROUTINE PACK28:

a. Purpose. Routine PACK28 packs one to four integer numbers with values of 63 (six bits) or less into one integer word of 24 bits. It also unpacks numbers that have been packed.

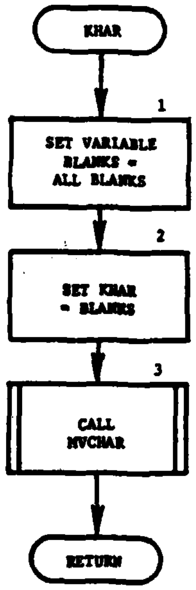


Figure VII-5-B-2. Routine KHAR

b. Input Variables:

Name	Source	Contents
IPACK	Call	Pack indicator: 0 = packing; 1 = unpacking.
N	Call	Total number of integers to be packed or unpacked.
INT1	Call	Packed integer word.
INT2	Call	Unpacked integer array.

c. Output Variables:

Name	Destination	Contents
INT1	Call	Packed integer word.
INT2	Call	Unpacked integer array.

d. Logical Flow (Figure VII-5-B-3):

(1) Blocks 1 and L200. If the number of integers (N) to be packed or unpacked is greater than four, print an error message and return control to the calling routine.

(2) Block 2. IPACK is checked to determine if the purpose of the call is to pack data. If not, control transfers to block L20.

(3) Blocks 3, L202, L10, and 4. Each number is checked and if the value is greater than 63, an error message is printed; and control returns to the calling routine. If not, the number is packed into the output integer until all numbers have been packed. Control returns to the calling routine.

(4) Blocks L20 and L201. IPACK is checked to determine if the purpose of the call is to unpack data. If not, an error message is printed, and control returns to the calling routine.

(5) Blocks 5 and 6. Each number is unpacked and put in the output array. Control returns to the calling routine.

5. ROUTINE INTCHR:

a. Purpose. INTCHR returns the integer number corresponding to the character numeral in INTG if the variable ITYPE is equal to one and INTG contains the character numeral left justified followed by blanks. If ITYPE is other than one and INTG represents an integer value between zero and nine, INTCHR returns a left justified character numeral corresponding to the given integer with blank fill. If the search fails to compute a valid answer due to input values, INTCHR returns a value of 45 which is neither an alphabetic nor numerical character.

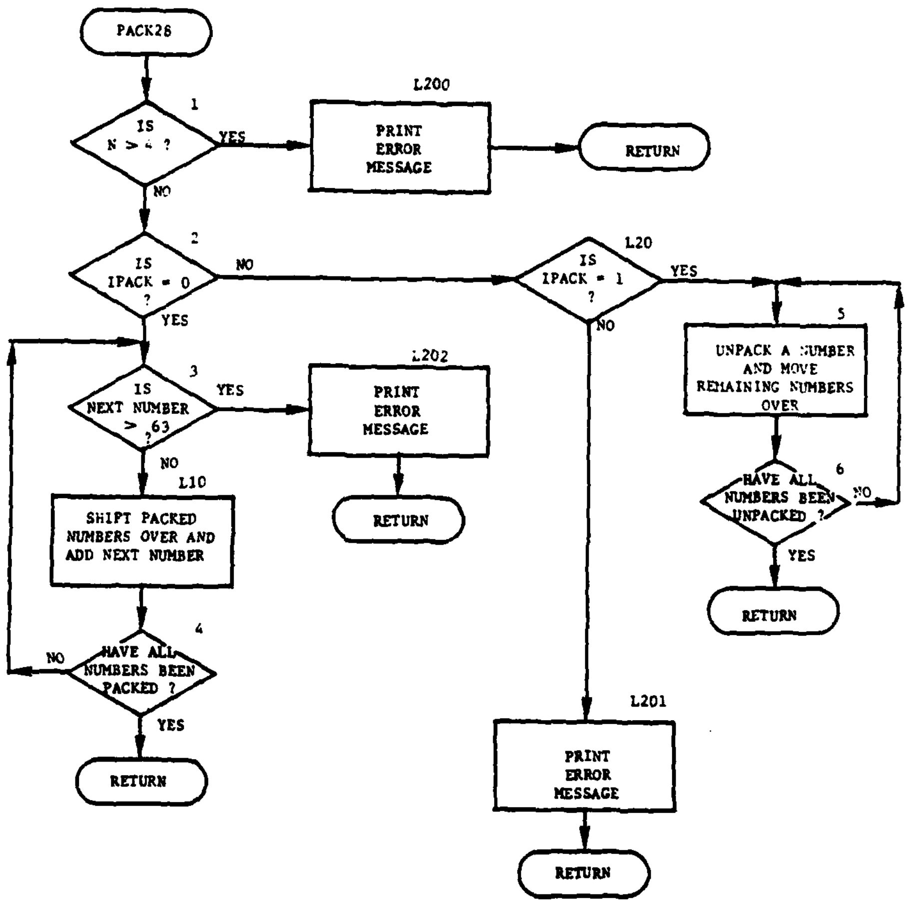


Figure VII-5-B-3. Routine PACK28

b. Input Variables:

Name	Source	Contents
INTG	Call	Character or numeral to be converted.
ITYPE	Call	Method of conversion to use.

c. Output Variables:

Name	Destination	Contents
INTCHR	Call	Converted version of INTG.

d. Logical Flow (Figure VII-5-B-4):

(1) Block 1. If INTCHR is to convert a character numeral to an integer, control goes to block 4.

(2) Block 2. Check to see if INTG is equal to an integer of zero to ten. If not, control goes to block 6.

(3) Block 3. Set INTCHR equal to the character numeral corresponding to the integer and return control to the calling routine.

(4) Block 4. Check to determine if INTG is equal to a character numeral of zero to ten. If not, control goes to block 6.

(5) Block 5. Set INTCHR equal to the integer corresponding to the character numeral and return control to the calling routine.

(6) Block 6. Set INTCHR equal to the number 45 and return control to the calling routine.

6. ROUTINE SNATCH:

a. Purpose. Routine SNATCH is used to access the Air Ground Engagement Model data on data file 26. The data on data file 26 are composed of 16 data tables. Each data table is assigned an identification number, to orient the routine with the desired table. The data tables are divided into four category dependencies: mission type, aircraft, air defense weapons, and general data. The four categories constitute a different number of records allocated to those tables within each category. Having grouped all tables within categories and knowing the number of records allocated to each group, a record index can be computed upon request for a specific table.

b. Input Variables:

Name	Source	Contents
ITABLE	Call	Table identification number (refer to data file 26 documentation for complete description of table data).

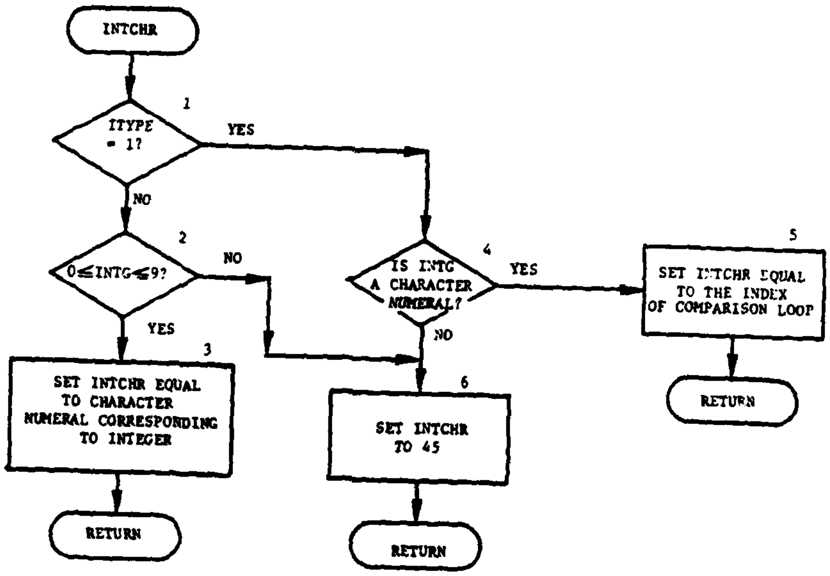


Figure VII-5-B-4. Routine INTCHR

Name	Source	Contents
DATA	Call	If IO = 1, DATA will contain the record to place on data file 26.
IREC	Call	The record desired within the table.
NUMREC	Call	The number of succeeding records desired.
IO	Call	Input/output indicator: 1 = output, 0 = input.
IFORCE	Call	Indicates the forcc: 1 = Blue, 2 = Red.

c. Output Variables:

Name	Destination	Contents
DATA	Call	Requested record(s) from data file 26.

d. Logical Flow (Figure VII-5-B-5):

(1) Blocks 1, 2, and 3. Initialize NREC equal to zero to indicate Blue data will be accessed. If the Red force is the force of interest, set NREC equal to 308.

(2) Block 4. Compute the record index of the requested table.

(3) Blocks 5, 6, and L350. Check IO to determine if SNATCH is to obtain data from data file 26 (IO equals zero) or replace data (IO equals one). Routine GETRCD returns the requested table from data file 26, and it is stored in array DATA; or, routine PUTRCD places the contents of the DATA array on data file 26 at the computed record index.

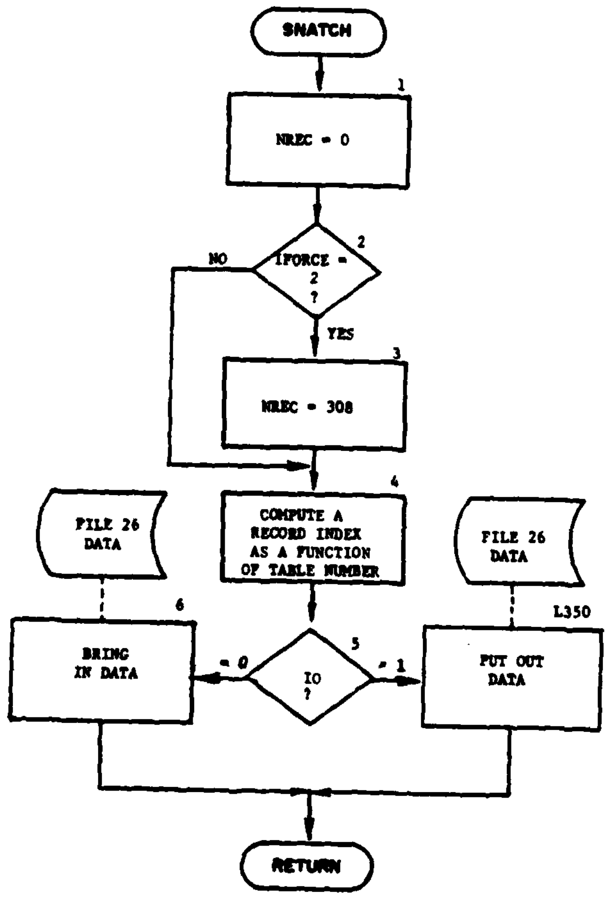


Figure VII-5-B-5. Routine SNATCH

APPENDIX C

OUTPUT DESCRIPTIONS FOR OTHER UTILITY ROUTINES

The other utility routines of the DIVWAG system utility packages return requested data to the calling routine. There is no printed output.

APPENDIX D

SOURCE LISTINGS FOR DIVWAG SYSTEM UTILITY PACKAGES OTHER UTILITY ROUTINES

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