30 April 1971

AD

AGN 16782

TECHNICAL REPORT T.R.9-71

SURVEILLANCE, TARGET ACQUISITION AND NIGHT OBSERVATION (STANO) PHASE I SYSTEM ASSESSMENT MODEL (SAM)

(Short Title: STANO PHASE I SAM)

FINAL REPORT

VOLUME II-USERS' MANUAL

UNITED STATES ARMY COMBAT DEVELOPMENTS COMMAND

SYSTEMS ANALYSIS GROUP

30 April 1971

AD

ACN 16782

TECHNICAL REPORT T.R.9-71

SURVEILLANCE, TARGET ACQUISITION AND NIGHT OBSERVATION (STANO) PHASE I SYSTEM ASSESSMENT MODEL (SAM) (Short Title: STANO PHASE I SAM)

FINAL REPORT

VOLUME II-USERS' MANUAL

PREPARED FOR:

UNITED STATES ARMY COMBAT DEVELOPMENTS COMMAND

SYSTEMS ANALYSIS GROUP

CONTRACT NO. DAAB07-69-C-0069
AMENDMENT P00002

CORNELL AERONAUTICAL LABORATORY, INC
BUFFALO, NEW YORK 14221
CAL REPORT NO. UM-2709-H-1

UNCLASSIFIED

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author)
US Army Combat Developments Command
Systems Analysis Group
Fort Belvoir, Virginia 22060

2a. REPORT SECURITY CLASSIFICATION
UNCLASSIFIED

2b. GROUP
N/A

3. REPORT TITLE
Surveillance, Target Acquisition and Night Observation (STANO) Phase I System Assessment Model (SAM) (Short Title: STANO Phase I SAM)

4. DESCRIPTIVE NOTES *(Type of report and inclusive dates)*
Final Report

5. AUTHOR(S) *(First name, middle initial, last name)*
No personal author

6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
30 April 1971	1267	

8a. CONTRACT OR GRANT NO.	DAAB07-69-C-0069 Amendment P00002	9a. ORIGINATOR'S REPORT NUMBER(S)	ACN 16782
b. PROJECT NO.	ACN 16782		T. R. 9-71
c.		9b. OTHER REPORT NO(S) *(Any other numbers that may be assigned this report)*	
d.			

10. DISTRIBUTION STATEMENT
Approved for public release - distribution unlimited.

11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY
None	US Army Combat Developments Command Systems Analysis Group Fort Belvoir, Virginia 22060

13. ABSTRACT

The STANO Phase I SAM is designed to simulate a brigade or smaller STANO System in a low-intensity conflict. The model will permit the establishment and evaluation of numerous effectiveness criteria for individual STANO sensors and subsystems. It will facilitate the formation of improved candidate STANO Systems, through better understanding of shortcomings in organization, materiel and concepts of employment. It has the capability of producing information permitting scientifically supportable evaluations and judgments of interface requirements and trade-off options of STANO subsystems. The model can be used for parametric analysis, trade-off analysis, and system performance sensitivity tests. (U)

DD FORM 1 NOV 68 1473 REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

UNCLASSIFIED
Security Classification

TABLE OF CONTENTS

14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
STANO						
System Assessment Model						
Surveillance						
Target acquisition						
Night observation						
Simulation						
Night vision						
Sensors						
Detection						
Systems analysis						
Sensitivity tests						
Performance						
Night operations						
Intelligence						

TABLE OF CONTENTS (Cont.)

FIGURES

TABLES

Section 1

INTRODUCTION

This manual is intended to help and guide the user in the preparation and proper program operation for the Phase I System Assessment Model (SAM) developed under Cornell Aeronautical Laboratory, Inc. (CAL) Project Mobile Army Surveillance System (MASS). It comprises Volume II of the documentation of the Systems Assessment Model developed under Amendment P00002 to Contract DAA-B07-69-C-0069. The SAM collectively comprises 21 distinct job steps, 240 sub-programs, and 27 data sets (some of which are composites of many subsets). Dependencies of job steps with other job steps vary widely, from "Making Sparse Digital Terrain Tape" and "Atmospheric" programs that are essentially self standing, to Output Processor type programs that require almost all other job steps to have been previously executed. In this manual, each job step is defined in terms of subroutines required, data sets needed, data sets generated and instructions for the preparation of planner input cards. For easier reference and identification a program or deck name has been given to all main programs, e. g., EXEC1 is the name of the main program in the Main Simulation Model (MSM). Similarly, a program or deck name has been given to all BLOCK DATA subprograms.

No attempt was made to describe details of job control language (JCL), especially the date definition (DD) cards, which are generally dependent upon machine type, upon its operating system, upon its peripheral storage facilities and upon user/programmer choices of devices and data control block parameters.

It should be noted that data set names (DSN) are completely optional. The names given in the following text are consistent, but user/programmers may make different choices having more meaningful mnemonic form.

Figure 1-1 illustrates the sequence of executing the 21 job steps and shows "external" input and output data sets. The 18 internal data sets used in the PRERUN will be shown in the discussion of the PRERUN Program Operation. Figure 1-2 lists the 240 subprograms within the 21 job steps.

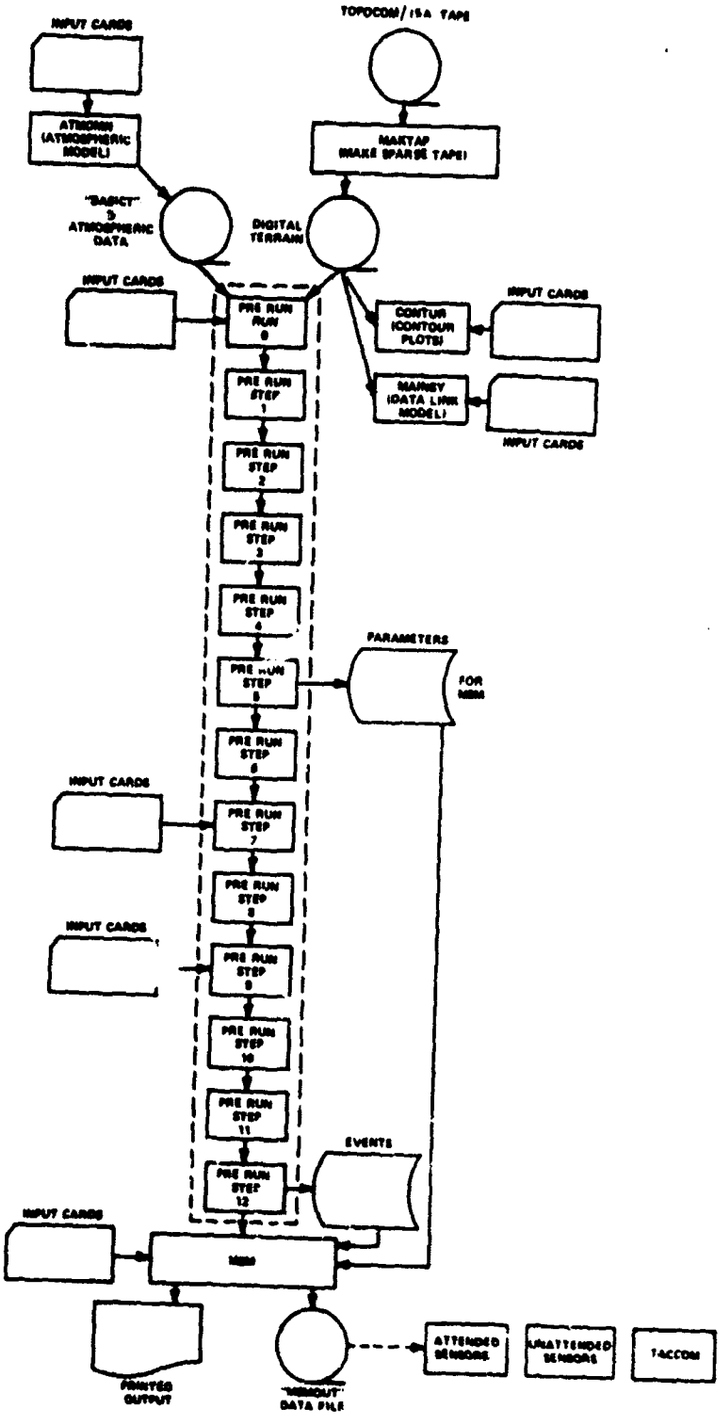


Figure 1-1 SEQUENCE OF SAM JOB STEPS

```
  1 ACOUBK      50 ELPEX      99 INMAIN     145 PLOT      195 SENXY
  2 ACOUTG      51 EMSG      100 INOUT      146 PRCONT    196 SEQ
  3 ALFCVT      52 END       101 INSPCT     147 PRFCIP    197 SETSC1
  4 ALPHA       53 ENVIR     102 INTER      148 PREMN1    198 SETSC2
  5 ANALMN      54 EPHEM     103 IRRAD      149 PREMN2    199 SNAIDR
  6 ANG         55 ERASE     104 ITODEV     150 PREMN3    200 SNPGT
  7 ANLYZE      56 EREC      105 IUTEVL     151 PREMN4    201 SPHTRI
  8 ARFBK       57 EVNEFD                   152 PREMN6    202 STCIRC
  9 ARFTG       58 EVNT9     106 JFBLK3     153 PREMN8    203 STRECT
 10 ARRIVL      59 EVNT23    107 JFBLK6     154 PREMN9
 11 ARRPTR      60 EVNT48    108 JSTETA     155 PREMNA    204 TACCOM
 12 ARRVLU      61 EXEC1                    156 PREMNB    205 TACOUT
 13 ATMOMN      62 EXEC1A    109 KSTVLU     157 PREMNC    206 TANDT
 14 ATMOS       63 EXEC1B                   158 PROB1     207 TARGBR
                64 EX2BFL    110 LDSRT      159 PROB2     208 TARGEX
 15 BATEX       65 EX2HLT    111 LEAST      160 PROB3     209 TERAN
 16 BATLBK      66 EX2SFA    112 LEST       161 PROB4     210 TERANE
 17 BATLTG      67 EX2SNP    113 LILMSM     162 PROB5     211 TERCTR
 18 BEMAP       68 EX2SNR    114 LOCATE     163 PROFIL    212 TGTLG
 19 BFIASK      69 EX2SPC    115 LODQUE     164 PSNP      213 TGTLXY
 20 BFILUN      70 EX2SRP    116 LOS        165 PSNP19    214 TGTPTR
 21 BLKLOS      71 EX2UPD    117 LSGT                     215 TGTVLU
 22 BRKWIR      72 EX3ARF                   166 QUAD      216 THERML
 23 BSCHDL      73 EX3BKW    118 MAGTG                    217 TIMER
 24 BSORT       74 EX3IMG    119 MAINLS     167 RADAR     218 TIMOUT
 25 BUPDAT      75 EX3MAG    120 MAINSY     168 RADCTR    219 TPDISK
 26 BWIRBK      76 EX3PIR    121 MAKTAP     169 RADIAN    220 TRAN
                77 EX3RDR    122 MAPPER     170 RADPLT    221 TRAN2
 27 CALLIT      78 EX3SAC    123 MCHART     171 RADSEL    222 TRNPAR
 28 CIRC        79 EX3THV    124 MERGDR     172 READ      223 TRNPR1
 29 CLOSEL                   125 MERGE1     173 READC     224 TRNSFR
 30 CNNECT      80 FAINTV    126 MICRO      174 READIN    225 TWBLKD
 31 COMMA       81 FINDX     127 MICTER     175 READUC
 32 COMMUP      82 FINDY     128 MONLST     176 RERR      226 UGSDET
 33 CONTUR      83 FLSTG     129 MSGQUE     177 RESET     227 UGSOUT
 34 CONVRT      84 FMERGE    130 MSMBLK     178 RFLINK    228 UPDN1
 35 COUNTR      85 FOLAGE    131 MVS        179 RHOTHE    229 UPDN3
 36 CRLATE      86 FSTARG                   180 RODRUM    230 UPDN5
 37 CSCHDL      87 FTPAR1    132 NMOD       181 ROUTE     231 UPDN6
 38 CULTBK      88 FTPAR2    133 NORMER     182 RUSUP     232 UPDNB
 39 CULTEX                   134 NUMBER                   233 UPDN10
                89 GMERGE                   183 SACDET    234 UPDN19
 40 DELHD       90 GREC      135 ORDER      184 SCAN1     235 URN
 41 DIFF        91 GRN       136 OUTCTR     185 SCAN2     236 URNASK
 42 DLLOS       92 GRNASK                   186 SCATT     237 URNORG
 43 DOPLER      93 GRNORG    137 PARMIN     187 SCNOUT
 44 DORDER                   138 PARPTR     188 SCREEN    238 VALID
 45 DSKOUT      94 HORIZ     139 PARVLU     189 SECLOG
 46 DUMPMS      95 HTGAIN    140 PATHS      190 SECT      239 WEATHR
                96 HYPERB    141 PGSKIP     191 SEISBK
 47 EDIT                     142 PGSKP2     192 SEISTG    240 XSORT
 48 EFFEC       97 IDIST     143 PIRBK      193 SELCTR
 49 ELPOT       98 IMAGE     144 PIRTG      194 SENSO
```

Figure 1-2 LISTING OF SAM SUBPROGRAM NAMES

Section 2

ATMOSPHERIC MODEL PROGRAM OPERATION

2.1 MAIN PROGRAM ATMOMN

2.1.1 Purpose

ATMOMN is the main program required to initiate generation of the atmospheric environment for the duration of the game. It is used as a vehicle for providing inputs to the simulation and therefore subject to alteration by the game planner. Because various portions of the PRERUN and Main Simulation Model require knowledge of the atmospheric environment, it is intended to be a stand-alone program executed prior to the PRERUN.

2.1.2 Use and Description of Inputs

Although ATMOMN only calls Subroutine ATMOS, fourteen other supporting subroutines are required for execution. Figure 2.1-1 lists these subroutines.

```
JOB STEP:  ATMOSPHERIC MODEL

SUBPROGRAMS NEEDED
     ATMOMN (MAIN PROGRAM)
     ATMOS
     EDIT
     EMSG
     END
     EPHEM
     GRN
     IRRAD
     ORDER
     PRECIP
     PROB1
     PROB2
     PROB3
     PROB4
     PROB5
     SPHTRI
     URN
     WEATHR

DATA SET NEEDED
     SYSIN          (UNIT 5 - INPUT DATA)

DATA SET GENERATED
     MASSDAT        (UNIT 3 - BASICT,ATMENV)
```

Figure 2.1-1ATMOSPHERIC SUBPROGRAMS AND DATA SETS

The ATMOMN Program is used as a vehicle for providing inputs to ATMOS as well as the PRERUN and Main Simulation Model. Fig. 2.1-2 presents the thirteen FORTRAN statements which compose the program. This auxiliary program must be prepared each time ATMOS is to be executed. Lines 1, 2, 9, 10, 12 and 13 should appear exactly as shown. Lines 3 through 8 and line 11 are altered as required for the particular game being played. Lines 3 through 6 specify the content of four integer variables in the BASICT common area. Line 3 establishes ITODST, the time of day at the start of the game in seconds. In the example presented, ITODST is equal to zero indicating that the start of the game is equal to 0000 hours. Line 4 sets ITDURN, a variable describing the duration of the game in seconds. In the present example the duration is equal to three days. The maximum allowed duration is six weeks. Line 5 which sets the variable IDATE specifies the date of the start of the game. This is always a 6-digit integer with the first two digits being the day of the start of game, the next two digits the month and the last two digits the year. In the present example the game begins on May 29, 1969. Line 6 which establishes the value of IDAREA describing the scenario area where the game is to be played; 1 = Khe Sanh, South Vietnam, 2 = Hue, South Vietnam, and 3 = Fort Hood, Texas. In the present example the game is being played in the Hue scenario area. Lines 7 and 8 describe reference numbers for the origin of the gaussian and uniform random number generators. These variables can be set to any arbitrary nine-digit integer but must be changed between successive executions of ATMOS if different atmospheric environments are required. Line 11 sets the variable PROPT representing an output option available to the planner. If PROPT is set equal to .TRUE. the values in the ATMENV tables describing the environment will be printed out and recorded on magnetic tape. If this variable is set equal to .FALSE. the printed report will be deleted and the ATMENV Tables will only be recorded on magnetic tape (DSNAME = MASSDAT).

In addition to the inputs which must be provided by the planner through the FORTRAN Statements composing ATMOMN, data must be supplied in an input data stream. Fig. 2.1-3 shows the data sets which compose the ATMOMN input data stream and a detailed description of the planner input preparation is made in Appendix A. The planner input data set presents the meteorological variables that the planner has elected to supply in the form of a time history. The preparation of this data set is detailed in the description of Subroutine ATMOS (Section 2.2). If no input is being supplied, this data set must consist of a blank data card. The remaining five data sets in the input data stream represent designer input data (PROB1 - PROB5) described in Appendix A. These sets contain the parameters of the statistical distributions determined from recorded meteorological data. These data sets must be included in the input data stream regardless of the amount and type of planner input data. A limited number of these designer input data sets have been prepared during development of the model. Detailed descriptions of the preparation of these data sets is included with the description of the corresponding supporting subroutine in Volume I. In placing the data sets into the input data stream one must take care to insure that they have the proper order and that the data sets selected agree with the month and scenario area of the game.

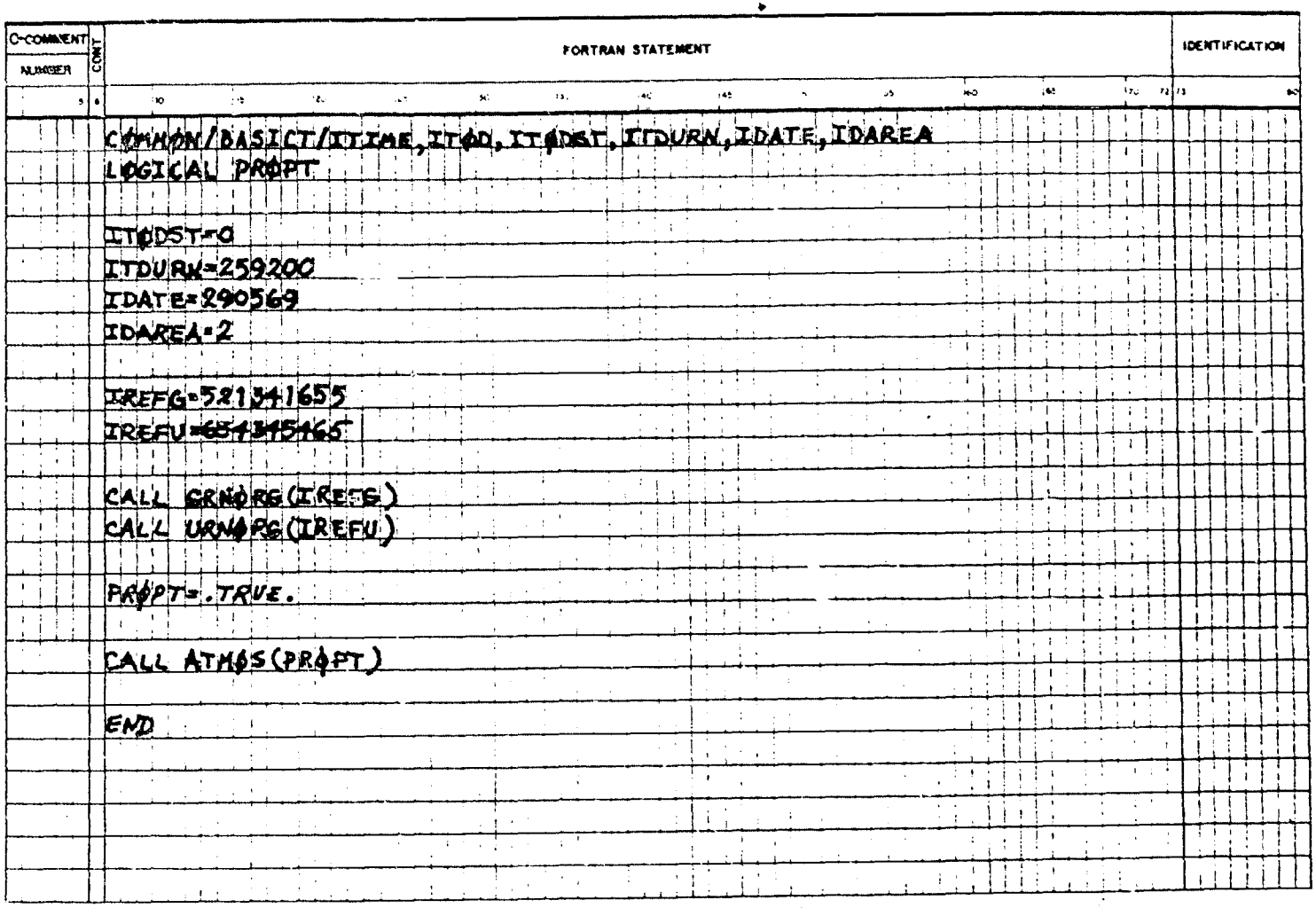


Figure 2.1-2 FORTRAN STATEMENTS COMPOSING ATMOMN PROGRAM

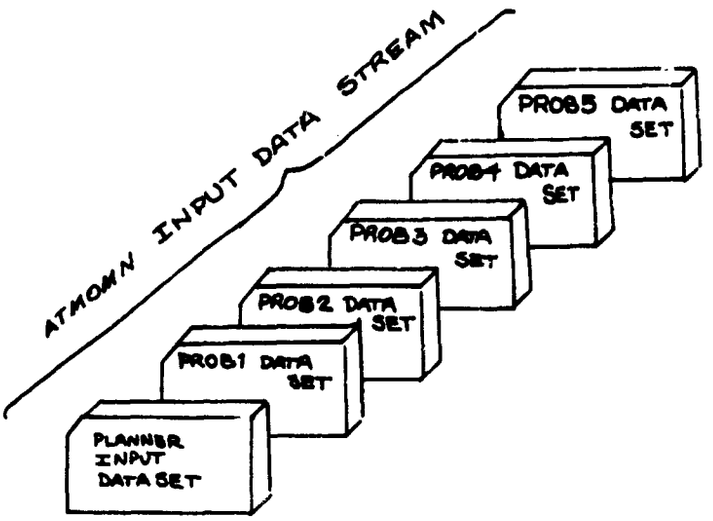


Figure 2.1-3 ATMOMN INPUT DATA STREAM

2.2 SUBROUTINE ATMOS

2.2.1 Purpose

Subroutine ATMOS generates values for a number of meteorological factors which describe the atmospheric environment during the duration of the game. These factors compose the ATMENV Common Area as shown in Tab. 2.2-I. Because various portions of the PRERUN and Main Simulation Model require knowledge of the atmospheric environment, Subroutine ATMOS is intended to be part of a stand-alone program executed prior to the PRERUN.

2.2.2 Use and Description of Inputs

The planner may input data for one or more (or possibly all) of the variables which would otherwise be generated by Subroutine ATMOS using statistical procedures. The input data must be in the form of a time history which will be described in detail. This history is punched onto cards to form the Planner Input Data Set (see the input data stream in the description of ATMOMN main program (2.1)), and read by Subroutine ATMOS. If no input is being supplied the data set must consist of a blank card.

TABLE 2.2-I

CONTENTS OF ATMENV COMMON AREA

VARIABLE NAME	TYPE	DESCRIPTION	UNITS
ITEFF	Integer	Value of ITIME when ATMENV Table effective	Seconds
SOLALT	Real	Solar Altitude	Degrees
ALTLUN	Real	Lunar Altitude	Degrees
PHSLUN	Real	Lunar phase (civil)	Fraction
IPCODE	Integer	Precipitation code identifying type of precipitation 0 = No precipitation 1 = Thunderstorm 2 = Rain or drizzle 3 = Freezing rain or drizzle 4 = Snow or sleet 5 = Hail 6 = Fog	-
PRATE	Real	Precipitation rate	mm/hr
PTOT24		Total precipitation during the last 24 hours	mm
H2ODEN	Real	Amount of water in the air	gm/cc
WSPEED		Wind speed	km/hr
CCOVER		Cloud cover	fraction
ATEMP		Air temperature	°C
PRESUR		Pressure	mm of mercury
HUMDTY		Relative humidity	%
VISIB		Meteorological visibility	meters
CEIL		Ceiling	meters
ASID	Real Array	ASID(1) = Amplitude of the spectral irradiance due to direct sunlight or direct moonlight ASID(2) = Amplitude of the spectral irradiance due to clear sky ASID(3) = Amplitude of the spectral irradiance due to air glow	watts/m^2
TCLOUD	Real	Transmission of cloud cover	-

There are nine categories in which the planner may elect to provide input. If he elects to provide any input at all, he must also provide time data. Table 2.2-II lists these categories with their descriptions.

Note that in each of the first two categories, Ephemeris/ Illumination Data and the Precipitation Data, the planner must specify more than one variable. For example, if he elects to input illumination information he must specify solar altitude, lunar altitude and lunar phase as a function of time for the total duration of the game being played. This does not restrict these time histories to be representative of the "real world." For example, the planner could play a game history of several days keeping the solar altitude constant or a three-day game with the phase of the moon changing from 1/4 to 1/2 to 3/4 on successive nights. Due to the extreme flexibility in the types of input accepted, overall compatibility of the input rests with the planner. He should not, for example, specify rain without cloud cover.

To assist the planner in preparing the input, a form has been prepared and is shown in Tab. 2.2-III. We have illustrated its use by employing the environmental data from a draft scenario shown on Table 2.2-IV. In the present case the planner elected to provide input in seven of the nine categories (pressure and visibility are left unspecified). As we will see from this example, the preparation of the planner input could become tedious when the planner elects to provide input in a majority of the categories for games with extensive duration. To ease the burden one can change the variables in a discontinuous or step function fashion with time (in the present example this was done with solar altitude, lunar altitude, lunar phase, cloud cover, relative humidity and ceiling) or keep them constant (as done for wind speed). If a smoother transition is desired (as done for temperature), the preparation becomes more difficult and it is recommended that the planner use the statistical procedures "built-in" to subroutine ATMOS.

The first entry in Table 2.2-III establishes the conditions at the beginning of the game (DAY = 00, HOUR = TIME AT THE START OF GAME, in the present example it was assumed to be midnight thus the HOUR = 0000). In addition, this entry allows the planner to specify the variables he does not want to provide for in his input data. The reader may note that all the variables except solar or lunar altitude and temperature do not normally have negative values. Thus by assigning any negative decimal number to the initial value of a variable the planner can indicate that he will not provide input for that variable. Note that in this example, pressure and visibility are left unspecified and therefore have been assigned an initial value of -1.0. The time histories for these variables will be generated by the ATMOS Subroutine.

In the case of the Ephemeris/Illumination data, a negative value for the lunar phase indicates that values for these variables are not provided in the planner input and no entry need be made for solar and lunar altitude. For the precipitation data, only TOTP need be set equal to a negative number while IPKODE can be left blank. To indicate that temperature

TABLE 2.2-II

TYPES OF PLANNER INPUT

CATEGORY	VARIABLE	DESCRIPTION/UNITS
Time	Day (INDAY)	A two-digit integer describing the day of the game, thus 00 is D-day, 05 D-day + 5, etc.
	Hour (INHR)	A four-digit integer equal to the military time, e.g., 0900, 1755 etc.
1. Ephemeris/ Illumination	Solar Altitude (SOLALT)	Local elevation of the sun in degrees. A negative value indicates that the sun is below the horizon (i.e., nighttime)
	Lunar Altitude (ALTLUN)	Local elevation of the moon in degrees. Negative value indicates moon below horizon.
	Lunar Phase (PHSLUN)	Expressed as a fraction, i.e., 0.25, 0.75 etc.
2. Precipitation	Condition Code (IPKODE)	A one-digit integer code identifying the type of precipitation 0 = No precipitation 1 = Thunderstorm 2 = Rain or drizzle 3 = Freezing rain or drizzle 4 = Snow or sleet 5 = Hail 6 = Fog
	Total Amount of Precipitation for Event (TOTP)	Total amount of rain (or snow) in inches for the event identified by the condition code
3. Wind Speed	(WSPEED)	Knots
4. Cloud Cover	(CCOVER)	Fraction 0.0 - 1.0
5. Dry Bulb Temperature	(ATEMP)	Degrees Fahrenheit
6. Pressure	(PRESUR)	Inches of Hg
7. Relative Humidity	(HUMDTY)	Percent 0 - 100
8. Meteorological Visibility	(VISIB)	Miles
9. Ceiling	(CEIL)	Feet

TABLE 2.2-III

Planner Input Form

DAY	HOUR	SOLAR ALTITUDE (Degrees)	LUNAR ALTITUDE (Degrees)	LUNAR PHASE (Fraction)	IPKODE	AMOUNT OF PRECI-PITATION (In)	WIND SPEED (Knots)	CLOUD COVER (Fraction)	TEMP. (°F)	PRESSURE (Inches of Hg)	RELATIVE HUMIDITY (Percent)	VISI-BILITY (Miles)	CEILING (Feet)
*00	0000	-90.0	-90.0	0.0	0	0.0	5.0	0.0	72.0	-1.0	91.0	-1.0	20000.
00	0500	-90.0	-90.0	0.0	6	0.0	5.0	0.0	72.0		91.0		20000.
00	0635	90.0	-90.0	0.0	6	0.0	5.0	0.0	72.0		91.0		20000.
00	0800	90.0	90.0	0.25	6	0.0	5.0	0.0	74.0		91.0		20000.
00	0900	90.0	90.0	0.25	0	0.0	5.0	0.0	74.0		91.0		20000.
00	1400	90.0	-90.0	0.0	0	0.0	5.0	0.0	87.0		69.0		20000.
00	1800	90.0	-90.0	0.0	0	0.0	5.0	1.0	85.0		69.0		3000.
00	1905	-90.0	-90.0	0.0	0	0.0	5.0	1.0	81.0		69.0		3000.
01	0100	-90.0	90.0	0.50	2	0.45	5.0	1.0	75.0		91.0		3000.
01	0400	-90.0	90.0	0.50	0	0.0	5.0	1.0	72.0		91.0		3000.
01	0500	-90.0	90.0	0.50	0	0.0	5.0	0.0	72.0		91.0		20000.
01	0635	90.0	90.0	0.50	0	0.0	5.0	0.0	72.0		91.0		20000.
01	1300	90.0	-90.0	0.0	0	0.0	5.0	0.0	85.0		69.0		20000.
01	1905	-90.0	-90.0	0.0	0	0.0	5.0	0.0	80.0		69.0		20000.
01	2300	-90.0	90.0	0.75	0	0.0	5.0	0.0	72.0		69.0		20000.
02	0635	90.0	90.0	0.75	0	0.0	5.0	0.0	72.0		91.0		20000.
02	0800	90.0	-90.0	0.0	0	0.0	5.0	0.0	74.0		91.0		20000.
02	1905	-90.0	-90.0	0.0	0	0.0	5.0	0.0	81.0		69.0		20000.

*First Entry must represent conditions at start of the game.

TABLE 2.2-IV

ENVIRONMENTAL DATA OF A DRAFT SCENARIO

1. General. The following data are provided to exercise the STANO equipment in various environmental conditions. The basic data were extracted from the Tactical Scale Study Hue and Vicinity, 14 June 1968, HQ United States Military Assistance Command, Vietnam. Climatic conditions for the month of April have been portrayed. Where deviations occur, it was for the convenience of the scenario.

2. Precipitation. There is only one instance of rain:

DAY	DURATION	TYPE
D+1	0100 to 0400	light to medium

3. Fog. The only instance of fog is during D-day from 0500 to 0900.

4. Ceiling. The ceiling will remain above 3000 ft. MSL during the entire period. The only instance of cloud cover will exist from D-day 1800 hrs. to D+1 0500 hrs.

5. Moon Data.

DAY	RISE	SET	PHASE
D	0800	1400	1/4
D+1	0100	1300	1/2
D+2	2300	0900	3/4

6. Light Data - (Mean for entire scenario)

BMNT	SUNRISE	SUNSET	EENT
0548	0635	1905	1952

7. Wind - The mean wind speed is 5 knots.

8. Temperature

Mean high - 87°F

Mean low - 72°F

9. Relative Humidity

Mean 0700 hrs. - 91%

Mean 1300 hrs. - 69%

information is not part of the input data, an initial value less or equal to -50.0 degrees must be assigned.

After the initial entry is made, time is advanced until the next change occurs in the atmospheric environment. In the example, a fog occurs on D-DAY (DAY=00)at HOUR= 0500. This is shown as the second entry or line in Tab. 2.2-III where the condition code ("IPKODE") has been changed from 0 to 6. The values of the other variables remain unchanged and are simply repeated. Note that no further entry is required for pressure or visibility. The third entry (line) in Tab.2.2-III occurs at sunrise (DAY = 00, HOUR = 0635) where the solar altitude has been changed from -90.0 to +90.0 degrees. This step function change in solar altitude is, of course, unrealistic. A smoother transition to account for twilight and low altitude periods could be provided by the planner at the expense of additional time and calculation. If he chose not to input Ephemeris/Illumination Data, the time history generated automatically would be smooth and represent the solar altitude occurring during the reference year 1969. The fourth entry (DAY = 00, HOUR = 0800) occurs at moon rise and the lunar altitude is changed from -90.0 to +90.0 degrees and the lunar phase from 0.0 to 0.25 as specified in "5. Moon Data" in Tab. 2.2-IV. The previous discussion in regard to solar altitude similarly applies here. The fifth entry (DAY = 00, HOUR = 0900) allows the fog condition to be terminated by changing "IPKODE" from 6 back to 0. The remainder of the entries in Tab. 2.2-III correspond directly to events specified in the draft scenario described in Tab. 2.2-IV. For example, Entry 9(DAY = 01, HOUR = 0100) corresponds to the rain shower on D-DAY +1. The condition code is changed from 0 to 2 and the amount of precipitation during the 3-hour shower is set equal to 0.45 inches. In selecting this value, the following guideline was used:

Light Precipitation	Less than 0.1 inches/hour
Medium or Moderate Precipitation	0.1-0.3 inches/hour
Heavy Precipitation	Greater than 0.3 inches/hour

Thus the shower has an average rainfall rate of 0.15 inches/hour equal to a moderate precipitation rate. The reader should note that entry 10 is made to terminate the rain shower at HOUR = 0400.

Section 3

MAKING A SPARSE DIGITAL TERRAIN TAPE PROGRAM OPERATION

3.1 PROGRAM DESCRIPTION

The operational tape for SAM digital terrain data has (X, Y) resolution of approximately 100 meters. It is derived from a U. S. Army (TOPOCOM) supplied FORTRAN readable tape* with eight times the linear resolution (64 times as many points). This input tape to the model is referred to as a "TOPOCOM/ISA" tape. The model job step is called "Making Sparse Digital Terrain Tape".

MAKTAP is the main program name with one subroutine (READ) required to reduce a TOPOCOM/ISA tape to a sparse digital terrain tape (DSNAME = JPOUT) compatible with IBM 360-series computers and readable with FORTRAN. (See Figure 3.1-1)

```
JOB STEP:  MAKE SPARSE TERRAIN TAPE

SUBPROGRAMS NEEDED
    MAKTAP (MAIN PROGRAM)
    READ

DATA SETS NEEDED
                    (UNIT 2 - TOPO TAPE)

DATA SETS GENERATED
    JPOUT           (UNIT 1 - TERRAIN TAPE)
```

Figure 3.1-1 MAKE SPARSE TERRAIN TAPE SUBPROGRAMS AND DATA SETS

No input cards are necessary, but a data statement for XINCH and YINCH is currently in use in the main program. The values for XINCH and YINCH represent scenario map dimensions, in inches, in the X (east-west) and Y (north-south) directions, respectively. In generating a sparse digital terrain tape for the acceptance scenario, the grid resolution for the input tape is approximately** 12.5 meters per hundredth of an inch. Thus:

*This ISA-supplied tape is converted from source tapes, provided by the U. S. Army Topographic Command. These original TOPOCOM tapes are not suitable for machine-independent FORTRAN coded I/O control.

**Based on 1:50000 scale maps. Exact value corresponding to 0.01 inch on the map is 500 inches = 12.70 meters. On the operational (sparse) tape, linear resolution is therefore 101.6 meters.

XINCH = 14.05 inches corresponding to about 17.6 km and

YINCH = 14.40 inches corresponding to about 18.0 km.

This program must be executed prior to PRERUN if "exact" calculations of line of sight, based on digital terrain, are to be made; if dummy line-of-sight calculations are made in PRERUN, MAKTAP is not relevant to PRERUN. The SPARSE is also used by the Radar Contour Plot model and for the RF Data Link submodel. Hence MAKTAP must be run if these models are to be run.

Figure 3.1-1 lists the subprograms needed, the data set required as input, and the data set generated by this program package.

3.2 TOPOCOM/ISA TERRAIN TAPE SPECIFICATIONS

This section contains a description of the techniques employed by CDC ISA to convert the original TOPOCOM source tapes into a FORTRAN readable tape which is used as input terrain data for the SAM. These tape conversion specifications were furnished to CAL as a CDC ISA memorandum dated 2 June 1970. It is included here to enable users of the model to prepare FORTRAN readable tapes from TOPOCOM source tapes for other scenario areas.

Format of FORTRAN - Compatible Tapes Containing Digital Terrain Data

1. Source - The present tapes were produced from TOPOCOM 7-Track Digital Terrain Tapes codes in packed octal.

2. Output Tape Format (See Figure 3.2-1).

   a. Specifications
      Density = 800 BPI
      Parity = odd
      Code = BCD (7-Track)
      Logical record length = 6
      Block size = 3000 characters

   b. Record Format

All physical records are 3000 characters in length. All records contain 500 values, each value in I6 format. Each physical record contains a sequential record number as the first six characters which acts as a new record indicator and counter. It takes the form:

800000 + RECORD COUNT

for example, a record headed by 800025 marks the beginning of the 25th physical record on the tape.

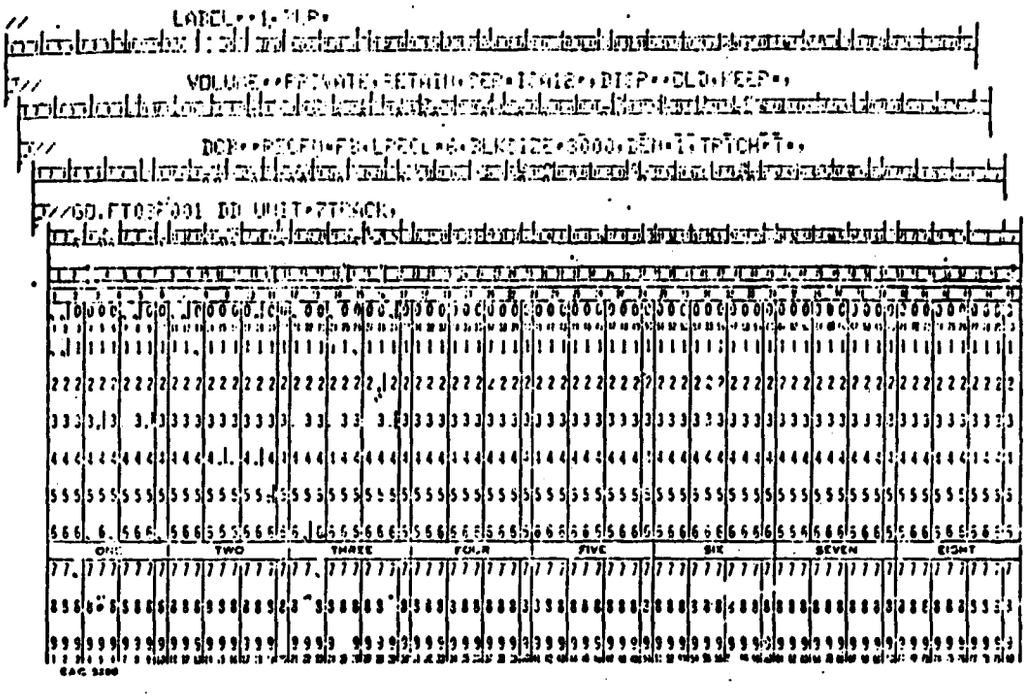


Figure 3.2-1 JOB CONTROL CARDS ON OUTPUT TAPE FORMAT

c. Data Format

(1) Scan Line Indicator - A second record number is used to indicate the start of data from a TOPOCOM record. It takes the form:

900000 + RECORD COUNT FROM ORIGINAL TAPE

This data separator is needed because beginning with the third record on the TOPOCOM tape, all data for one scan line was contained in one record. (The first two records on the TOPOCOM tapes are 80-character ID records, and the last two are 80-character End of File records.) This second record number may be found anywhere within the present output tape records, excepting the first 6 bytes. For example, then, a 900003 would indicate the

start of data from the third record on the TOPOCOM tape, this record containing the first scan line elevations (see description of TOPOCOM standard tape format).

(2) Identification Data - A Tape Identification Record number and Sheet number is taken from the first TOPOCOM ID record, a File Identification number and Sheet number from the second TOPOCOM ID record.

(3) Elevation Data - The elevations for one scan line are preceded by four values; the scan line indicator, scan line count, scan line x-coordinate, and first y-coordinate. The scan line count is simply a running counter for the scan lines. The scan line x-coordinate is constant for all elevations in the scan line. Coordinates are expressed in one-hundredths of an inch and are the actual distances measured along an axis of the map from which the scan lines were originally taken. The first y-coordinate is that of the first elevation. The y-coordinates for successive elevations are found by incrementing the first y-coordinate by 1 unit (.01"). Note that these coordinates are recorded as integers based on a unit value of .04 inch. Elevations for the entire scan line follow next, requiring as many 3000 byte records as necessary, and terminating with the next 9xxxxx scan line indicator (whose x-coordinate is .01" greater than the previous x-coordinate).

(4) End of File Data - The last elevation of the last scan line is followed by: a TOPOCOM record number (in this case not correctly called a scan line indicator); a 999999 to denote end of elevation data; a final scan line count; and total number of elevations on the tape. Any remaining logical records in this last 3000 byte record are coded as 777777 filler, and the tape is terminated with a tape mark.

d.* An Example - is a Xeroxed printout of one full 500 (I6) record. It is the first record on the output tape, as indicated by the first value, 800001. The 900001 indicates the following data was taken from the first record on the original tape. The tape Identification Record number is 16, the Sheet number is 1. The second record on the original tape contained a File Identification number of 80, a Sheet number of 1. 900003 indicates the third record, i.e. the first input tape data record; the scan line count is 1, the x-coordinate is 112 = 1.12 in., and the first y-coordinate is 100 = 1.00 in. The rest of the record is elevation data: z(112, 100) = 292 m., z(112, 101) = 292 m., z(112, 102) = 289 m., etc., and is continued into the third output record before data for that scan line is exhausted.

*This paragraph extracted from original CDC ISA Memorandum. However, the "Example" of Xeroxed printout is not included here.

Section 4

RADAR CONTOUR PLOT PROGRAM OPERATION

4.1 INTRODUCTION

Radar coverage contour plots, based on digital terrain data and foliage data, can be produced by a program package comprising CONTUR (main program) and nine subroutines. Figure 4.1-1 lists the routines.

```
JOB STEP:  CONTOUR PLOT MODEL

SUBPROGRAMS NEEDED
    CONTUR (MAIN PROGRAM)
    FOLAGF
    IUTEVL
    PLOT
    OUTCTR
    RADCTR
    RADPLT
    RADSFL
    TERAN
    TERCTR

DATA SETS NEEDED
    MASSDAT        (UNIT 1 - BASICT,ATMENV)
    JPOUT          (UNIT 2 - TERRAIN TAPE)
    SYSIN          (UNIT 5 - INPUT DATA)
```

Figure 4.1-1 **CONTOUR PLOT SUBPROGRAMS AND DATA SETS**

Use of this program package is optional. Its results are not directly used by any other program.

4.2 DATA INPUT REQUIREMENTS

Three parameters not normally subject to change are currently set by FORTRAN statements within CONTUR to "standard values", that can be changed by recompilation if necessary:

TABLE 4.2-I
DATA INPUT REQUIREMENTS

	Variable	Definition	Initial Designer Value
1.	ANGINC	Azimuth angle increment	radian equivalent of 2°
2.	DGD	Grid dimension, meters	100.0
3.	AVEHT	Average target height, meters	1.5

In addition to these default parameter values (in effect designer values, changeable by altering FORTRAN statements in CONTUR), data must also be supplied from an input data stream (See Fig 4.2-1) and data sets stored on disk or tape. Detailed descriptions of the Header Card, Data Subset 1 (Plotting Parameters), Data Subset 2 (Playing Area Coordinate Parameters), Data Subset 3 (Sensor Descriptor Parameters), Data Subset 4 (Radar Alternate Characteristics), and Data Subset 5 (Radar Identifying Card) are given in Appendix B.

Also needed are "UTVSXY" and "UNTER" Tables (terrain parameters), which are not unique to CONTUR. Instructions for preparation of these tables are in Appendices D and C, respectively.

External data sets required as input are "BASICT" and "ATMENV" data generated by the Atmospheric Model and "SPARSE TERRAIN TAPE" generated by MAKTAP program.

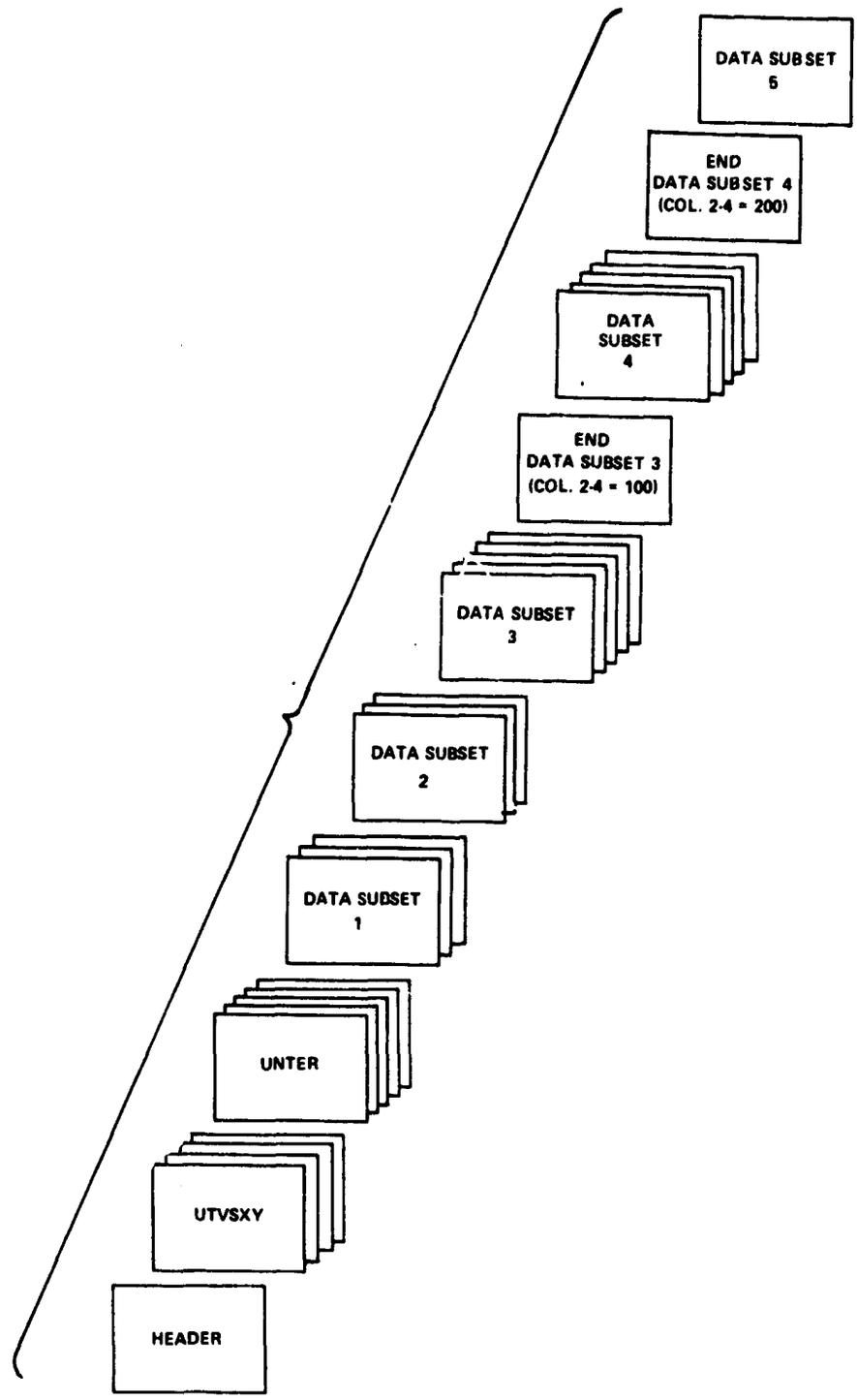


Figure 4.2-1 CONTOUR PLOT DATA STREAM

Section 5

RF DATA LINK MODEL PROGRAM OPERATION

5.1 INTRODUCTION

The RF Data Link Model provides information on RF propagation losses and related parameters over the data links connecting sensors, relays and monitors, based on digital terrain data over the ground paths, general terrain (vegetation) parameters, and planner specified parameters for transmitters, receivers and antennas.

Output results of this program are not directly used by any other program, and use of this program is optional. It is intended to provide verification of satisfactory RF propagation, or allow relocation to obtain such, over proposed links prior to execution of PRERUN/MSM. It may be noted that data link connection logic and up/down times (as affected by planned values, possibly affected by reliability or power source statistics) are played in PRERUN.

5.2 PROGRAM OPERATIONS AND DATA REQUIREMENTS

This model is subdivided into two job steps. The first job step consists of one main program (TPDISK) which simply transfers the terrain heights from the "SPARSE DIGITAL TERRAIN TAPE" to disk (DSNAME = TEMP). This temporary disk file is then used (in lieu of tape) during execution of the second job step, to reduce terrain retrieval times.

The second job step consists of the main program (MAINSY) and 20 subroutines. Figure 5.2-1 lists these routines.

Operating parameters (planner/designer input) for the actual model (second job step) are currently entered by three different mechanisms:

(a) DATA statement within program MAINSY

(b) FORTRAN statements (of form "parameter name = number") within MAINSY and RFLINK

(c) planner prepared data cards

Changes in those parameters corresponding to (a) and (b) require recompilation of MAINSY and/or RFLINK. The following discussion explains user control of program parameters, in the order indicated.

DATA Statement: Two variables are currently set by a data statement in MAINSY

```
JOB STEP:  DATA LINK MODEL

SUBPROGRAMS NEEDED
     TPDISK (MAIN PROGRAM STEP 1)
     MAINSY (MAIN PROGRAM STEP 2)
     COMMA
     DELHD
     DIFF
     DLLOS
     EFFEC
     FOLAGE
     GRN
     HORIZ
     HTGAIN
     INTER
     IUTEVL
     LEAST
     LEST
     MICRO
     PROFIL
     READC
     RFLINK
     SCATT
     TERAN
     TERANE

DATA SETS NEEDED
     MASSDAT        (UNIT 1 - BASICT,ATMENV)
     SYS1.JP        (UNIT 2 - TERRAIN ON DISK)
     JPOUT          (UNIT 3 - TERRAIN TAPE)
     SYSIN          (UNIT 5 - INPUT DATA)
```

Figure 5.2-1 **DATA LINK SUBPROGRAMS AND DATA SET**

(1) YRANGE - length in meters, in y-direction, of scenario area covered by stored digital terrain; value currently set is 18000.

(2) XTENT - length in meters, in x-direction, of scenario area; currently set to 17800.

FORTRAN Statement: Two numbers are currently used in MAINSY to convert from UTM to game x, y-coordinates. Currently, origin coordinates - SW corner with values (49300., 7300.) are set by FORTRAN statements in the main program. Also two variables are currently set by statements within

(1) POL = 1.0 (Antenna polarization of link-vertical)

(2) PEMMAX = 0.05 (Maximum allowable message error probability)

Planner Prepared Data: For the input data stream see Fig. 5.2-2. "UTVSXY" and "UNTER" Tables (terrain parameters), not unique to MAINSY, are required. Instructions for preparation of these tables are in Appendices D and C, respectively.

Detailed descriptions of Data Subset 1 (Arrays), Data Subset 2 (Monitors), Data Subset 3 (Data Links, Relays, Receiver/Transmitter) are given in Appendix E.

External data sets required as input are "MASSDAT" generated by the Atmospheric Model and "TEMP" terrain data stored on disk by the first job step.

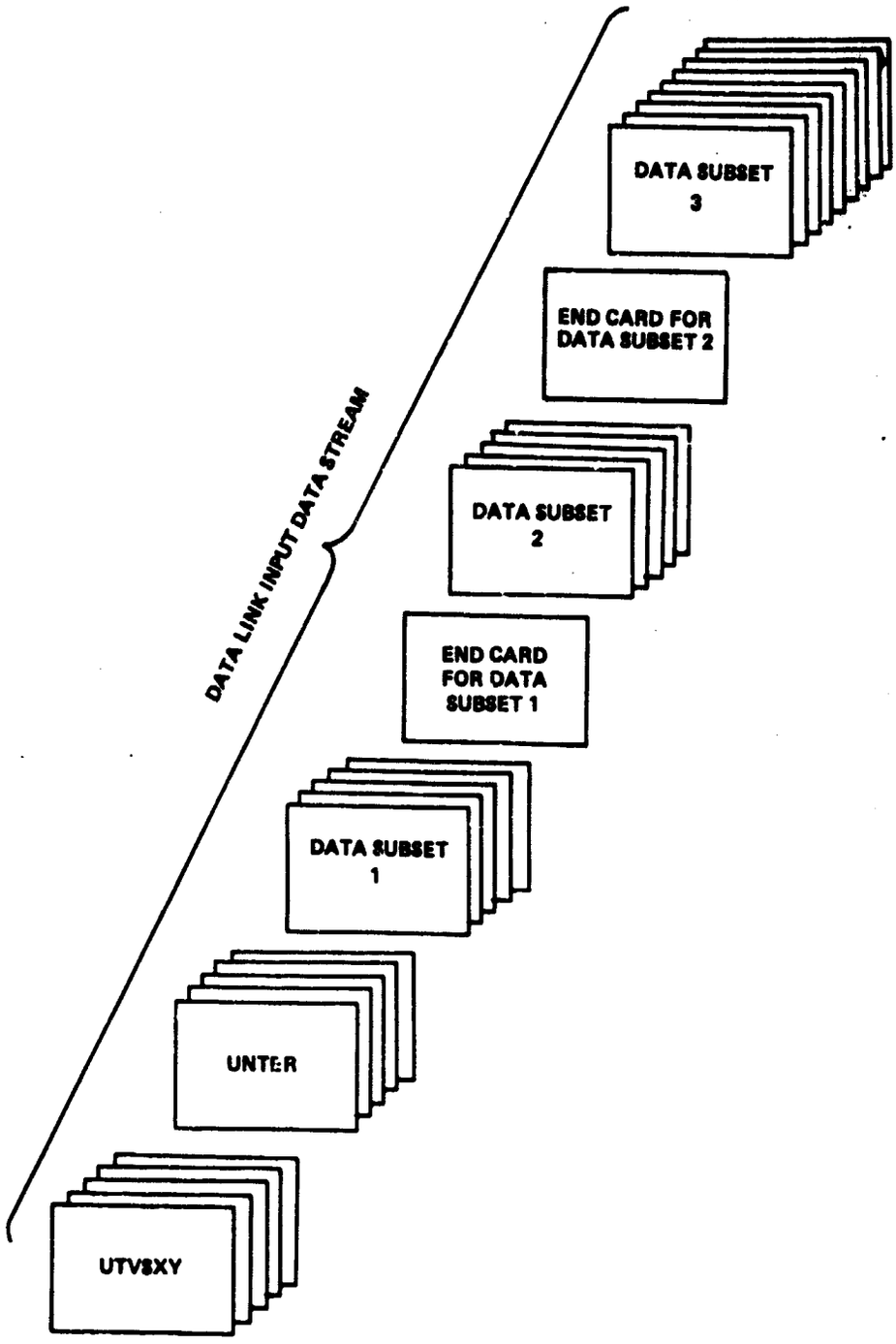


Figure 5.2-2 DATA LINK DATA STREAM

Section 6

PRERUN PROGRAM OPERATION

6.1 GENERAL

The overall PRERUN package comprises 13 distinct job steps, contains 96 subprograms, and is associated with 23 data files (3 externally provided as input*, 18 used as scratch files for internal linkage, and 2 provided as output for use by MSM).

The 13 job steps are shown in the block diagram, Fig. 6.1-1, in the order in which they must be run. Job steps are described one by one in the following sections. Note that the 13 job steps are enumerated 0 - 12, not 1 through 13.

Fig. 6.1-2 provides a detailed master diagram of the roles of data sets in linking together the job steps of the overall model in general, and of the job steps in PRERUN in particular. The boxes along the left edge represent job steps or program packages. The symbols across the top represent data sets with currently assigned data set names (except that 'SYSIN', card reader, and PRINTER are not job unique names).

The connection matrix is interpreted in terms of the horizontal line from a program box (to a vertical line for a data set):

(a) if the arrow points to the program box, then that program reads data from the corresponding data set

(b) if the arrow points away from the program box, then that program writes data onto the data set

(c) if a double arrow appears (both directions), then both read and write occur; i.e., the data set is altered (updated)

Except for the printer, data sets are indicated for convenience by a common (tape) symbol. The actual physical devices are, however, chosen by the programmer/user. Recommended or typical device choices are:

---

*SYSIN (card reader) is counted here as one input file, although a number of logically distinct data sets are entered through SYSIN.

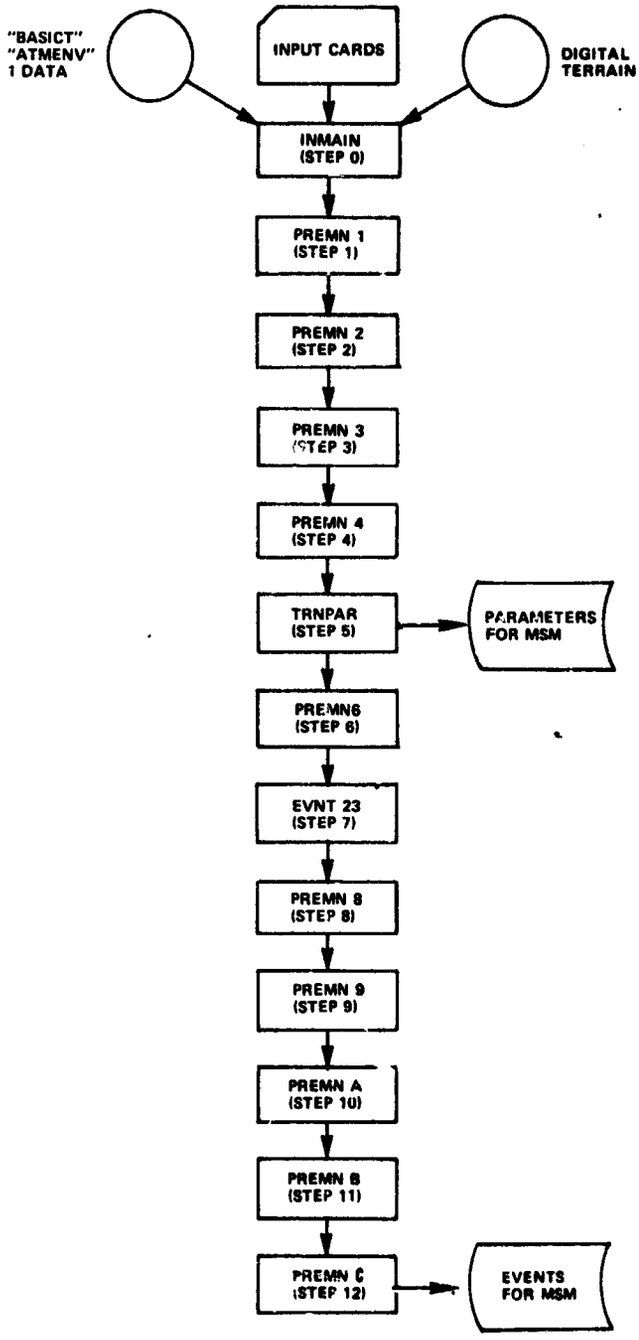


Figure 6.1-1 PRERUN JOB STEPS

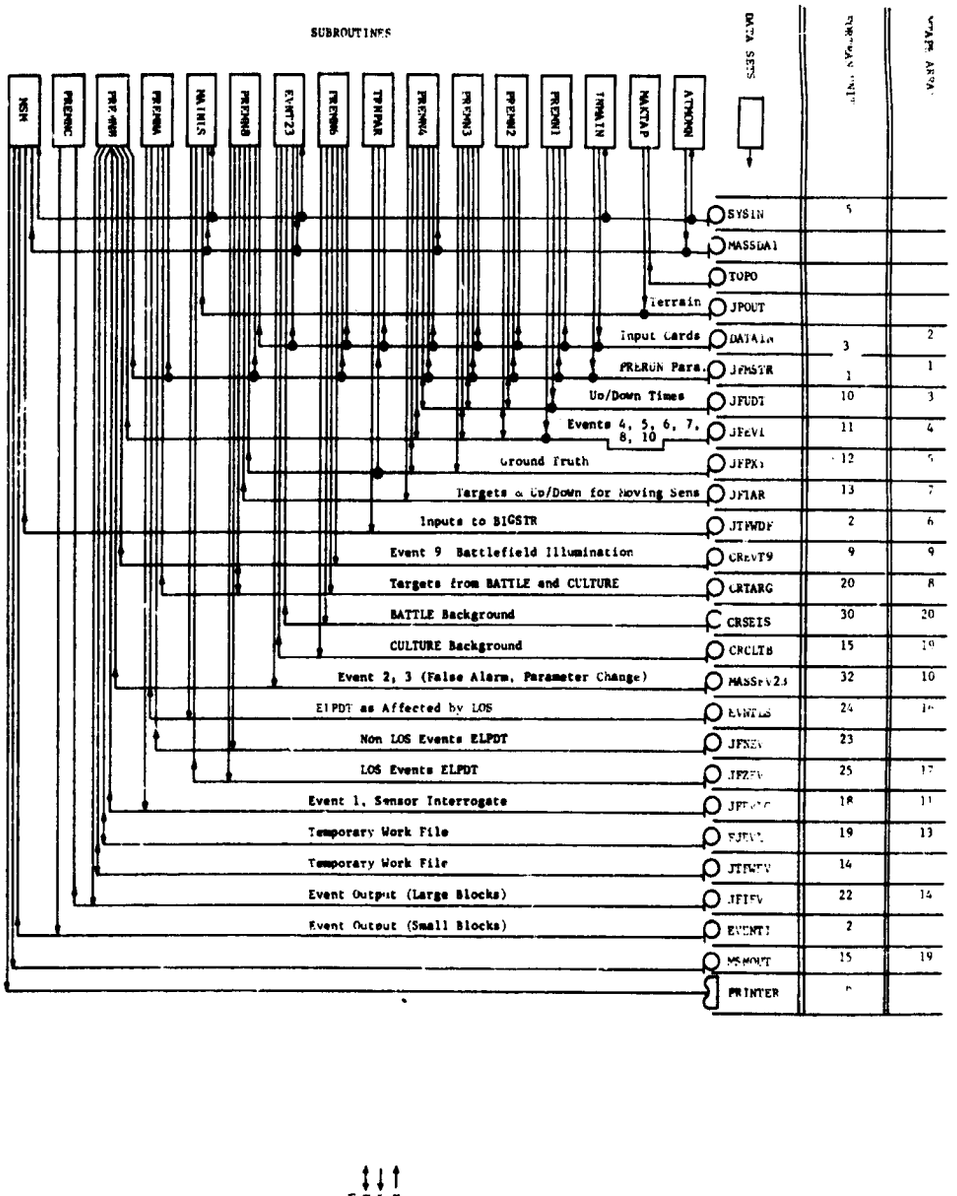


FIGURE 6.1-2 SUBROUTINE/DATA SET LINKAGES

SYSIN	card reader
TOPO, JPOUT	tape
MSMOUT	tape or disk
all others	disk

With reference to PRERUN itself, the three input data sets required are:

(a) BASICT and ATMOSPHERIC DATA (disk file; DSNAME = MASSDAT; prepared by Atmospheric model prior to PRERUN execution)

(b) DIGITAL TERRAIN* (tape file; DSNAME = JPOUT; prepared by MAKTAP prior to PRERUN execution)

(c) PLANNER INPUT SCENARIO (data on cards, via SYSIN).

Set (a) is used in job steps 4, 7 and 9. Set (b) is used in job step 9*. Set (c) explicitly enters only into job step 0.

The data sets generated as external output (for use by MSM) are:

(d) SYSTEM PARAMETERS (edited for MSM use; disk file, DSNAME = JTFWDF)

(e) EVENTS (disk file, DSNAME = EVENT1). Table 6.1-I shows the event types generated.

PRERUN also uses for internal data linkage 18 disk data sets. Names and linkages are also shown in Figure 6.1-2 and discussed in following sections.

6.2 PRERUN STEP 0

Step 0 in PRERUN comprises a main program (INMAIN) with the four subroutines listed in Figure 6.2-1.

*Not required if dummy line of sight routine is used.

TABLE 6.1-I
EVENT TYPES GENERATED BY PRERUN

1. SENSOR INTERROGATE
2. SENSOR FALSE ALARM
3. SENSOR PARAMETER CHANGE
4. SENSOR UP/DOWN STATUS
5. MONITOR UP/DOWN STATUS
6. DATA LINK UP/DOWN STATUS
7. FIRETRAP OPS BEGIN/END
8. ARRAY OPS BEGIN/END
9. BATTLEFIELD ILLUMINATION
10. SENSOR REPOSITION

99. END

```
JOB STEP:  PLANNER INPUT READIN (PRE RUN STEP 0)

SUBPROGRAMS NEEDED
    INMAIN (MAIN PROGRAM)
    CONVRT
    ERASE
    READIN
    TIMER

DATA SET NEEDED
    SYSIN          (UNIT 5 - INPUT DATA)

DATA SET GENERATED
    DATAIN         (UNIT 3 - PLANNER INPUTS CONVERTED)
    JFMSTR         (UNIT 1 - COMMON INFO )
```

Figure 6.2-1 PRERUN STEP 0 SUBPROGRAMS AND DATA SETS

Operating parameters (planner/designer input) for the PRERUN steps are currently entered by three different mechanisms:

(a) DATA statements within program INMAIN and CONVRT.

(b) FORTRAN statements (of form 'parameter name = number') within INMAIN

(c) Planner prepared data cards (Scenario Specifications)

Changes to those parameters corresponding to (a) and (b) require recompilation of INMAIN and/or CONVRT. The following discussion explains user control of program parameters, in the order indicated.

6.2.1 Data Statements

6.2.1.1 One variable and three arrays are currently set by data statements in INMAIN.

(1) NSETS - Number of Data Sets read in. Currently set to 29.

(2) MPRINT (30) - An array used to control BCD printing (0 - don't print; 1 - print), within job categories specified by the subscript value:

MPRINT (1) - UPDN1

(2) - PSNP

(3) - UPDN3

(5) - UPDN5

(6) - UPDN6

(8) - UPDN8

(10) - UPDN10

(13) - CULTURE

(14) - BATTLE

(15) - CULTURE (INPUT TABLES)

(16) - BATTLE (INPUT TABLES)

(18) - PSNP19

(19) - UPDN19

(20) - MVS

(3) MTAPE(20) - An array used to define binary storage units. An MTAPE value specifies the unit device number associated with disk (or tape) file. The subscript specifies data set content as follows:

MTAPE	(1)	MASTER DATA STREAM
	(2)	COMMON INFO
	(3)	UPDOWN TIMES
	(4)	MSM-EVENTS
	(5)	GROUND TRUTH
	(6)	ATMOSPHERIC DATA
	(7)	TARGET INFO FROM MVSNE
	(8)	TARGET INFO FROM BATTLE CULTURE
	(9)	EVENT TYPE 9 FROM BATTLE
	(10)	EVENTS 2-3 FROM SENS. PARM.

(11) EVENTS 1

(12) WORK TAPE FOR FINAL MERGE

(13) WORK TAPE FOR FINAL MERGE

(14) MERGED TAPE OF EVENTS NOT BLOCKED

(15) EARLY LATE DETECTION - NON LOS

(16) EARLY LATE DETECTION - LOS

(17) EARLY LATE ZEV's FOR LOS INPUT

(18) FINAL OUTPUT FOR MSM BLOCKED EVENTS

(19) CULTURE BACKGROUND

(20) BATTLE BACKGROUND

(4) NPLAY (20) - An array of 0 or 1 values, specifying whether planned updown times are to be played (0 value) or whether statistical variations on up-down time are to be played (1 value).... for the following system elements.

NPLAY	(1)	UPDN1	ARRAY UGS/MONITOR-DATA LINK
NPLAY	(2)	UPDN3	ARRAY UGS-SENSORS
NPLAY	(6)	UPDN6	MONITORS
NPLAY	(8)	UPDN8	RELAYS
NPLAY	(10)	UPDN10	DATA LINKS
NPLAY	(19)	UPDN19	ARRAY STASCAN-SENSORS
NPLAY	(20)	MVS	MOVE ARRAYS/SENSORS

6.2.1.2 Two arrays are currently set by data statements in CONVRT.

(1) CNST(10) - see Note 4, Appendix F, Data Set I (ARRAYUGS)

(2) DESVAL(10) - see Note 5, Appendix F, Data Set I (ARRAYUGS)

The data statements in CONVRT correspond to designer inputs, which would not normally be changed over long periods of program usage. In contrast, the data statements in INMAIN would tend to be fixed for computer runs in the same problem context, but might be changed if a major change of program context occurs.

6.2.2 FORTRAN Statements

Fourteen variables are currently set by statements within INMAIN.

(1) IPRINT - PRINTER UNIT DEVICE NO.*

(2) ICARD-CARD READER UNIT DEVICE NO.*

(3) TSTART-TIME OF GAME START (DAY, HOUR, MINUTE)

(4) TMAX-TIME OF GAME END (DAY, HOUR, MINUTE)

(5) ZMAP-STANDARD DEVIATION OF MAP ERROR (METERS)

(6) XLOC = 1 PLAY LOCATION ERROR, = 0 DO NOT PLAY

(7) RELOC= 1 PLAY RELOCATION ERROR, = 0 DO NOT PLAY

(8) ANAV = 1 PLAY NAVIGATION ERROR, = 0 DO NOT PLAY

(9) ARTY = 1 PLAY ART/MORTAR ERROR, = 0 DO NOT PLAY

(10) AIRD = 1 PLAY VERTICAL FALL ERROR, = 0 DO NOT PLAY

(11) XSW SOUTH WEST X COORDINATE OF PLAY AREA

(12) YSW SOUTH WEST Y COORDINATE OF PLAY AREA

(13) XNE NORTH EAST X COORDINATE OF PLAY AREA

(14) YNE NORTH EAST Y COORDINATE OF PLAY AREA

*Values for most IBM computer installations are 5 for ICARD, 6 for IPRINT.

6.2.3 Planner Prepared Data

Planner prepared scenario data are currently entered into the program by a card deck that includes an initial block of 18 header cards, followed by cards for 29 major data sets that contain system-specified parameter values. Each data set is preceded by a title card and two variable format cards, and terminated by one or more blank cards according to the specified variable format statement. Overall card deck structure is shown in Figure 6.2-2. Instructions for preparation of the header cards and data sets are detailed in Appendix F.

6.2.4 Other Operations

In addition to providing the direct read of planner input data, this job step also:

(a) converts data from "external units" to consistent "internal units" of measurement (e.g., all angles are converted to radians, all distances to meters).

(b) stores on a disk file (DSNAME=DATAIN) the so-called Master Data Set.

(c) stores on a disk file (DSNAME=JFMSTR) other data ("COMMON INFO") common to many subsequent job steps.

6.3 PRERUN STEP 1

Step 1 in PRERUN comprises the main program (PREMN1) with 12 subroutines listed in Figure 6.3-1.

External data sets required as input are "DATAIN" and "JFMSTR", both generated in Step 0.

This step (a) computes up-down times of monitors, data links, fire-traps, and UGSARRAYS, and stores this information on disk (DSNAME=JFUDT), and (b) creates event types 5, 6, 7 and 8 for MSM and stores them on disk (DSNAME=JFEVT).

6.4 PRERUN STEP 2

Step 2 in PRERUN comprises the main program (PREMN2) with 12 subroutines listed in Figure 6.4-1.

External data sets required as input are "DATAIN", "JFMSTR", "JFUDT", and "JFEVT", generated in Steps 0 and 1.

This step computes up-down times of those sensors from UGSARRAYS and STASCAN ARRAYS, the primary subroutine being RUSUP. The updown disk file "JFUDT" is updated and events type 4 (sensor up-down) are added to the disk event file "JFEVT".

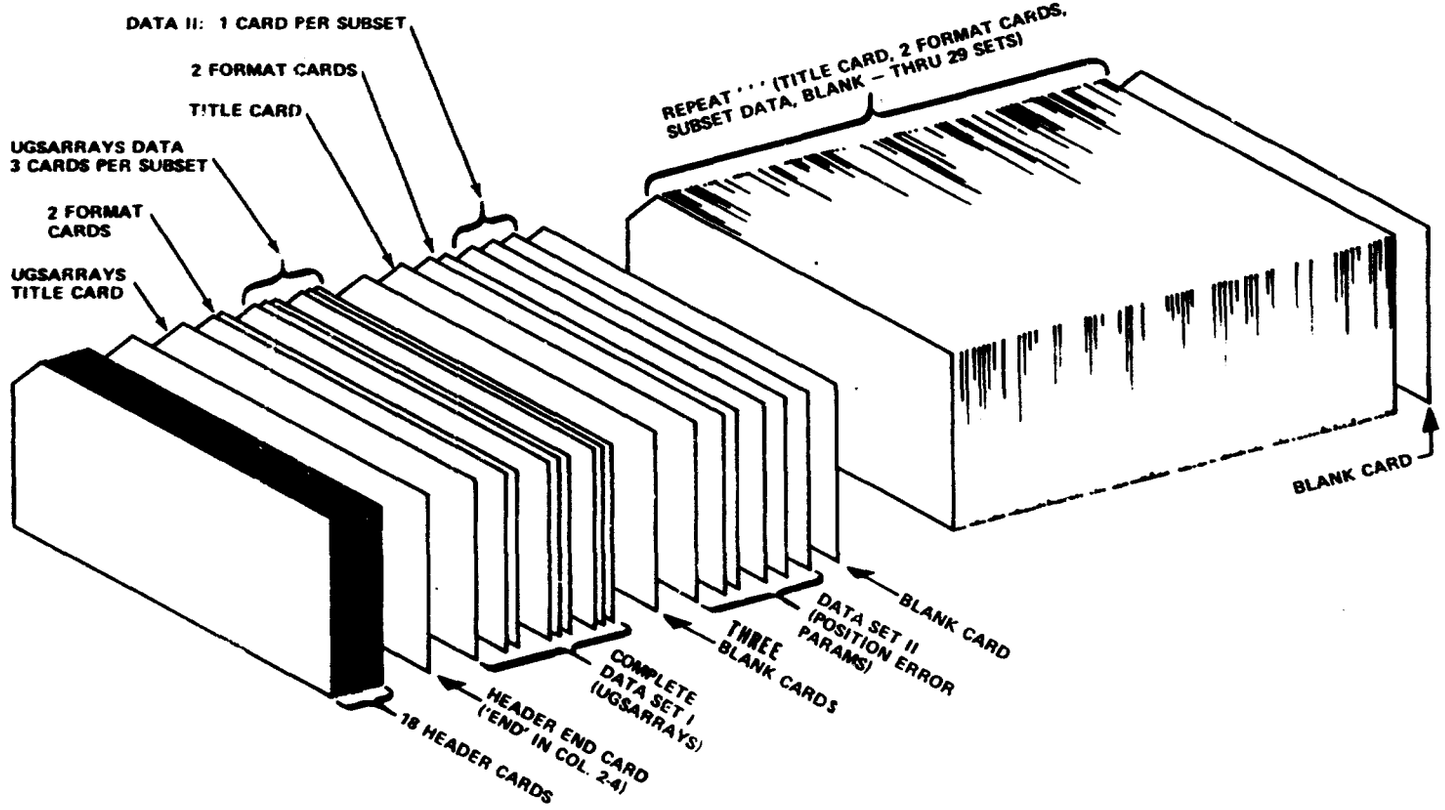


Figure 6.2-2 INPUT CARD DECK FOR PRERUN STEP 0
(HEADER CARDS AND PLANNER SCENARIO CARDS)

```
JOB STEP:  PRE RUN STEP 1
    COMPUTES UP DOWN TIMES FOR MONITORS-RELAYS-DATA LINKS,
    FIRETRAPS AND THE MONITOR DATA LINK COMBINATIONS FOR ARRAY UGS
    BEGINS SEQUENCE OF EVENTS FOR MSM.

SUBPROGRAMS NEEDED
    PREMN1 (MAIN PROGRAM)
    COMMUP
    DORDER
    ERASE
    FINDX
    FINDY
    MERGOR
    READUP
    UPDN1
    UPDN5
    UPDN6
    UPDN8
    UPDN10

DATA SET NEEDED
    DATAIN          (UNIT 3 - PLANNER INPUTS CONVERTED)
    JFMSTR          (UNIT 1 - COMMON INFO )

DATA SETS GENERATED
    JFUDT           (UNIT 10 - UP DOWN TIMES )
    JFEVT           (UNIT 11 - MSM EVENTS (TEMPORARY))
```

Figure 6.3-1 PRERUN STEP 1 SUBPROGRAMS AND DATA SETS

```
JOB STEP:  PRE RUN STEP 2
    COMPUTES UP DOWN TIMES FOR THE SENSORS ASSOCIATED WITH
    UGS + STASCAN ARRAYS USING SUB. RUSUP.
```

```
SUBPROGRAMS NEEDED
    PREMN2 (MAIN PROGRAM)
    DORDER
    ERASE
    EVNT48
    FINDX
    FINDY
*   GMERGE
    GRN
    MERGDR
    RUSUP
    UPDN3
    UPDN19
    URN

DATA SETS NEEDED
    JFMSTR          (UNIT 1 - COMMON INFO)
    JFUDT           (UNIT 10 - UP DOWN TIMES)
    JFEVT           (UNIT 11 - MSM EVENTS)
    DATAIN          (UNIT 3 - PLANNER INPUTS)
```

Figure 6.4-1 PRERUN STEP 2 SUBPROGRAMS AND DATA SETS

6.5 PRERUN STEP 3

Step 3 in PRERUN comprises the main program (PREMN3) with 16 subroutines listed in Figure 6.5-1.

```
JOB STEP:  PRE RUN STEP 3
    COMPUTES THE GROUND TRUTH POSITIONS FOR THE SENSORS ASSOCIATED
    WITH UGS + STASCAN ARRAYS USING SUB. SNPGT.

SUBPROGRAMS NEEDED
    PREMN3 (MAIN PROGRAM)
    DOPLER
    DORDER
    ERASE
    FINDX
    FINDY
    GMERGE
    GRN
    HYPERB
    JFBLK3
    MERGDR
    NORMER
    PSNP
    PSNP19
    RERR
    RHOTHE
    SNPGT

DATA SETS NEEDED
    JFMSTR          (UNIT 1 - COMMON INFO)
    JFUDT           (UNIT 10 - UP DOWN TIMES)
    JFEVT           (UNIT 11 - MSM EVENTS)
    DATAIN          (UNIT 3 - PLANNER INPUTS)

DATA SETS GENERATED
    JFPXY           (UNIT 12 - GROUND TRUTH POSITION TABLES)
```

Figure 6.5-1 **PRERUN STEP 3 SUBPROGRAMS AND DATA SETS**

External data sets required as input are "DATAIN", "JFMSTR", "JFUDT", and "JFEVT" generated and updated in Steps 0, 1, and 2.

Designer input values for SNPGT routine are set by BLOCK DATA (JFBLK3). See Appendix I, for designer input tables.

This step computes the ground truth positions for sensors within UGSARRAYS and STASCAN ARRAYS using SNPGT subroutine. These ground truth positions are stored on disk (DSNAME=JFPXY). In this step

also, data set "JFEVT" is updated by inclusion of type 10 events (Sensor Reposition).

6.6 PRERUN STEP 4

Step 4 in PRERUN comprises the main program (PREMN4) with 12 subroutines listed in Figure 6.6-1.

```
JOB STEP:  PRE RUN STEP 4
    COMPUTES THE GROUND PATH FOR MOVING ARRAYS, THE UP DOWN TIMES
    OF THE ASSOCIATED SENSORS, AND DEFINES THE MOVING PLATFORM AS
    A TARGET.

SUBPROGRAMS NEEDED
    PREMN4 (MAIN PROGRAM)
    DOPLER
    DORDER
    FINDX
    GMERGE
    GRN
    HYPERB
    MERGDR
    MVS
    NORMER
    RERR
    RHOTHE
    URN

DATA SETS NEEDED
    JFMSTR          (UNIT 1 - COMMON INFO)
    MASSDAT         (UNIT 2 - BASICT,ATMENV)
    DATAIN          (UNIT 3 - PLANNER INPUTS)
    JFUDT           (UNIT 10 - UP DOWN TIMES)
    JFEVT           (UNIT 11 - MSM EVENTS)
    JFPXY           (UNIT 12 - GROUND TRUTH POSITION TABLES)

DATA SET GENERATED
    JFTAR           (UNIT 13 - TARGET INFO FROM MVSNE)
```

Figure 6.6-1 PRERUN STEP 4 SUBPROGRAMS AND DATA SETS

External data sets required as input are "DATAIN", "JFMSTR", "JFUDT", "JFEVT", "JFPXY", and "MASSDAT" generated and updated in previous steps.

Designer input values for MVS routine are arrays PRNV1, PRNV2, PRNV3, PRNV4 (nominal navigation system errors). These values are the same as those in BLOCK DATA (JFBLK3) in the previous step. Any changes to these values must be made in both steps.

This step computes ground paths for moving arrays (MOVARRAY), updown times for the associated sensors, and defines the moving platforms as targets. These targets are stored on disk (DSNAME= JFTAR). Events type 4 (Sensor Up/Down) and events type 8 (Array Up/Down) are added to the disk event file "JFEVT".

6.7 PRERUN STEP 5

Step 5 in PRERUN comprises the main program (TRNPAR) with 8 subroutines listed in Figure 6. -1.

```
JOB STEP:  PRE RUN STEP 5
    TRANSMITS PARAMETERS TO MSM.

SUBPROGRAMS NEEDED
    TRNPAR  (MAIN PROGRAM)
    DSKOUT
    ERASE
    FINDX
    FINDY
    TRAN
    TRAN2
    TRNPR1
    VALID

DATA SETS NEEDED
    DATAIN          (UNIT 3 - PLANNER INPUT)
    JFPXY           (UNIT 12 - GROUND TRUTH POSITION TABLES)

DATA SETS GENERATED
    JTFWDF          (UNIT 2 - PASS PARAMETERS TO MSM)
```

Figure 6.7-1 **PRERUN STEP 5 SUBPROGRAMS AND DATA SETS**

External data sets required as input are "DATAIN" and "JFPXY", both generated in previous steps.

This step prepares the system parameter data set for use in MSM and stores this set on disk (DSNAME=JTFWDF).

6.8 PRERUN STEP 6

Step 6 in PRERUN comprises the main program (PREMN6) with 20 subroutines listed in Figure 6.8-1.

```
JOB STEP:  PRE RUN STEP 6
    CREATES BATTLE AND CULTURE BACKGROUND FOR STEP 7, CREATES
    FALSE TARGETS AND ILLUMINATION EVENTS.


SUBPROGRAMS NEEDED
    PREMN6 (MAIN PROGRAM)
    BATEX
    BATLBK
    BATLTG
    BEMAP
    BSCHDL
    CSCHDL
    CULTBK
    CULTEX
    DORDER
    EVNT9
    FINDX
    GMERGE
    JFBLK6
    MERGDR
    NUMBER
    PATHS
    SELCTR
    SENXY
    URN


DATA SETS NEEDED
    JFMSTR          (UNIT 1 - COMMON INFO)
    DATAIN          (UNIT 3 - PLANNER INPUT)

DATA SETS GENERATED
    CREVT9          (UNIT 9 - EVENT TYPE 9)
    CRTARG          (UNIT 20- TARGETS FROM BATTLE AND CULTURAL)
    CRSEIS          (UNIT 30- BATTLE DATA)
    CRCLTB          (UNIT 15- CULTURAL DATA)
```

Figure 6.8-1 PRERUN STEP 6 SUBPROGRAMS AND DATA SETS

External data sets required as input are "DATAIN" and "JFMSTR", both generated in previous steps.

Designer input values for Battle and Cultural are set by BLOCK DATA (JFBLK6). See Appendix I for Designer Input Tables. In addition, a DATA statement within BSCHDL sets designer values for battlefield illumination parameters (array ELIGHT).

This step creates battle and cultural background noise levels in dB for PRERUN Step 7 and stores these values on disk (DSNAME=CRSEIS for battle values, and DSNAME=CRCLTB for cultural values). Step 6 also stores generated false targets on disk (DSNAME=CRTARG) and stores generated battle illumination e ents type 9 on disk (DSNAME=CREVT9).

6.9 PRERUN STEP 7

Step 7 in PRERUN comprises the main program (EVNT23) with 15 subroutines listed in Figure 6.9-1.

```
JOB STEP:  PRE RUN STEP 7
    CREATES EVENT TYPE 3 (SENSORS PARAMETER CHANGES) , AND
    TYPE 2 (FALSE ALARMS).

SUBPROGRAMS NEEDED
    EVNT23 (MAIN PROGRAM)
    ACOUBK
    ARFBK
    BWIRBK
    ENVIR
    FAINTV
    FINDX
    IUTEVL
    MERGE1
    PIRBK
    SEISBK
    TERAN
    TRNSFR
    TWBLKD
    URN
    VALID

DATA SETS NEEDED
    SYSIN          (UNIT 5 - INPUT DATA)
    DATAIN         (UNIT 3 - PLANNER INPUT)
    MASSDAT        (UNIT 2 - BASICT,ATMENV)
    CRSEIS         (UNIT 30 - BATTLE DATA)
    CRCLTB         (UNIT 15 - CULTURAL DATA)

DATA SETS GENERATED
    MASSEV23       (UNIT 32- EVENT TYPE 2 AND 3)
```

Figure 6.9-1 PRERUN STEP 7 SUBPROGRAMS AND DATA SETS

External data sets required as input are "DATAIN", "MASSDAT", "CRSEIS", and "CRCLTB", all generated in previous steps.

Designer values not normally subject to change are provided internally within this job step via data statements. The most important of these are fixed sensor parameters, residing in common area/SENVAR/. The logical variable LDUMP, residing in common area/CONST/, controls the option of "local" dump by sensor routines. The normal value is .FALSE. (no dump). (The value .TRUE. may be used, but probably only for debugging operations). These common area variables are defined and values set in BLOCK DATA subprogram (TWBLKD). Also two variables are currently set in EVNT23 by data statements:*

1) ITREE = 0 (SEISMIC SENSORS PLACED NEAR TREES)

2) ISEXP = 1 (SEISMIC SENSORS ARE BURIED)

For the input data stream (SYSIN; cards) "UTVSXY" and "UNTER" Tables (terrain parameters), not unique to EVNT23 are required. Instructions for preparation of these tables are in Appendices D and C respectively.

This step creates events type 3 - sensor parameter changes due to (a) atmospheric variations and (b) background noise levels computed by battle and cultural routines (Step 6). Step 7 also creates events type 2 - false alarms. Event histories for these two event types (2 and 3) are merged in time sequence and stored on disk (DSNAME=MASSEV23).

6.10 PRERUN STEP 8

Step 8 in PRERUN comprises the main program (PREMN8) with 12 subroutines listed in Figure 6.10-1.

External data sets required as input are "DATAIN," "JFMSTR," "JFPXY", "CRTARG" and "JFTAR," all generated in previous steps.

This step sets up RED FORCES, and BLUE FORCES not associated with moving arrays,** as targets. It plays all sensors against all targets for "geometrical detection" through ELPDT subroutine. These detections are stored on two separate disk files: the non-LOS events (DSNAME=JFNEV) and the LOS events (DSNAME=JFZEV).

---

*See program listings (SE1SBK) for definitions of and effect of these two variables on sensor simulation. Sensor background routines within this job step may have internal DATA Statements for designer values. See Vol. I discussion of sensor routines.

** Target status for each BLUE FORCE associated with a moving sensor array was treated in a previous job step.

```
JOB STEP:  PRE RUN STEP 8
    SET UP RED FORCES, AND BLUE FORCES NOT ASSOCIATED WITH A
    MOVING ARRAY AS TARGETS. PLAYS ALL SENSORS AGAINST ALL TARGETS
    FOR GEOMETRICAL DETECTION.

SUBPROGRAMS NEEDED
    PREMN9 (MAIN PROGRAM)
    CIRC
    ELPDT
    ELPEX
    FINDX
    FINDY
    GREC
    SECLOG
    SECT
    SENSO
    TARGBR
    TARGEX
    VALID

DATA SETS NEEDED
    JFMSTR          (UNIT 1 - COMMON INFO)
    DATAIN          (UNIT 3 - PLANNER INPUTS)
    JFPXY           (UNIT 12 - GROUND TRUTH POSITION TABLES)
    JFTAR           (UNIT 13 - TARGET INFO FROM MVSNE)
    CRTARG          (UNIT 20 - TARGETS FROM BATTLE AND CULTURE)

DATA SETS GENERATED
    JFNEV           (UNIT 23 - NON LOS EVENTS)
    JFZEV           (UNIT 25 - LOS EVENTS)
```

Figure 6.10-1 PRERUN STEP 8 SUBPROGRAMS AND DATA SETS

6.11 PRERUN STEP 9

Step 9 handles line of sight calculations. Options exist on subroutine structure: the user may play Line-of-Sight with full achievable accuracy based on digital terrain tape, or he may use a dummy LOS routine, by simply inserting the subprograms comprising the deck set up desired as Step 9.

(a) For dummy LOS, the Step 9 set up comprises the main program (PREMN9) with 1 subroutine (LSGT) listed in Figure 6.11-1.

External data sets required as input are "JFMSTR", and "JFZEV", both generated in the previous steps.

```
JOB STEP:  PRE RUN STEP 9  (DUMMY LOS)

SUBPROGRAMS NEEDED
    PREMN9 (MAIN PROGRAM)
    LSGT

DATA SETS NEEDED
    JFMSTR          (UNIT 1 -  COMMON INFO)
    JFZEV           (UNIT 25 - LOS ZEVS (22 ITEMS))

DATA SETS GENERATED
    EVNTLS          (UNIT 24 - LOS NEVS (4 ITEMS))
```

Figure 6.11-1 PRERUN STEP 9 (DUMMY LOS) SUBPROGRAMS AND DATA SETS

The dummy LOS routine simply stores the LOS geometrical detections on disk (DSNAME=EVNTLS).

(b) For "accurate" LOS, the Step 9 setup comprises the main program (MAINLS) with 8 subroutines listed in Figure 6.11-2.

```
JOB STEP:  PRE RUN STEP 9 (LOS)
SUBPROGRAMS NEEDED
    MAINLS (MAIN PROGRAM)
    BLKLOS
    FOLAGE
    IUTEVL
    LOS
    MICTER
    TERAN
    TERANE
    URN
DATA SETS NEEDED
    SYSIN           (UNIT 5 - INPUT DATA)
    MASSDAT         (UNIT 2  - BASICT, ATMENV )
    JPOUT           (UNIT 2  - TERRAIN DATA)
    JFZEV           (UNIT 25 - LOS ZEVS (22 ITEMS))
DATA SET GENERATED
    EVNTLS          (UNIT 24 - LOS EVENTS (4 ITEMS))
```

Figure 6.11-2 PRERUN STEP 9 (LOS) SUBPROGRAMS AND DATA SETS

External data sets required as input are "MASSDAT", "JPOUT" and "JFZEV" generated in previous steps.

For the input data stream "UTVSXY" and "UNTER" tables (terrain parameters), not unique to MAINLS are required in that order. Instructions for preparation of these tables are in Appendices D and C, respectively.

Two variables are currently set by a data statement in BLOCK DATA (BLKLOS): XRANGE, YRANGE = length in meters, in X, Y direction, of scenario area covered by stored digital terrain. Values currently set are (17800, 18300). Also one logical variable LDUMP, residing in common area /CONST/, controls the option of "local" dump by MAINLS. The normal value is .FALSE. (no dump). The value .TRUE. may be used, but for debugging purposes only.

This deck set up plays actual LOS and stores them on disk (DSNAME=EVNTLS).

6.12 PRERUN STEP 10

Step 10 in PRERUN comprises the main program (PREMNA) with 6 subroutines listed in Figure 6.12-1.

```
JOB STEP:  PRE RUN STEP 10
    CREATES EVENT TYPE 1 FROM THE RESULTS OF STEP 8 AND 9.
    ADDS INFORMATION ON FALSE TARGETS FOR MSM WHERE REQUIRED.

SUBPROGRAMS NEEDED
    PREMNA (MAIN PROGRAM)
    DORDER
    ERASE
    FLSTG
    GMERGE
    SFQ
    TRNSFR

DATA SETS NEEDED
    JFMSTR          (UNIT 1 - COMMON INFO
    CRTARG          (UNIT 20 - TARGETS FROM BATTLE AND CULTURE)
    JFNFV           (UNIT 23 - NON LOS EVENTS)
    EVNTLS          (UNIT 24 - LOS EVENTS)

DATA SETS GENERATED
    JFEVLC          (UNIT 18 - EVENTS TYPE 1)
```

Figure 6.12-1 PRERUN STEP 10 SUBPROGRAMS AND DATA SETS

External data sets required as input are "JFMSTR", "CRTARG," "JFNEV" and "EVNTLS", all generated in previous steps.

This step creates events type 1 (sensor interrogate). False-target information is merged into the event 1 lists where required. Event 1 lists are then stored on disk (DSNAME=JFEVLC).

6.13 PRERUN STEP 11

Step 11 in PRERUN comprises the main program (PREMNB) with 2 subroutines listed in Figure 6.13-1.

```
JOB STEP:  PRE RUN STEP 11
    COLLECTS AND MERGES ALL MSM EVENTS FROM PREVIOUS STEPS.

SUBPROGRAMS NEEDED
    PREMNB (MAIN PROGRAM)
    FMERGE
    GMERGE

DATA SETS NEEDED
    JFMSTR          (UNIT 1  - COMMON INFO)
    MASSEV23        (UNIT 32 - EVENT TYPE 2,3)
    JFEVLC          (UNIT 18 - EVENT TYPE 1)
    CREVT9          (UNIT 9  - EVENT TYPE 9)
    JFEVT           (UNIT 11 - MSM EVENTS)

DATA SETS GENERATED
    FJEVL           (UNIT 19 - WORK TAPE FOR FINAL MERGE)
    JTFWEV          (UNIT 14 - WORK TAPE FOR FINAL MERGE)
    JFIEV           (UNIT 22 - MERGED TAPE OF EVENTS)
```

Figure 6.13-1 PRERUN STEP 11 SUBPROGRAMS AND DATA SET

External data sets required as input are "JFMSTR", "MASSEV23", "JFEVLC", "CREVT9" and "JFEVT", all generated in previous steps.

Internal data sets required as work (scratch) disk files are "FJEVL", and "JTFWEV".

This step collects and merges all events of all types that have been generated and stored in the previous PRERUN steps. The merged sequence of events lists are stored on disk (DSNAME=JFIEV).

6.14 PRERUN STEP 12

Step 12 in PRERUN has one (main) program, PREMNC, and requires only 1 external data set "JFIEV" as input.

This step takes all the merged events, blocks them for MSM (900 or fewer words/block), and stores them on disk (DSNAME=EVENT1).

The program required, the data set needed and the data set generated are shown in Figure 6.14-1.

```
JOB STEP:  PRE RUN STEP 12
    BLOCKS EVENT GROUPS TO A MAXIMUM OF 900 WORDS FOR MSM.

SUBPROGRAMS NEEDED
    PREMNC (MAIN PROGRAM)

DATA SETS NEEDED
    JFIEV          (UNIT 22 -  MERGED TAPE OF EVENTS)

DATA SETS GENERATED
    EVENT1         (UNIT 2  -  MERGED EVENTS BLOCKED FOR MSM - 900)
```

Figure 6.14-1 PRERUN STEP 12 SUBPROGRAMS AND DATA SETS

Section 7

MSM PROGRAM OPERATIONS

7.1 INTRODUCTION

Main Simulation Model (MSM) is a complex of 75 subprograms (including main program and a BLOCK DATA subprogram) constituting a single job setup. Required subprograms are listed in Figure 7.1-1. MSM must follow PRERUN in program operations sequencing. Input requirements and output specifications are given below.

7.2 INPUT DATA REQUIREMENTS FOR MSM

MSM requires the following input data:

(a) HEADER CARDS (SYSIN; cards)

(b) TERRAIN PARAMETER TABLES UTVSXY and UNTER (SYSIN; cards)

(c) BASICT and ATMOSPHERIC DATA (disk file; DSNAME = MASSDAT)

(d) SYSTEM PARAMETERS (disk file prepared by PRERUN; DSNAME = JTFWDF)

(e) EVENTS (disk file prepared by PRERUN; DSNAME = EVENT1)

The card sequence for data items (a) and (b) is shown in Figure 7.2-1.

In addition, certain designer values not normally subject to change are provided internally within MSM via data statements. The most important of these are fixed sensor parameters, residing in common area /SENVAR/. The logical variable LDUMP, residing in common area/CONST/, controls the option of "local" dump by sensor routines. The normal value is .FALSE. (no dump). The value .TRUE. may be used, but probably only for debugging operations. Fig. 7.2-2 lists the BLOCK DATA subprogram MSMBLK in which these common area variables are defined and values set. Only MSMBLK would require recompilation if numerical changes were required.

Variable names IPRINT AND ICARD are used consistently to indicate unit device numbers for printer and card reader, respectively.

JOB STEP: MSM

SUBPROGRAMS NEEDED

ACOUTG	EX2UPD	PIRTG
ALFCVT	EX3ARF	QUAD
ANG	EX3 'RW	RADAR
ARFTG	EX3IMG	SACDET
ARRPTR	EX3MAG	SCAN1
ARRVLU	EX3PIR	SCAN2
BFIASK	EX3RDR	SCNOUT
BFILUM	EX3SAC	SEISTG
BRKWIR	EX3THV	SETSC1
CLOSFL	FTPAR1	SETSC2
DUMPMS	FTPAR2	STCIRC
ERASE	GRN	STRECT
ERFC	GRNASK	TANDT
EVNEED	GRNORG	TERAN
EXEC1	IMAGE	TGTLG
EXEC1A	ITODEV	TGTLXY
EXEC1B	IUTEVL	TGTPTR
EX2RFL	KSTVLU	TGTVLU
EX2HLT	MAGTG	THERML
EX2SFA	MSMBLK	TIMOUT
EX2SNP	PARMIN	TRNSFR
EX2SNR	PARPTR	UGSDET
EX2SPC	PARVLU	UGSOUT
EX2SRP	PGSKIP	URN
	PGSKP2	URNASK
		URNORG

DATA SETS NEEDED

SYSIN	(UNIT 5 - INPUT DATA)
MASSDAT	(UNIT 2 - BASICT,ATMENV)
JTFWDF	(UNIT 11 - INPUT PARAMETERS)
EVENT1	(UNIT 2 - EVENTS 1-10)

DATA SETS GENERATED

MSMOUT	(UNIT 70 - BINARY OUTPUT FROM MSM)

Figure 7.1-1 MSM SUBPROGRAMS AND DATA SETS

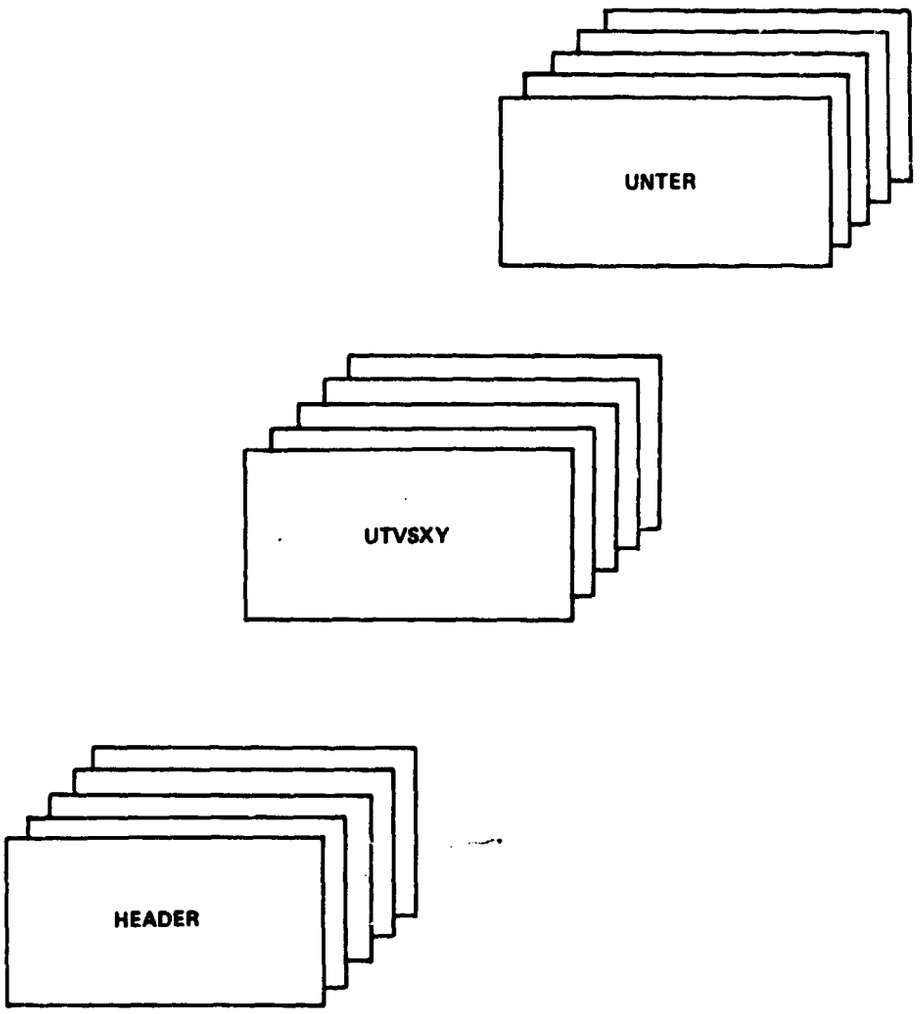


Figure 7.2-1 INPUT CARD SET UP FOR MSM

```
C*****************************  MSMBLK  *********************************
C*                                                                       *
C*                        BLOCK DATA MSMBLK                              *
C*                                                                       *
C*     PURPOSE                                                           *
C*        BASIC BLOCK DATA PROGRAM FOR ALL MSM COMMON AREAS              *
C*                                                                       *
C***************************************************************************
C*                                                                       *
C***************************************************************************
C
C
      BLOCK DATA
C
C
C                    *** /TGLGCM/ ***
      COMMON /TGLGCM/ IDTGLG(20),X0(20),Y0(20),T0(20),X1(20),Y1(20),
     X T1(20),TLD(20),SPEEDL(20),VX(20),VY(20),KTL
      DIMENSION TLDUM(221)
      EQUIVALENCE (TLDUM(1),IDTGLG(1))
      DATA TLDUM/221*0.0/
C
C                    *** /BIGSTR/ ***
      COMMON /BIGSTR/ LJUMP(13),NDSMSM(13),IPBIGS(15),IPBLU(200),
     X  IPPATH(100),MSMPAR(20000)
      DATA  LJUMP/15,8,8,0,14,24,38,10,11,7,0,7,10/, NDSMSM/13*0/,
     X  IPBIGS/15*0/, IPBLU/200*0/, IPPATH/100*0/, MSMPAR/20000*0/
C
C
C                    *** /PGCONT/ ***
      COMMON /PGCONT/ ILINES,IPAGE,HEADNG(17)
       DATA ILINES/0/,IPAGE/0/,HEADNG/17*4H    /
C
C
C
C          *** /SYSCNT/  (SYSTEM COUNTERS) ***
      COMMON / SYSCNT/ KSEI(3),KACO(3),KMAG(3),KARF(3),KPIR(3),
     1 KRDR(3,3),KIMG(3,3),KTHV(3,3),KBKW(3),KDSEI(3),KDACO(3),
     2 KDMAG(3),KDARF(3),KDPIR(3),KDRDR(3,3),KDIMG(3,3),KDTHV(3,3),
     3 KDBKW(3), K3SEI,K3ACO,K3MAG,K3ARF,K3PIR,K3RDR,K3IMG,K3THV,
     4 K3BKW,KSCN1R,KSCN2R,KSCN1I,KSCN2I,KSCN1T,KSCN2T,KFSEI,KFACO,
     5 KFMAG,KFARF,KFPIR,KFBKW,KEV1,KEV2,KEV3,KEV4,KEV5,KEV6,KEV7,
     6 KEV8,KEV9,KEV10,KNTDEV,KRTPRI,KBTPRI,KFTPRI,KRT,KBT,KFT
      DIMENSION KNTSYS(128)
      EQUIVALENCE (KNTSYS(1),KSEI(1))
      DATA KNTSYS /128*0/
C
C                    ***  /ANDQUE/  ***
      COMMON /ANDQUE/ KODD(10),ITPSN(10),IDSN(10),ITDT(10),NRT(10),
     1  NAT(10),NFT(10),IOPRT(10),XPRT(10),YPRT(10),RPRT(10),XSN(10),
```

Figure 7.2-2 **BLOCK DATA SUBPROGRAM MSMBLK**

```
     2  YSN(10),IDCFM(10),NMN(10),IDM1(10),IDM2(10),IDM3(10),IDAR(10),
     3  IDFTR(10),ADM1(10),ADM2(10),ADM3(10),ADFTR(10),ADCFM(10)
      DIMENSION  IANDQ(250)
      EQUIVALENCE (IANDQ(1),KDCD(1))
      DATA  IANDQ /250*0/
C
C                     ***  /OUTCOM/  ***
      COMMON /OUTCOM/ KDCODE,ITYPSN,IDSNSR,ITIMDT,NRTGTS,NBTGTS,
     1    NFTGTS,IDPTGT,XPTGT,YPTGT,RPTGT,XSNSR,YSNSR,
     2    IDCONF,NMONS,IDMON1,IDMON2,IDMON3,IDARAY,IDFTRP,
     3    ADMON1,ADMON2,ADMON3,ADFTRP,ADCONF
      DIMENSION IOUTCM(25)
      EQUIVALENCE  (IOUTCM(1),KDCODE)
      DATA IOUTCM/25*0/
C
C                     *** /SENVAR/ ***
      COMMON /SENVAR/ CONSTA,TDEL2A,BIASAC,BWACOU,
     1                CONSTS,TDEL2S,BIASSE,BWSEIS
     2, PHIAZ,PHIEL,DIAM,BWPIR,DEVXMN
     3 ,XMNDEV,BANDTH,ANEP,OPTXMN
     4 ,THRESP,DELAZ,TIMMAX
      DATA BIASAC,BWACOU,CONSTA,TDEL2A/0.2,500.0,1.0,40.0/
      DATA BIASSE,BWSEIS,CONSTS,TDEL2S/0.2,100.0,1.0,40.0/
      DATA PHIAZ,PHIEL,DIAM,BWPIR,DEVXMN / 0.0174533,0.0523599,10.0,100.
     1,0.9/
      DATA XMNDEV,BANDTH,ANEP/0.9,2600.0,1.E-10/
      DATA OPTXMN/0.8/
      DATA THRESP,DELAZ,TIMMAX/0.5E-07,0.0349,3.0/
C
C
C                     *** /CONST/ ***
      COMMON /CONST/ LDUMP,SQ2,DEG,RAD,PI,STEFK,ICARD,IPRINT
      LOGICAL LDUMP
      DATA LDUMP,SQ2,DEG,RAD,PI,STEFK/.FALSE.,1.414214,57.29578,0.017453
     13,3.141593,1.805456E-8/
      DATA ICARD,IPRINT/5,6/
C
      END
```

Figure 7.2-2 **BLOCK DATA SUBPROGRAM MSMBLK (CONT)**

Their values, in initial coding, are set to 6 and 5*, respectively, by data statements. However, these data statements occur in nearly all of the individual subprograms that use printer or card reader, so a number of recompilations would be necessary for change.**

Designer values for sensors are also specified by data statements internal to the sensor routines. See Volume I sensor routine documentation for details.

7.3 MSM OUTPUT

MSM operations in completing system simulation are discussed in Volume I. The final output channels, which contain information on sensor reports and auxiliary information are:

(a) PRINTER

(b) BINARY OUTPUT (tape or disk; DSNAME = MSMOUT.)

Explicit descriptions of content, structure and list formats for MSM output are given in Volume I, Part II, Appendix C.

---

* These values are common to most computer installations using IBM computer.

** System procedures on many computers allow the choice to be made with Job Control Language, external to the FORTRAN programs.

Section 8

ANALYSIS (ATTENDED SENSORS) PROGRAM OPERATION

8.1 INTRODUCTION

This program package is a restricted-scope OUTPUT PROCESSOR (post-MSM) program that simulates, in part, the generation of messages from operators of attended sensors. It comprises a main program (ASMAIN) and 7 subroutines directed to the physical problem; it also uses the URN random number generator. Names and brief descriptions of subprograms are given in Figure 8.1-1. Data sets needed are also listed in Figure 8.1-1 and described below.

8.2 DIRECT INPUT REQUIREMENTS

Primary input, supplying information about "raw" sensor reports, is the tape or disk file, MSMOUT, generated by the MSM portion of the primary simulation package.

In addition, two data cards must be supplied, both very elementary:

Card No. 1 - Arbitrary alphanumeric text (80 columns), used only for run identification.

Card No. 2 - First 3 columns are used as selection flags for radar, image, and thermal viewer sensors respectively. A "0" or blank in a column indicates that reports for the sensor type (corresponding to column) are to be processed. A "1" (or any non-zero digit) indicates that processing is to be suppressed. Note that a completely blank card would imply processing for all three sensor types.

8.3 PARAMETERS SET BY DATA STATEMENTS

Numerical values for program parameters are defined within subprograms by DATA statements. The option exists of altering parameter values, without affecting logic or internal coding of subprograms, by revising these DATA statements.

ASMAIN	Main program.
RDRMSG	Executive routine for radar sensors.
RDRVEH	Working routine for radar sensors, vehicle targets
RDRPRS	Working routine for radar sensors, personnel targets.
RPTMSG	Print routine for simulated report messages.

The following routines are provided as near dummy routines. Although full program linkages exist for illustrative purposes, and in order that information is not completely missing from printed output, no real "analysis" is performed.

IMGMSG	Executive routine for image type sensors.
THVMSG	Executive routine for thermal viewer sensors.
RDRBOT	Working routine for radar sensors, boat targets

The following function type subprogram is a utility program, not unique to the sensor analysis package:

URN	Uniform random number generator

DATA SETS NEEDED:

SYSIN	(Unit 5 - INPUT (Card Reader) for 2 DATA CARDS)
MSMOUT	(Unit 10 - TAPE OR DISK FILE FROM MSM)

Figure 8.1-1
Subprogram and Data Sets for Attended Sensor Analysis Package

The following three variables set the unit device numbers for the MSMOUT data file, the card reader, and the printer. Initial values for the latter two are set to standard IBM 360 conventions. That for MSMOUT is arbitrary.

Variable	Routine(s)	Value, Initial Coding	Definition
MSMOUT	ASMAZN	10	Unit device number for MSMOUT or disk file
ICARD	ASMAZN	5	Unit device number, card reader
IPRINT	ASMAIN RDRMSG RPTMSG RDRBOT	6	Unit device number, printer

The following parameters of physical significance are set by DATA statements within subroutine RDRPRS:

Variable	Value Set in Initial Coding	Definition
PNOKAT	0.08	Probability that operator does not specify target category (type)
FAST	1.35	Radial speed (meters/sec.), above which personnel likely to be specified as vehicles
SNREF1	0.5	Reference values (dB) for separating signal-to-noise ratio (S/N) into 3 categories (ISN index) S/N < SNREF1 ISN = 1 SNREF1 < S/N < SNREF2 ISN = 2 SREF2 < S/N ISN = 3
RVAR(3)	1.0, 0.5, 0.2	Fraction of range gate over which reported range may deviate from true range, depending upon 3 levels of S/N.
AZVAR(3)	1.0, 0.5, 0.2	Same except with reference to beamwidth and azimuth deviations
PUNSPQ(3)	0.6, 0.3, 0.2*	Probability values that operator not specify target count, depending upon 3 levels of S/N.
PQ (3,3)	0.6 0.3 0.1 0.4 0.4 0.2 0.1 0.3 0.6	Given that a target count is specified by operator, these are probabilities for the reported count KINDEX (column), given true target count IKOUNT (row). Row sums must = 1.0

* Keypunch error in original deck. The value 0.2 was punched as 0.5

The following parameters are set by DATA statements within subroutine RDRVEH. They are directly analogous to variables in RDRPRS and have analogous physical significance.

Variable	For Definition, Refer to this Variable in RDRPRS
PNOKVH	PNOKAT
FASTVH	FAST
SNRFV1	SNREF1
SNRFV2	SNREF2
RVARV	RVAR
AZVARV	AZVAR
PUNSVQ	PUNSPQ
PQ	PQ

Values initially coded are identical to those within RDRPRS.

Section 9

ANALYSIS (UNATTENDED SENSORS) PROGRAM OPERATION

9.1 INTRODUCTION

This program package is a specific OUTPUT PROCESSOR (post-MSM) program, that develops from "raw" reports by unattended sensors inferential information about targets -- validity (true target vs false alarm), direction and speed of motion, etc. It comprises a main program (ANALMN), 3 BLOCK DATA subprograms and 18 operational subprograms -- all listed in Figure 9.1-1.

```
JOB STEP:  ANALYSIS MODEL (UNATTENDED SENSORS)

SUBPROGRAMS NEEDED
     ANALMN (MAIN PROGRAM)
     ALPHA
     ANLYZE
     ARRIVL
     CALLIT
     CNNECT
     COUNTR
     CRLATE
     FSTARG
     IDIST
     INOUT  (BLOCK DATA)
     INSPCT
     JSIETA
     LILMSM
     LOCATE
     MCHART (BLOCK DATA)
     MONLST (BLOCK DATA)
     NMOD
     RADIAN
     RESET
     RODRUM
     SNAIDR

DATA SET NEEDED
     SYSIN          (UNIT 5 - INPUT DATA)
```

Figure 9.1-1 **UNATTENDED SENSOR ANALYSIS MODEL (UNATTENDED SENSORS)**

The program currently operates from manually prepared data card input, as described below. With later programming of an appropriate executive program, the MSM output file ("MSMOUT") would substitute for those cards that provide detection event data.

9.2 INPUT REQUIREMENTS

This model requires as input basic data in these categories:

(a) number of monitors, sensors, firetraps.

(b) physical linkages or associations (monitors-sensors-firetraps).

(c) information that defines geometrical areas under surveillance.

(d) Certain parameters for sensor and firetraps (x, y-coordinates types, etc.).

(e) designer values for decision making thresholds.

(f) detection event data (sensor reports).

At the present stage of program development, data in these categories are supplied via card input. The card deck structure, (Figure 9.2-1) and the card contents and formats, are given in detail in Appendix G.

Eventual applications of this model may require full linkage to MSM and possibly PRERUN output data sets. Such linkage implies creation of an overall executive routine, not initially supplied, that would access external disk or tapes data sets, do necessary editing, and create as input to the model that information now read from cards.

Results of this model are printed output. Content and significance of these output results are discussed in Volume I, Part II.

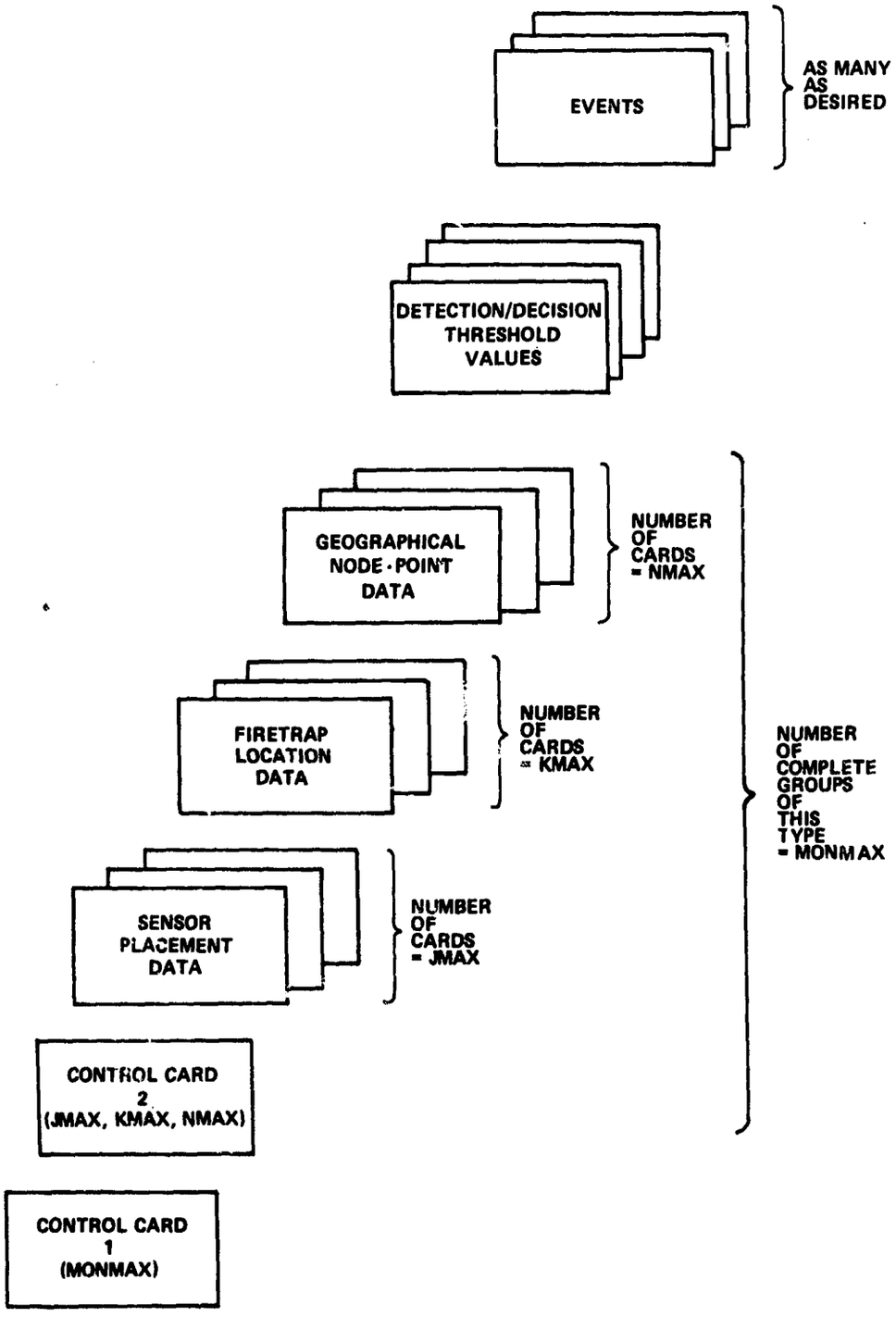


Figure 9.2-1 ANALYSIS, UNATTENDED SENSORS: INPUT CARD DECK STRUCTURE

Section 10

TACTICAL COMMUNICATIONS MODEL PROGRAM OPERATION

10.1 INTRODUCTION

The Tactical Communications (TACCOM) Model comprises the main program* (DUMXTC) and 11 subroutines, as listed in Figure 10.1-1. This TACCOM model is a specific OUTPUT PROCESSOR (post-MSM) type of model, that is intended to be run following completion of an MSM run. It is addressed to the transmission over military nets of sensor report information.

Fully "linked," TACCOM would receive its sensor report event data from the MSM output tape file ("MSMOUT").** In its current version, however, these data are entered from manually prepared cards as described below.

10.2 INPUT REQUIREMENTS

Input to the TACCOM model consists of a card deck, that includes seven data sets and associated control cards. Program operations in setting up this card deck are described in detail in Appendix H. A schematic representation of the card deck is shown in Figure 10.2-1.

JOB STEP: TACTICAL COMMUNICATIONS MODEL	
SUBPROGRAMS NEEDED	
DUMXTC	(MAIN PROGRAM)
BSORT	
BUPDAT	
LOSRT	
LODQUE	
MAPPER	
MSGQUE	
PRCONT	
ROUTE	
TACCOM	
TACOUT	
XSORT	
DATA SET NEEDED	
SYSIN	(UNIT 5 - INPUT DATA)

Figure 10.1-1 TACTICAL COMMUNICATIONS SUBPROGRAMS AND DATA SETS

* Subroutine TACCOM is the effective main program for dynamic simulation. It is given control by DUMXTC after some initial data reads.

** An executive routine, replacing DUMXTC, would be required -- that would be coded to translate from tape file into format required for subroutine TACCOM.

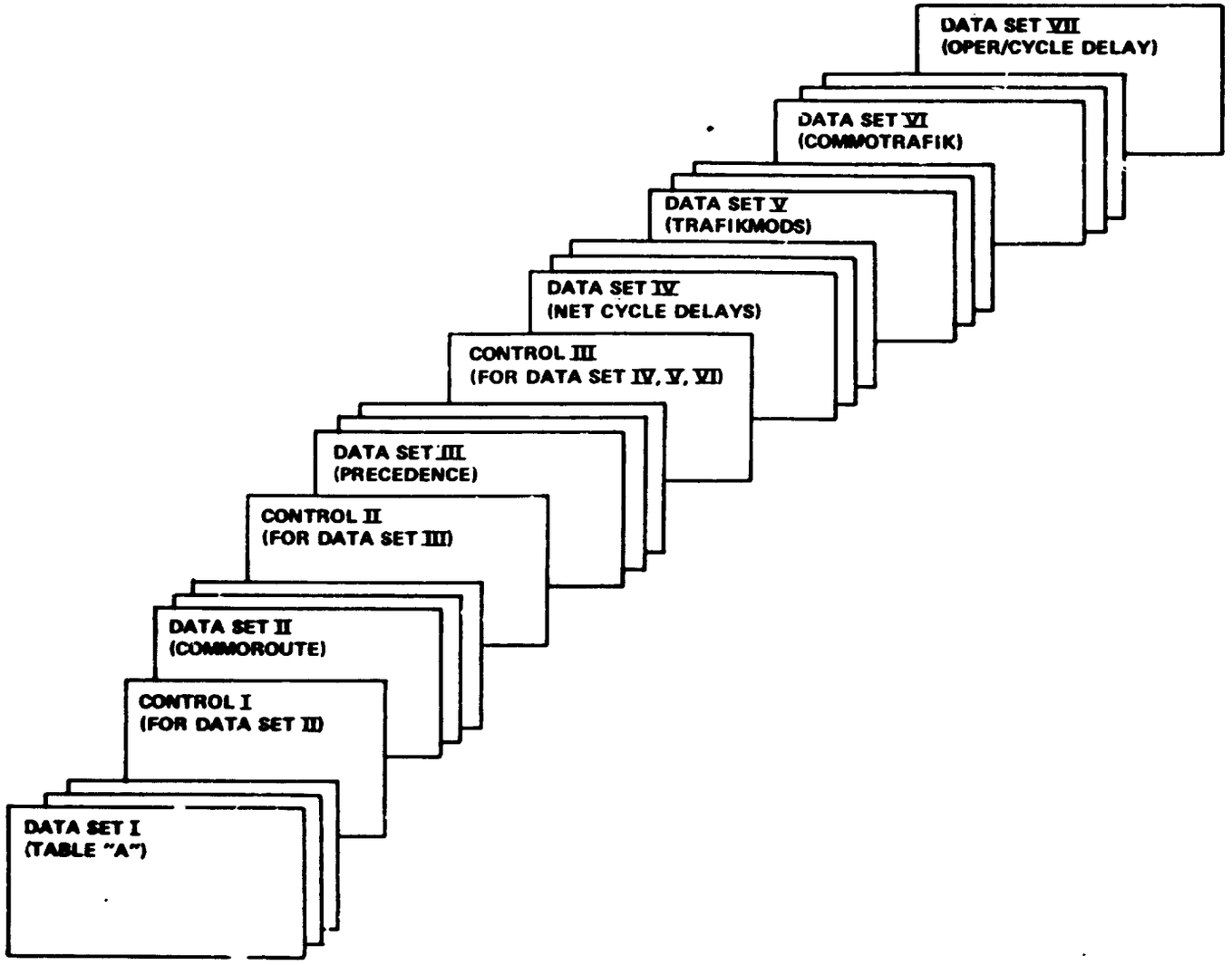


Figure 10.2-1 INPUT STREAM CARD SET UP FOR TACTICAL COMMUNICATIONS MODEL

APPENDIX A

PLANNER INPUT FOR ATMOSPHERIC MODEL

DATA SET I
ATMOSPHERIC
PLANNER INPUT

Item No.

0. Header Card - number of data cards to follow and any alphanumeric text.

1. Day of Game (INDAY) - a two-digit integer describing the day of the game. (Day at start of game is 00).

2. Time of Day (INHR) - a four-digit integer equal to the military time. The first two digits indicate the hour, the last two digits indicate the minutes.

3. Solar Altitude (SOLALT) - Local elevation of the sun in degrees. A negative value indicates that the sun is below the horizon (i.e., nighttime).

4. Lunar Altitude (ALTLUN) - Local elevation of the moon in degrees. A negative value indicates moon below horizon.

5. Lunar Phase (PHSLUN) - Expressed as a fraction, i.e., 0.00 = New Moon, 0.25 = 1st Quarter, 0.50 = Full Moon, 0.75 = 3d Quarter.

6. Precipitation - Condition Code (IPCODE) - A one digit integer code identifying the type of precipitation:

0	No precipitation
1	Thunderstorm
2	Rain or drizzle
3	Freezing rain or drizzle
4	Snow or sleet
5	Hail
6	Fog

7. Precipitation - Total Amount (TOTP) - Total amount of rain (or snow) in inches for the event identified by the Condition Code.

8. Wind Speed (WSPEED) - knots.

9. Cloud Cover (CCOVER) - Fraction 0.0 - 1.0.

10. Dry Bulb Temperature (ATEMP) - Degrees Fahrenheit.

11. Pressure (PRESUR) - Inches of Hg.

12. Relative Humidity (HUMDTY) - Percent 0 - 100.

13. Meteorological Visibility (VISIB) - Miles.

14. Ceiling (CEIL) - Feet.

Note: If no input is supplied, this data set must consis' of one blank card.

CARD FORMAT FOR ATMOSPHERIC PLANNER INPUT

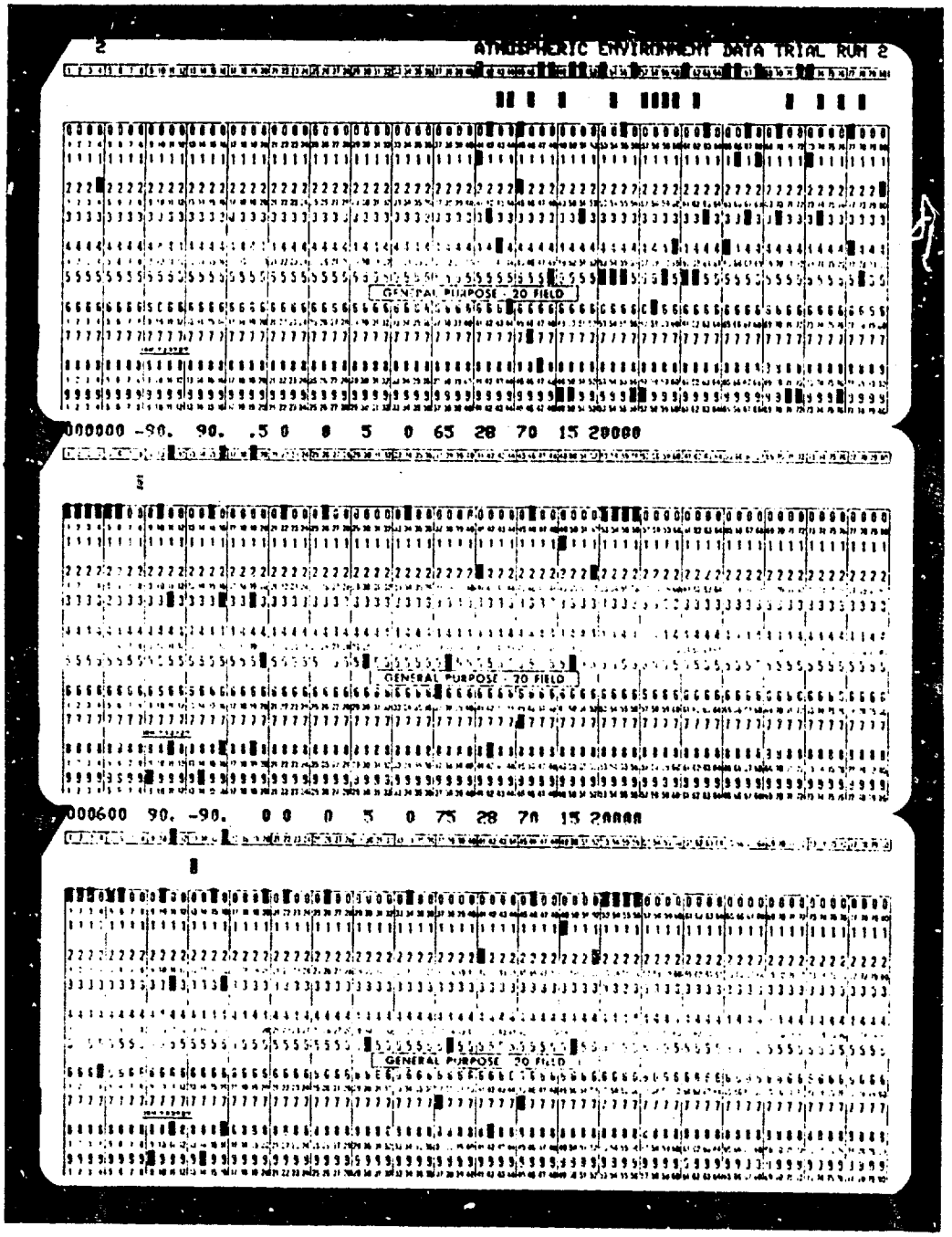
CARD 1	ITEM	WORD	COLUMNS	READ FORMAT
	0	1	1- 4	I4
	0	2,20	5-80	19A4

Note: If Card 1 is blank no other cards follow in this data set.

CARD 2				
	1	1	1- 2	I2
	2	2	3- 6	I4
	3	3	7-11	F5.0
	4	4	12-16	F5.0
	5	5	17-20	F4.0
	6	6	21-22	I2
	7	7	23-26	F4.0
	8	8	27-30	F4.0
	9	9	31-34	F4.0
	10	10	35-38	F4.0
	11	11	39-42	F4.0
	12	12	43-46	F4.0
	13	13	47-50	F4.0
	14	14	51-56	F6.0

CARD 3 Same format as Card 2 if necessary as per input for word in Card 1, Word 1.

A TYPICAL DATA SET FOR ATMOS PLANNER INPUT



DATA SET II

PROB 1 DATA SET

Item No.

0. Header Card - Identifying Alphanumeric Text, Scenario Area (IDAREA), Month - IMONTH, PROB SUB. NO., CARD NO.

1. PARAM(1) - PARAM(4) - Probability of Precipitation conditioned to time of day

   [(1) = 00 to 06 hrs.,
   (2) = 06 to 12 hrs.,
   (3) = 12 to 18 hrs.,
   (4) = 18 to 24 hrs.]

2. PARAM (5) - PARAM (7) - Non Precipitation duration distribution over 00 to 06 hrs.

3. PARAM (8) - PARAM (10) - Non Precipitation duration distribution over 06 to 12 hrs.

4. PARAM (11) - PARAM (13) - Non Precipitation duration distribution over 12 to 18 hrs.

5. PARAM (14) - Part of non-precipitation duration distribution over 18 to 24 hrs.

6. IDAREA, IMONTH, PROB SUB NO., CARD NO. required on this card also.

7. PARAM (15) - PARAM (16) - Remainder of non precipitation duration distribution over 18 to 24 hrs.

8. PARAM (17) - PARAM (19) - Precipitation duration distributed over 00 to 06 hrs.

9. PARAM (20) - PARAM (22) - Precipitation duration distributed over 06 to 12 hrs.

10. PARAM (23) - PARAM (25) - Precipitation duration distributed over 12 to 18 hrs.

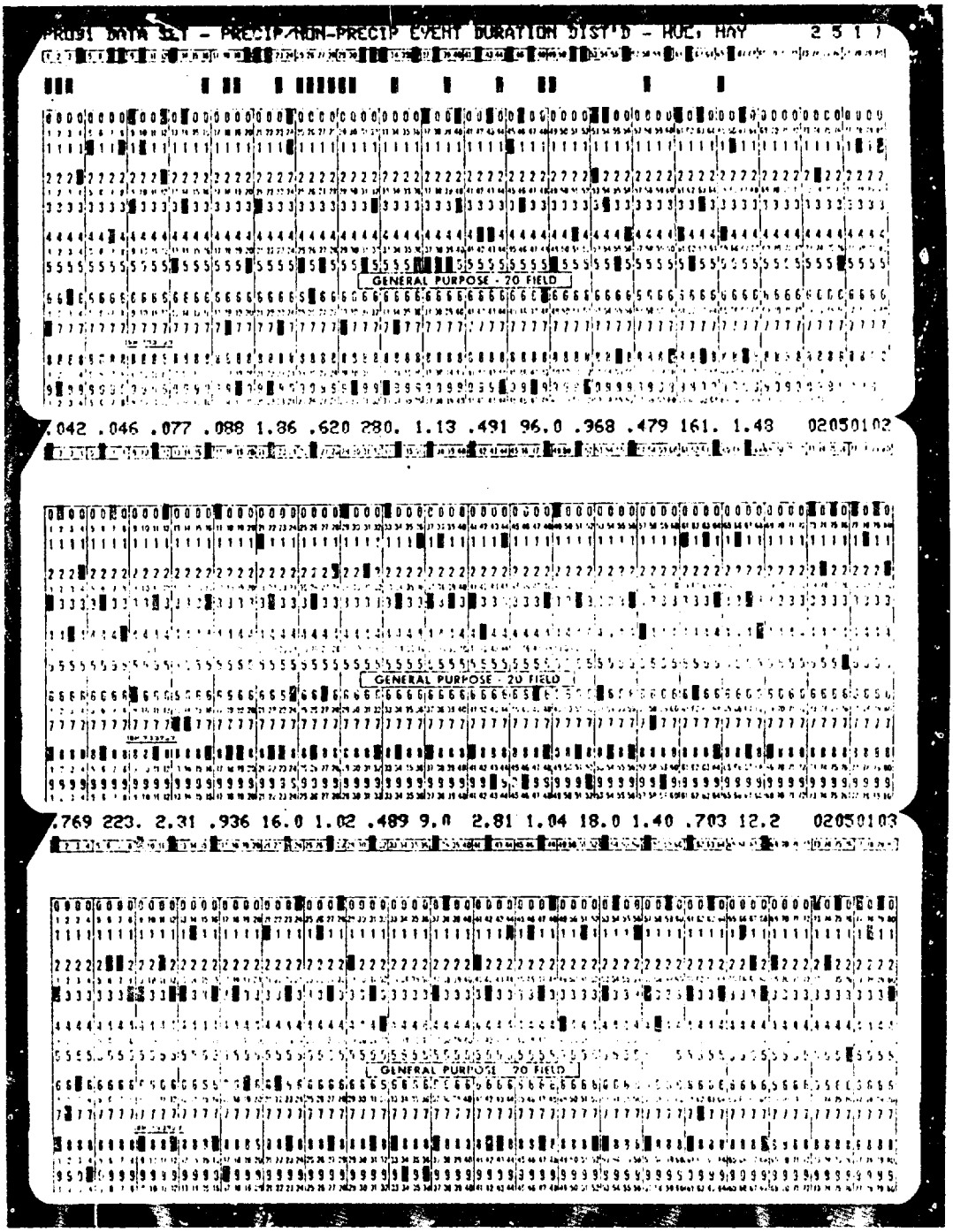
11. PARAM (26) - PARAM (28) - Precipitation duration distributed over 18 to 24 hrs.

12. IDAREA, IMONTH, PROB SUB NO., CARD NO. required on this card also.

CARD FORMAT FOR PROB 1 DATA SET

CARD 1	ITEM	WORD	COLUMNS	READ FORMAT
	0	1-18	1-72	72X
	0	19-22	73-80	4I2
CARD 2	1	1- 4	1-20	4F5.0
	2	5- 7	21-35	3F5.0
	3	8-10	36-50	3F5.0
	4	11-13	51-65	3F5.0
	5	14	66-70	F5.0
	6	15-18	73-80	4I2
CARD 3	7	1- 2	1-10	2F5.0
	8	3- 5	11-25	3F5.0
	9	6- 8	26-40	3F5.0
	10	9-11	41-55	3F5.0
	11	12-14	56-70	3F5.0
	12	15-18	73-80	4I2

A TYPICAL PROB 1 DATA SET



DATA SET III

PROB 2 DATA SET

Item No.

0. Header Card - Identifying Alphanumeric Text, Scenario Area (IDAREA), Month (IMONTH), PROB SUB. NO., CARD NO.

1. PARAM (1) - PARAM (3) - Precipitation rate distribution parameters, all hrs.

2. PARAM (4) - PARAM (8) - Precipitation type probabilities over 00 to 06 hrs.

3. PARAM (9) - PARAM (13) - Precipitation type probabilities over 06 to 12 hrs.

4. PARAM (14) - Part of precipitation type probabilities over 12 to 18 hrs.

5. IDAREA, IMONTH, PROB SUB NO., CARD NO. required on this card also.

6. PARAM (15) - PARAM (18) - Remainder of Precipitation type probabilities over 12 to 18 hrs.

7. PARAM (19) - PARAM (23) - Precipitation type probabilities over 18 to 24 hrs.

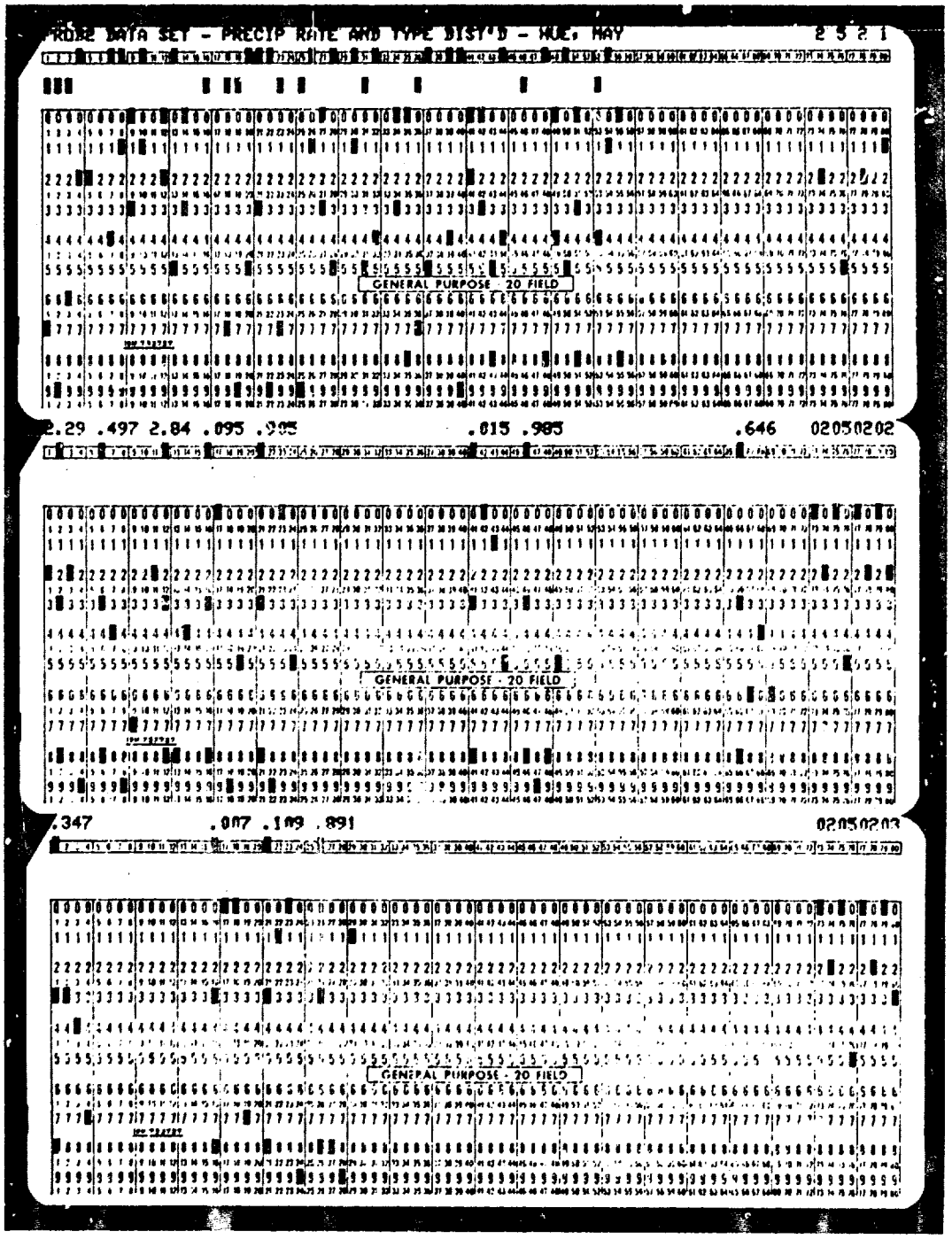
8. PARAM (24) - PARAM (28) - Blank

9. IDAREA, IMONTH, PROB SUB NO., CARD NO. required on this card also.

CARD FORMAT FOR PROB 2 DATA SET

CARD 1	ITEM	WORD	COLUMNS	READ FORMAT
	0	1-18	1-72	72X
	0	19-22	73-80	4I2
CARD 2	1	1- 3	1-15	3F5.0
	2	4- 8	16-40	5F5.0
	3	9-13	41-65	5F5.0
	4	14	66-70	F5.0
	5	15-18	73-80	4I2
CARD 3	6	1- 4	1-20	4F5.0
	7	5- 9	21-45	5F5.0
	8	10-14	46-70	5F5.0
	9	15-18	73-80	4I2

A TYPICAL PROB 2 DATA SET



DATA SET IV

PROB 3 DATA SET

Item No.	
0.	Header Card - Identifying Alphanumeric Text; Scenario Area (IDAREA), Month (IMONTH), PROB SUB NO., CARD NO.
1.	PARAM (1) - PARAM (4) - Cloud cover distribution over 00 to 06 hrs.
2.	PARAM (5) - PARAM (8) - Atmospheric pressure distribution, non-precipitation period 00 to 06 hrs.
3.	IDAREA, IMONTH, PROB SUB NO., CARD NO. required on this card.
4.	PARAM (9) - PARAM (12) - Atmospheric pressure distribution, precipitation period 00 to 06 hrs.
5.	PARAM (13) - PARAM (16) - Visibility distribution, non-precipitation period 00 to 06 hrs.
6.	IDAREA, IMONTH, PROB SUB NO., CARD NO. required on this card.
7.	PARAM (17) - PARAM (20) - Visibility distribution, light precipitation period 00 to 06 hrs.
8.	PARAM (21) - PARAM (24) - Visibility distribution, medium precipitation period 00 to 06 hrs.
9.	IDAREA, IMONTH, PROB SUB NO., CARD NO. required on this card.
10.	PARAM (25) - PARAM (28) - Visibility distribution, heavy precipitation peiod 00 to 06 hrs.
11.	PARAM (29) - PARAM (32) - Wind speed distribution, non-precipitation period 00 to 06 hrs.
12.	IDAREA, IMONTH, PROB SUB NO., CARD NO. required on this card.
13.	PARAM (33) - PARAM (36) - Wind Speed distribution, light precipitation period 00 to 06 hrs.
14.	PARAM (37) - PARAM (40) - Wind speed distribution, medium precipitation period 00 to 06 hrs.
15.	IDAREA, IMONTH, PROB SUB NO., CARD NO. required on this card.
16.	PARAM (41) - PARAM (44) - Wind speed distribution, heavy precipitation period 00 to 06 hrs.
17.	PARAM (45) - PARAM (48) - Cloud cover distribution over 06 to 12 hrs.
18.	IDAREA, IMONTH, PROB SUB NO., CARD NO. required on this card.

19. Same as Item 2, over 06 to 12 hrs.

20. Same as Item 4, over 06 to 12 hrs.

21. IDAREA, IMONTH, PROB SUB NO., CARD NO. required on this card.

22. Same as Item 5, over 06 to 12 hrs.

23. Same as Item 7, over 06 to 12 hrs.

24. IDAREA, IMONTH, PROB SUB NO., CARD NO. required on this this card.

25. Same as Item 8, over 06 to 12 hrs.

26. Same as Item 10, over 06 to 12 hrs.

27. IDAREA, IMONTH, PROB SUB NO., CARD NO. required on this card.

28. Same as Item 11, over 06 to 12 hrs.

29. Same as Item 13, over 06 to 12 hrs.

30. IDAREA, IMONTH, PROB SUB NO., CARD NO. required on this card.

31. Same as Item 14, over 06 to 12 hrs.

32. Same as Item 16, over 06 to 12 hrs.

33. IDAREA, IMONTH, PROB SUB NO., CARD NO. required on this card.

34-49. Same as Items 1-16, over 12 to 18 hrs.

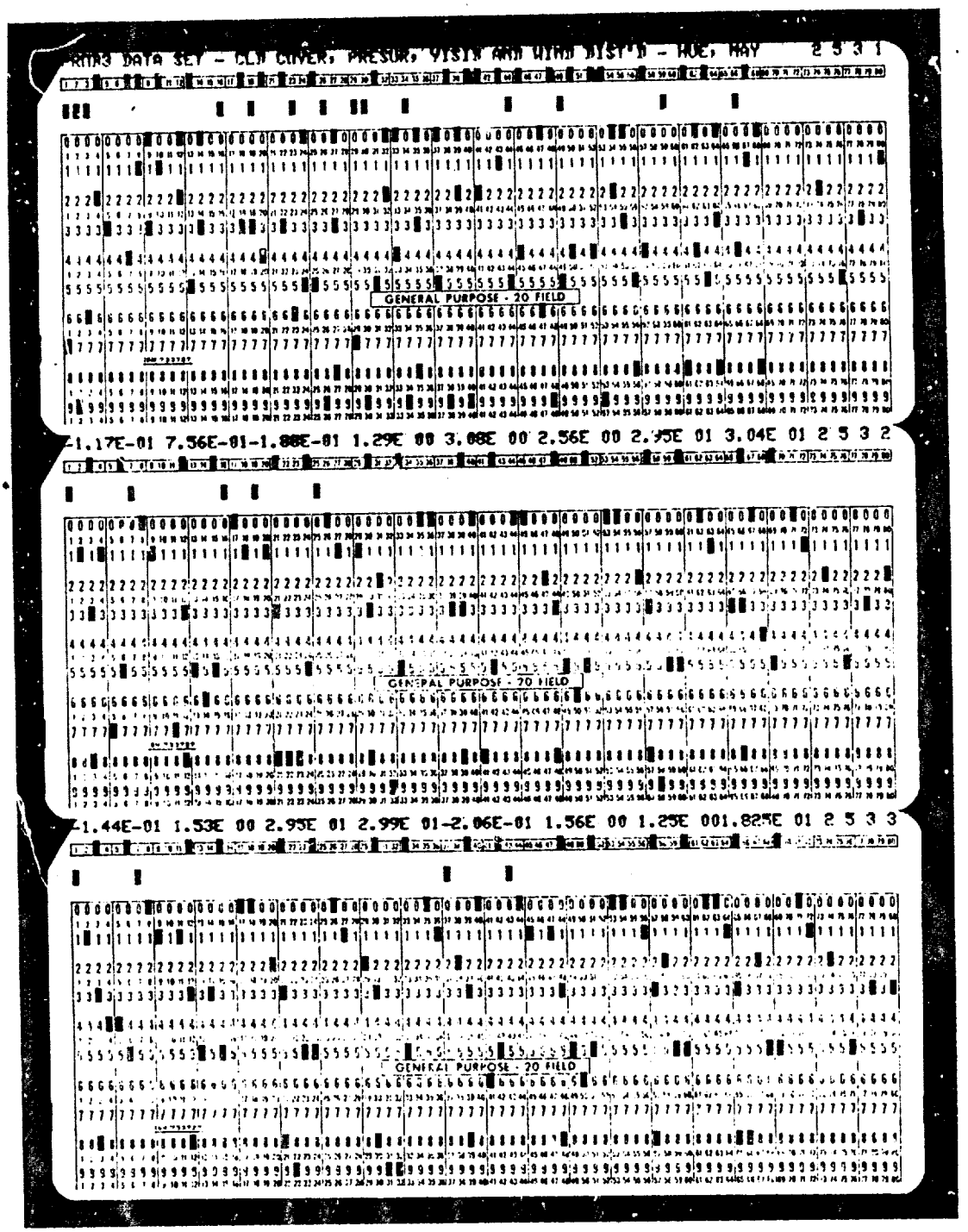
50-66. Same as Items 17-33, over 18 to 24 hrs.

CARD FORMAT FOR PROB 3 DATA SET

CARD 1	ITEM	WORD	COLUMNS	READ FORMAT
	0	1-18	1-72	72X
	0	19-22	73-80	4I2
CARD 2	1	1- 4	1-36	4E9.2
	2	5- 8	37-72	4E9.2
	3	9-12	73-80	4I2
CARD 3	4	1- 4	1-36	4E9.2
	5	5- 8	37-72	4E9.2
	6	9-12	73-80	4I2
CARD 4	7	1- 4	1-36	4E9.2
	8	5- 8	37-72	4E9.2
	9	9-12	73-80	4I2
CARD 5	10	1- 4	1-36	4E9.2
	11	5- 8	37-72	4E9.2
	12	9-12	73-80	4I2
CARD 6	13	1- 4	1-36	4E9.2
	14	5- 8	37-72	4E9.2
	15	9-12	73-80	4I2

CARD 7 through 23 contain Items 16 - 66. Each card has the format (8E9.2, 4I2).

AN EXAMPLE OF FIRST THREE CARDS FROM PROB 3 DATA SETS



DATA SET V

PROB 4 DATA SET

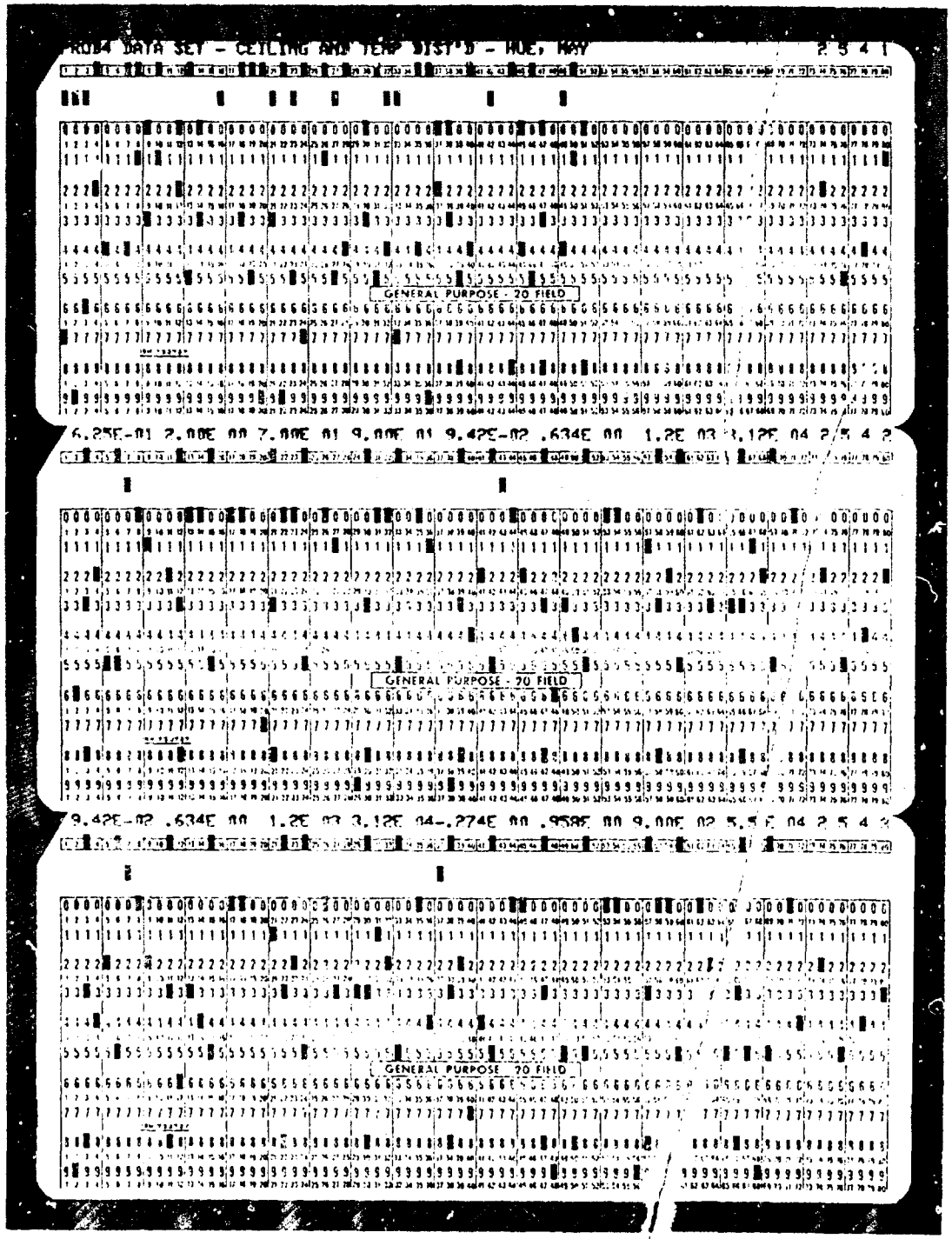
Item No.	
0.	Header Card - Identifying Alphanumeric Text, Scenario Area, (IDAREA), Month (IMONTH), PROB SUB NO., CARD NO.
1.	PARAM (1) - PARAM (4) - Temperature distribution, non-precipitation period 00 to 06 hrs.
2.	PARAM (5) - PARAM (8) - Ceiling distribution, non-precipitation period, visibility from 0 to 5 miles from 00 to 06 hours.
3.	IDAREA, IMONTH, PROB SUB NO., CARD NO.
4.	PARAM (9) - PARAM (12) - Ceiling distribution, non-precipitation period, visibility from 5 to 10 miles from 00 to 06 hrs.
5.	PARAM (13) - PARAM (16) - Ceiling distribution, non-precipitation period, visibility over 10 miles from 00 to 06 hrs.
6.	IDAREA, IMONTH, PROB SUB NO., CARD NO.
7.	PARAM (17) - PARAM (20) - temperature distribution, precipitation period 00 to 06 hrs.
8.	PARAM (21) - PARAM (24) - Ceiling distribution, precipitation period, visibility from 0 to 5 miles from 00 to 06 hrs.
9.	IDAREA, IMONTH, PROB SUB NO., CARD NO.
10.	PARAM (25) - PARAM (28) - Ceiling distribution, precipitation period, visibility from 5 to 10 miles, from 00 to 06 hrs.
11.	PARAM (29) - PARAM (32) - Ceiling distribution precipitation period, visibility over 10 miles from 00 to 06 hrs.
12.	IDAREA, IMONTH, PROB SUB NO., CARD NO.
13-24.	Same as Items 1-12 in the 06 to 12 hr. time period.
25-36.	Same as Items 1-12 in the 12 to 18 hr. time period.
37-48.	Same as Items 1-12 in the 18 to 24 hr. time period.

CARD FORMAT FOR PROB 4 DATA SET

CARD 1	ITEM	WORD	COLUMNS	READ FORMAT
	0	1-18	1-72	72X
	0	19-22	73-80	4I2
CARD 2	1	1- 4	1-36	4E9.2
	2	5- 8	37-72	4E9.2
	3	9-12	73-80	4I2
CARD 3	4	1- 4	1-36	4E9.2
	5	5- 8	37-72	4E9.2
	6	9-12	73-80	4I2
CARD 4	7	1- 4	1-36	4E9.2
	8	5- 8	37-72	4E9.2
	9	9-12	73-80	4I2
CARD 5	10	1- 4	1-36	4E9.2
	11	5- 8	37-72	4E9.2
	12	9-12	73-80	4I2

Card 6 through Card 17 contain Items 13 through 48; and each card has the format (8E9.2, 4I2).

AN EXAMPLE OF FIRST THREE CARDS FROM PROB 4 DATA SETS



DATA SET VI

PROB 5 DATA SET

Item No.

0. Header Card - Identifying Alphanumeric Text, Scenario Area, (IDAREA), Month, (IMONTH), PROB SUB NO., CARD NO.

1. [TMIN(I)-TMAX(I), I = 1, 4]

   TMIN(1) = minimum temperature, 00 to 06 hrs.
   TMAX(1) = maximum temperature, 00 to 06 hrs.
   TMIN(2) = minimum temperature, 06 to 12 hrs.
   TMAX(2) = maximum temperature, 06 to 12 hrs.
   TMIN(3) = minimum temperature, 12 to 18 hrs.
   TMAX(3) = maximum temperature, 12 to 18 hrs.
   TMIN(4) = minimum temperature, 18 to 24 hrs.
   TMAX(4) = maximum temperature, 18 to 24 hrs.

2. IDAREA, IMONTH, PROB SUB NO., CARD NO.

3. [PARAM (I), I = 1, 8]

   Distribution of Dew Point Depression, 00 to 06 hrs., conditioned on temperature from TMIN(1) to TMAX(1) in eight degree intervals (TMAX - TMIN≤64°).

4. IDAREA, IMONTH, PROB SUB NO., CARD NO.

5. [PARAM(I), I = 9, 16]

   Distribution of Dew Point Depression, 00 to 06 hrs. conditioned on temperature from TMIN(1) to TMAX(1) in eight degree intervals (TMAX - TMIN≤64°).

6. IDAREA, IMONTH, PROB SUB NO., CARD NO.

7. [PARAM(I), I = 17, 24]

   Distribution of Dew Point Depression, 00 to 06 hrs. conditioned on temperature from TMIN(1) to TMAX(1) in eight degree intervals (TMAX - TMIN≤64°).

8. IDAREA, IMONTH, PROB SUB NO., CARD NO.

9. [PARAM(I), I = 25, 32]

   Distribution of Dew Point Depression, 00 to 06 hrs. conditioned on temperature from TMIN(1) to TMAX(1) in eight degree intervals (TMAX - TMIN≤64°).

10. IDAREA, IMONTH, PROB SUB NO., CARD NO.

11-20. Same as Items 3-10 in the 06-12 hr. time period.

21-30. Same as Items 3-10 in the 12-18 hr. time period.

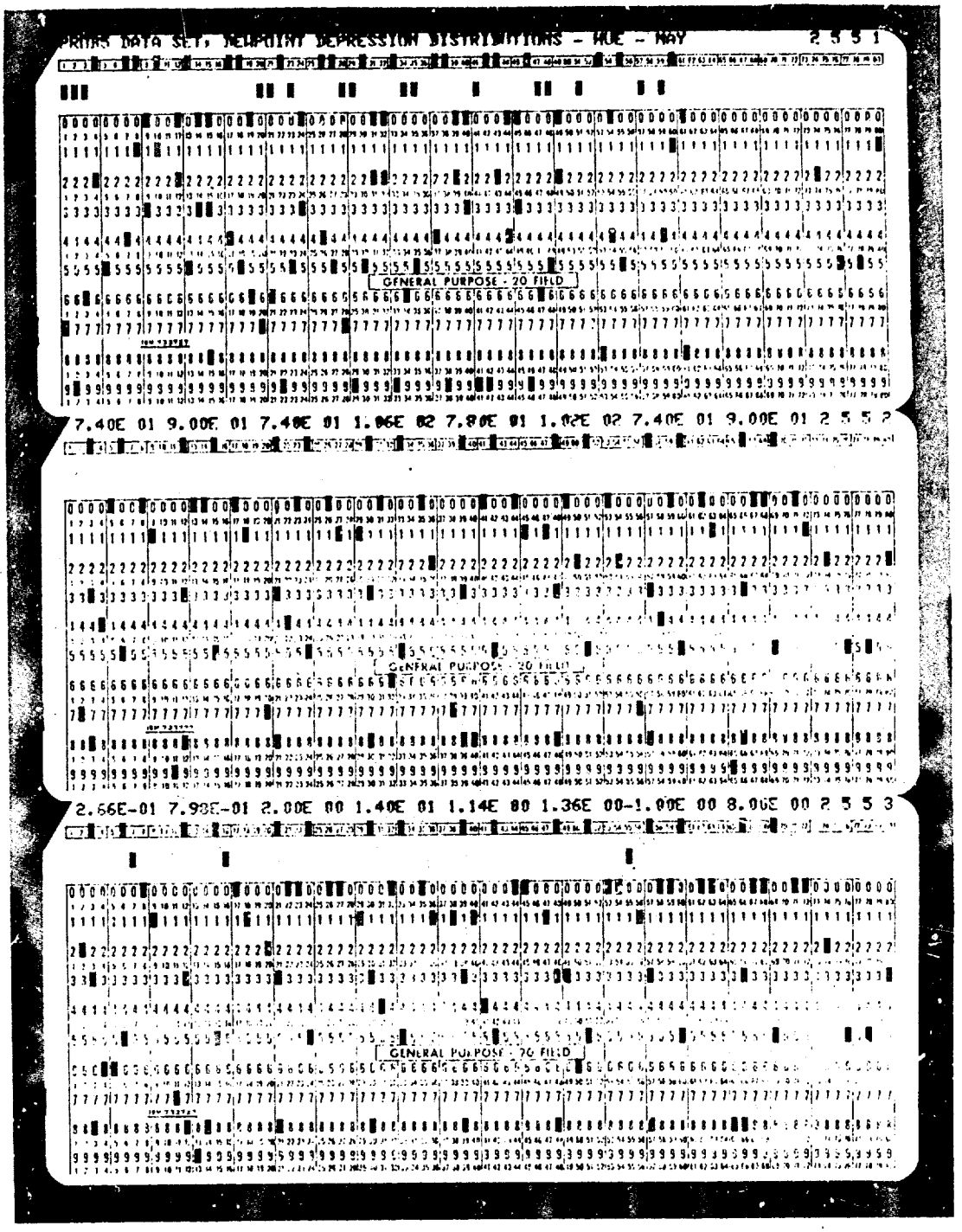
31-40. Same as Items 3-10 in the 18-24 hr. time period.

CARD FORMAT FOR PROB 5 DATA SET

CARD 1	ITEM	WORD	COLUMNS	READ FORMAT
	0	1-18	1-72	72X
	0	19-22	73-80	4I2
CARD 2	1	1- 8	1-72	8E9.2
	2	9-12	73-80	4I2
CARD 3	3	1- 8	1-72	8E9.2
	4	9-12	73-80	4I2
CARD 4	5	1- 8	1-72	8E9.2
	6	9-12	73-80	4I2
CARD 5	7	1- 8	1-72	8E9.2
	8	9-12	73-80	4I2
CARD 6	9	1- 8	1-72	8E9.2
	10	9-12	73-80	4I2

Card 7 through Card 18 contain Items 11 through 40; and each has the format (8E9.2, 4I2).

AN EXAMPLE OF FIRST THREE CARDS FROM PROB 5 DATA SETS



APPENDIX B

PLANNER INPUT FOR CONTOUR PLOTS

DATA SET
PLANNER INPUT (CONTOUR PLOTS)

Item No.		
1.	Header Card - any alphanumeric text	
2.	PALIM	Playing area size in meters
3.	SIZE	Plot scale factor, 1 = 1:50000
4.	NPACOD	Plotting code 1 = plot on new playing area 0 = use previous area
5.	MXREF	X-coordinate of playing area, origin in meters
6.	MYREF	Y-coordinate of playing area, origin in meters
7.	MXTENT	X-extent of playing area, in meters
8.	MYTENT	Y-extent of playing area, in meters
	NOTE:	Items 9-12 are radar parameters and may be repeated for as many sets as required
9.	ID	Radar Identification code
10.	SCNANG	Width of scan angle in mils — First card of set
11.	IRANGE	Maximum range of radar in meters
12.	HIGH	Height of radar above ground in feet. - Second card
13.	ID = 100	Signifies end of the data set for Item 9-12 together with a 2nd card that must be blank.
	NOTE:	Items 14 - 16 are radar alternate characteristics and may be repeated for as many sets as required.
14.	ID	Radar identification code
15.	JRANGE	Maximum range of alternate radar in meters.
16.	CANG	Width of scan angle in mils for alternate radar
17.	ID=200	Signifies end of data sets for Items 14-16.
	NOTE:	Items 18 - 22 may be repeated as many times as desired, terminated when ID = 0. For ID2 ≠ 0 alternate radar will be used.
18.	ID	Radar identification code.
19.	X	X-coordinate of radar in meters
20.	Y	Y-coordinate of radar in meters
21.	ORANG	Mid-point of radar sweep angle from north, in mils
22.	ID2	Alternate radar identification

CARD FORMAT FOR CONTOUR PLOT PLANNER INPUT

CARD	ITEM	WORD	COLUMNS	READ FORMAT
	1	1-20	1-80	20A4
CARD 2	2	1	1-10	F10.0
	3	2	11-20	F10.0
	4	3	21-30	I10
CARD 3	5	1	1-10	I10
	6	2	11-20	I10
	7	3	21-30	I10
	8	4	31-40	I10
CARD 4	9	1	1- 4	I4
	10	2	49-53	44X, F5.0
	11	3	63-67	9X, I5
CARD 5	12	1	65-72	64X, F8.0

Note: The next card signifies the end of the data set described by cards 4-5.

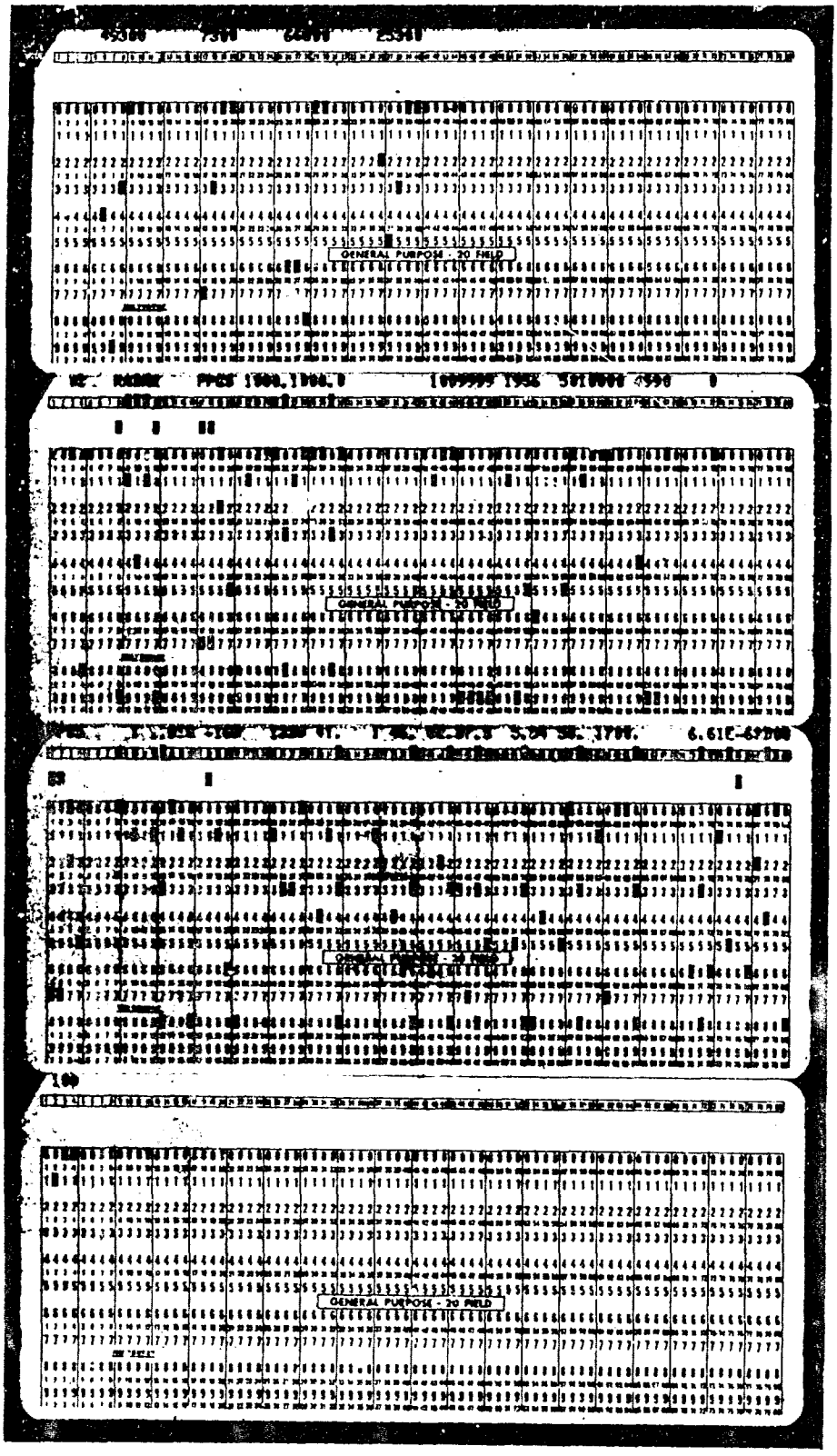
CARD 6	13	1	1- 4	I4
CARD 7	Must be a blank card			
CARD 8	14	1	1- 4	I4
	15	2	17-24	12X, I8
	16	3	25-32	F8.0

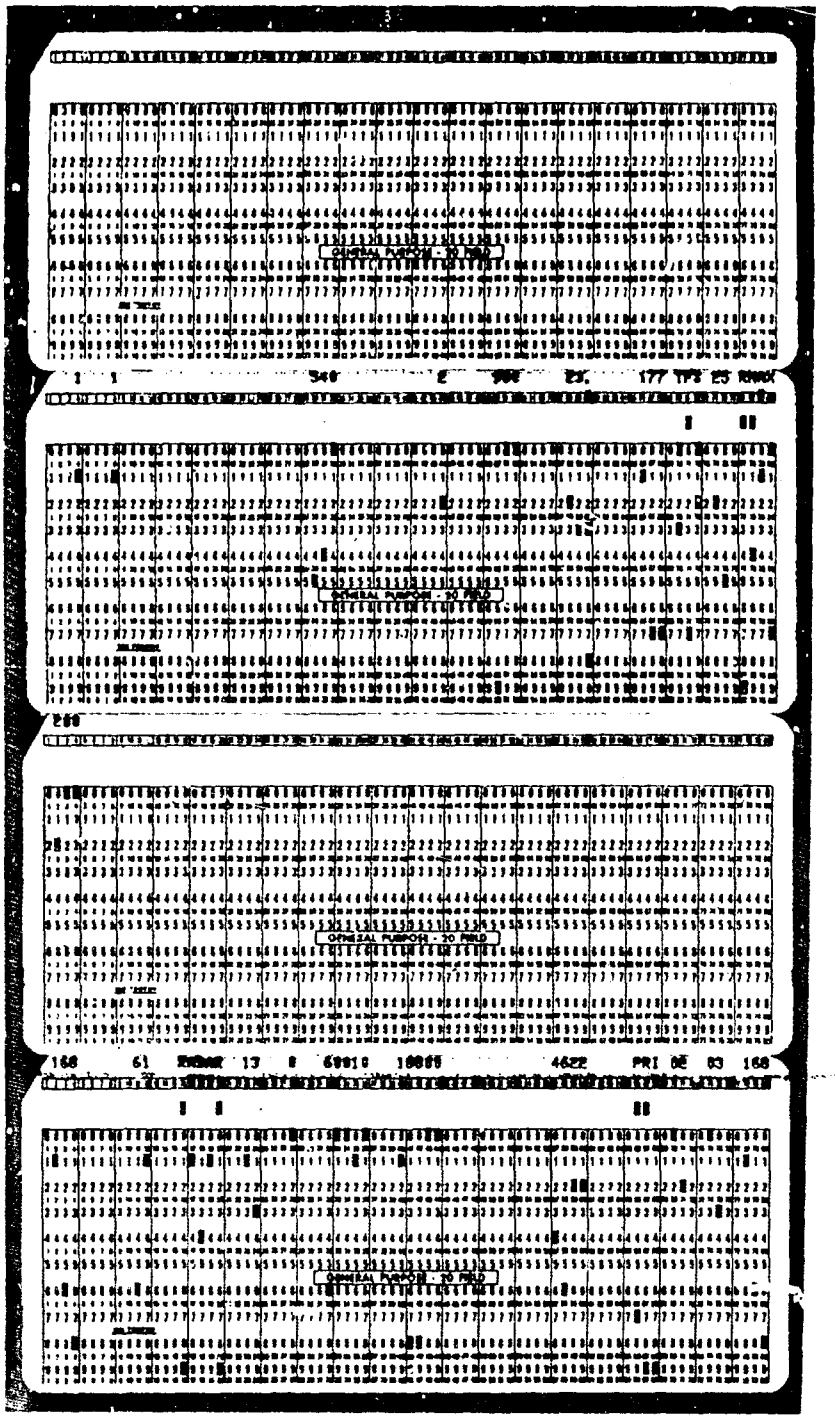
Note: The next card signifies the end of the data set described by card 10.

CARD 9	17	1	1- 4	I4
CARD 10	18	1	21-24	20X, I4
	19	2	29-36	4X, F8.0
	20	3	37-44	F8.0
	21	4	53-60	8X, F8.0
	22	5	61-64	I4

CONTOUR PLOT INPUT EXAMPLE

CARD 1	(HEADER)
CARD 2	(DATA ITEMS 2 THRU 4)
CARD 3	(DATA ITEMS 5 THRU 8)
CARD 4	(DATA ITEMS 9 THRU 11)
CARD 5	(DATA ITEM 12)
CARD 6, 7	(DATA ITEM 13)
CARD 8	(DATA ITEMS 14 THRU 16)
CARD 9	(DATA ITEM 17)
CARD 10	(DATA ITEMS 18 THRU 22)


GENERAL PURPOSE - 20 FIELD
GENERAL PURPOSE - 20 FIELD
GENERAL PURPOSE - 20 FIELD
GENERAL PURPOSE - 20 FIELD



APPENDIX C

PLANNER INPUT FOR "UNTER" DATA SET

DATA SET

PLANNER INPUT ("UNTER" DATA SET)

Item No.		
1.	IDENTIFICATION	Identifying alphanumeric text
2.	MAXIUT	No. of unit terrain types for scenario area
3.	XFIELD, YFIELD, ZFIELD	X, Y, Z components of the earth's magnetic field at scenario area OERSTED
4.	IDAREA	Scenario area
5.	IMONTH	Month to which the data set applies
6.	CARD NO.	Card sequence no.
7.	SGLL	Real array, lower limit of slope gradient, percent
8.	SGUL	Real array, upper limit of slope gradient, percent
9.	CHLL	Real array, lower limit, canopy vegetation height, meters
10.	CHUL	Real array, upper limit, canopy vegetation height, meters
11.	TDLL	Real array, lower limit of tree diameters, diameter at Breast Height (DBH), meters
12.	TDUL	Real array, upper limit of tree diameters , Diameter at Breast Height (DBH), meters
13.	SPLL	Real array, lower limit , stem or clump spacing, meters
14.	SPUL	Real array, upper limit, stem or clump spacing, meters
15.	ITRDEN	Integer array, tree density
		1 Sparse; 150 trees/100m^2
		2 lightly forested, 200 trees/100m^2
		3 dense forest, 500 trees/100m^2
16.	CCLL	Real array, lower limit, percent canopy closure, fraction
17.	CCUL	Real array, upper limit, percent canopy closure, fraction
18.	IVCOV	Integer array, index describing vegetation cover
		1 Heavy
		2 Medium
		3 Light
		4 Open
		5 Rice/water

19.	IBACK	Integer array, index identifying the most likely background reflec ance function between 0.4 to 0.9 microns 1 Tree/grass - summer 2 Coniferous trees 3 Trees/grass - autumn 4 Leaves 5 Elephant grass
20.	TVEG	Real array, transmittance of vegetation cover of canopy for light between 0.4 and 0.9 microns (fraction)
21.	ISM	Two-dimensional integer array, index describing soil moisture conditions ISM(1, IUT) ambient soil moisture ISM(2, IUT) soil moisture after 1/2 inch of rain ISM(3, IUT) soil moisture after 1 inch of rain 1 Dry, 25 percent saturated 2 Moist, 25-50 percent saturated 3 Wet, 50-100 percent saturated 4 Inundated, 100 percent saturated
22.	VISBLL	Real array, lower limit, ground-to-ground visibility, meters
23.	VISBUL	Real array, upper limit, ground-to-ground visibility, meters
24.	IDAREA	Scenario area
25.	IMONTH	Month to which the data set applies
26.	CARD NO.	Card sequence no

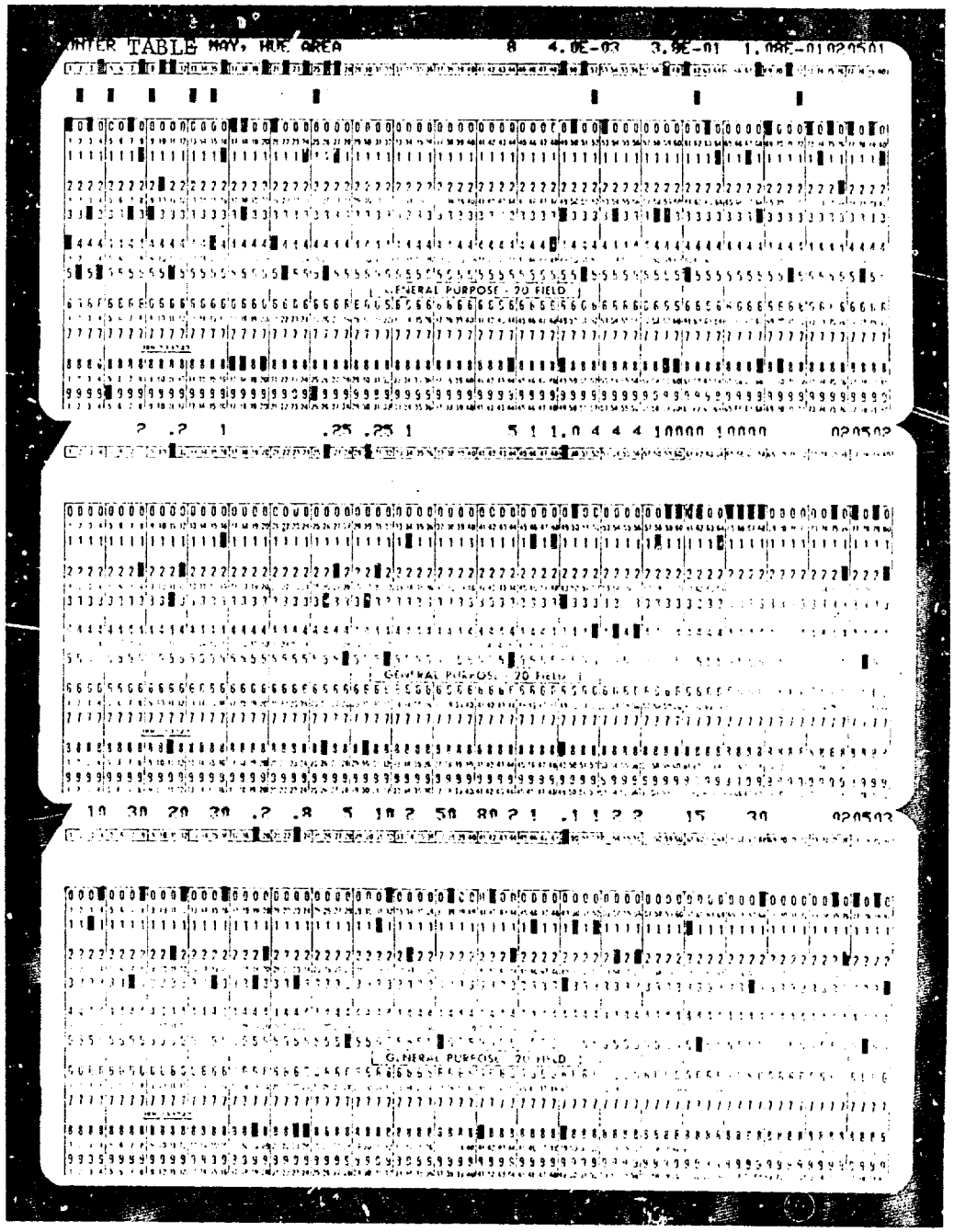
Note: As many cards with items 7-26 can be input as are specified by MAXIUT.

CARD FORMAT FOR "UNTER" DATA SET

CARD	ITEM	WORD	COLUMNS	READ FORMAT
	1	1	1-42	42X
	2	2	43-44	I2
	3	3,5	45-74	3E10.4
	4	6	75-76	I2
	5	7	77-78	I2
	6	8	79-80	I2
CARD 2	7	1	1- 4	F4.0
	8	2	5- 8	F4.0
	9	3	9-12	F4.0
	10	4	13-16	F4.0
	11	5	17-20	F4.0
	12	6	21-24	F4.0
	13	7	25-28	F4.0
	14	8	29-32	F4.0
	15	9	33-34	I2
	16	10	35-38	F4.0
	17	11	39-42	F4.0
	18	12	43-44	I2
	19	13	45-46	I2
	20	14	47-50	F4.0
	21	15-17	51-56	3I2
	22	18	57-62	F6.0
	23	19	63-68	F6.0
	24	20	69-76	6X,I2
	25	21	77-78	I2
	26	22	79-80	I2

Note: Card 3 through card number of terrain types for scenario area have the same format as Card 2.

EXAMPLE OF THE FIRST THREE CARDS OF THE "UNTER" TABLE



APPENDIX D

PLANNER INPUT FOR "UTVSXY" DATA

DATA SET

PLANNER INPUT ("UTVSXY" DATA SET)

Item No.		
1.	NTRACK	The integer number of 500 meter high east-west tracks (or strips) which are required to cover the north-south extent of the scenario area. ($1 \leq$ NTRACK ≤ 60).
2.	IDENTIFICATION	Identifying alphanumeric text.
3.	IUTXY(K, J) K = 1, 15 J = 1, NTRACK	An integer formed from the number of 500 meter square sequential blocks of a constant unit terrain type.

NOTE: A common area ("UTVSXY") has been defined to accept the planner input of the areal extent of the unit terrain types. The unit terrain assignments will be made on a grid with a 500 meter by 500 meter block size. The planner is allowed 15 specifications along a 30 kilometer track 500 meters high. A 30 kilometer by 30 kilometer playing area would have 60 of these tracks. The format for specifying the unit terrains along the jth scan is

$$N_{1j}, I_{1j}, N_{2j}, I_{2j}, \cdots N_{kj}, I_{kj}$$

where N_{kj} is the number of consecutive 500 meter blocks with unit terrain type I_{kj} and $k \leq 15$. Thus

2006 3001 1002

would indicate that the first 20 blocks in the scan were unit terrain type 6, the next 30 blocks unit terrain type 1 and the last 10 blocks unit terrain type 2. These data will be stored in the IUTXY integer array dimensioned at (15, 60). The expression for the elements of the array as a function of N_{kj} and I_{kj} is

$$\text{IUTXY}(k, j) = 100 * N_{kj} + I_{kj}$$

and therefore

$$I_{kj} = \text{MOD}(\text{IUTXY}(k, j), 100)$$

and

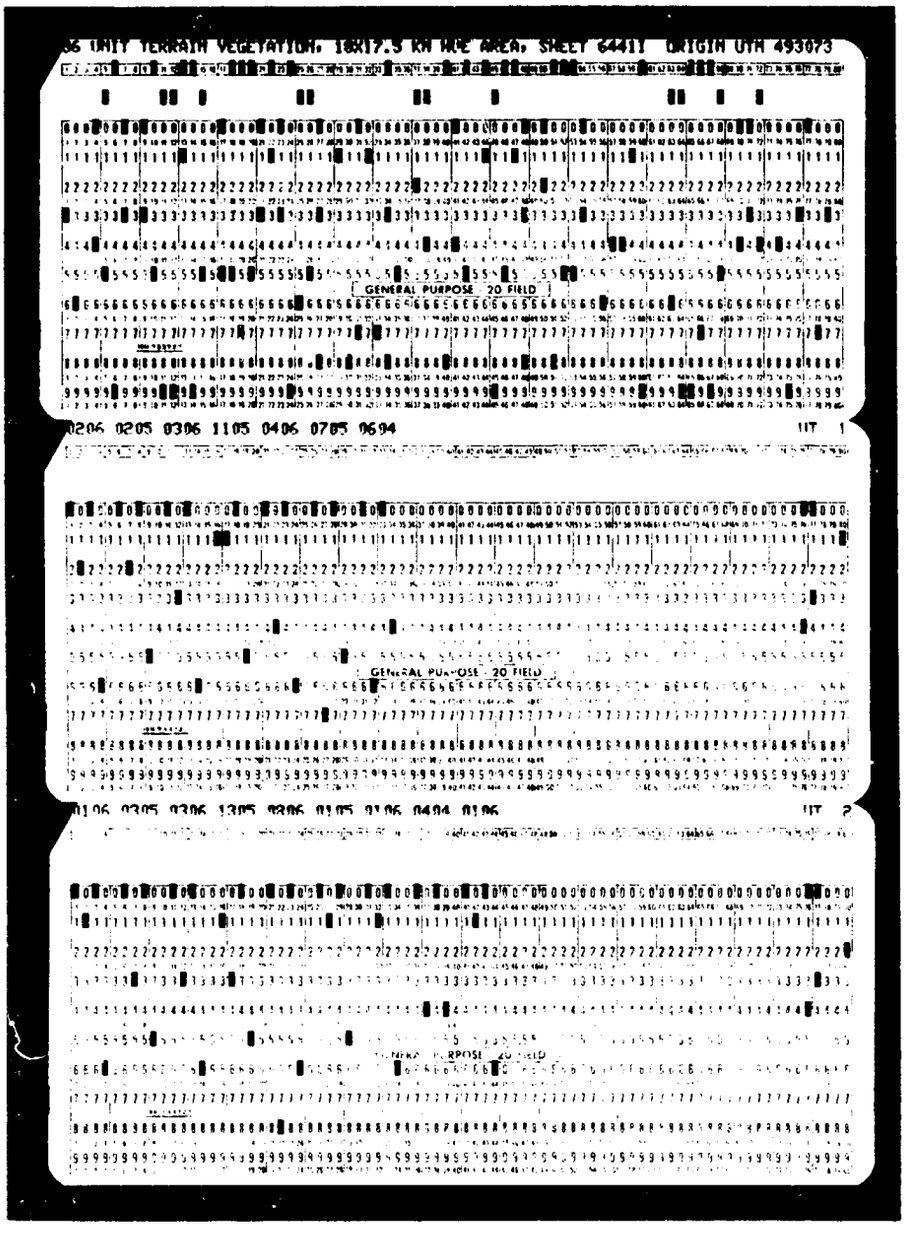
$$N_{kj} = \text{IUTXY}(k, j)/100.$$

CARD FORMAT FOR "UTVSXY" DATA SET

CARD 1	ITEM	WORD	COLUMNS	READ FORMAT
	1	1	1- 2	I2
	2	2-20	3-80	78X
CARD 2	3	1-15	1-75	15(I4, 1X)

Note: Cards 3 through NTRACK require the same format as Card 2.

EXAMPLE OF THE FIRST THREE CARDS OF THE "UTVSXY" TABLE



APPENDIX E

PLANNER INPUT FOR DATA LINK MODEL

DATA SET

PLANNER INPUT (DATA LINK)

DATA SUBSET 1

	Item No.		
CARD 1	1.	N	Array ID
	2.	XA(N), YA(N)	X, Y ARRAYS
	Note:	Items 1 and 2 may be repeated for as many sets as desired up to 200 sets.	
CARD 2	3.	N = 200	Signifies end of data sets for Items 1 and 2

DATA SUBSET 2

CARD 3	4.	L	Monitor ID
	5.	XM(L),YM(L)	X,Y MONITOR
	Note:	Items 4 and 5 may be repeated for as many sets ax desired up to 100 sets.	
CARD 4	6.	L = 100	Signifies end of data sets for Items 4 and 5.

DATA SUBSET 3

CARD 5	7.	NN	Array ID
	8.	LL	Monitor ID
CARD 6	9.	F	Link operating frequency, megahertz
	10.	H1GP	Transmitter antenna height above ground, meters
	11.	H2GP	Receiver antenna height above ground, meters
	12.	S	Conductivity of propagation surface, MHO/meter
	13.	E	Relative permittivity of propagation surface
	14.	NO	Minimum monthly surface refractivity normalized to sea level
	15.	GO	Not used
	16.	PATH	Relay links propagation path switch
			0 No
			1 Yes
CARD 7	17.	PT	Transmitter power, watts
	18.	GT	Transmitter antenna gain (dB)
	19.	GR	Receiver antenna gain (dB)
	20.	ALT	Internal transmitter system losses (dB)
	21.	ALR	Internal receiver system losses (dB)
	22.	ANF	Receiver noise figure
	23.	T	Ambient temperature, degrees Kelvin
	24.	B	Receiver bandwidth, Hz

25.	BTP	Receiver bandwidth time product
26.	AK	Boltzmann's constant
27.	NAN	Message bit length

Notes:

Data Subset 3, Items 7 and 8, 9 through 16 and 17 through 27 may be repeated for as many sets as desired.

Ground mounted quarter-wave vertical whip antennas should be assigned a height which is $2/\pi$ (0.635) times the actual antenna length, e. g., at 170 MHz HIGP = 0.28M.

See B. R. Bean, J. D. Horn, and A. M. Ozanich, Jr., "Climatic charts and Data of the Radio Refractive Index for the United States and the World," National Bureau of Standards Monograph 22, 25 November 1960, U. S. Government Printing Office, p. 168.

A propagation path is classified as a relay link when one terminal (antenna) has been located on a prominent terrain peak to improve the propagation situation. Aircraft mounted antennas also are included in this classification whereas elevated receiver antennas (10-20M) should not be unless the terrain is very flat.

Before attempting to run the model, the inputs for the X, Y coordinates of the southwest corner of the map to be used should be put in the data initialize statement (Data XSW, YSW/ , /) in the executive program MAINSY.

Appropriate values for IFLAT and IVEG may also be initialized in MAINSY for analysis.

IFLAT = Ø, for regular terrain
IFLAT = 1, for flat terrain
IVEG = Ø, for regular vegetation
IVEG = 1, for rice
IVEG = 2, for triple canopy

CARD FORMAT FOR DATA LINK MODEL

CARD	ITEM	WORD	COLUMNS	READ FORMAT
1	1	1	1- 8	5X,I3
	2	2,3	9-48	24X,2F8.0

Note: Items 1 and 2 may be repeated for as many sets as desired up to 200 sets.

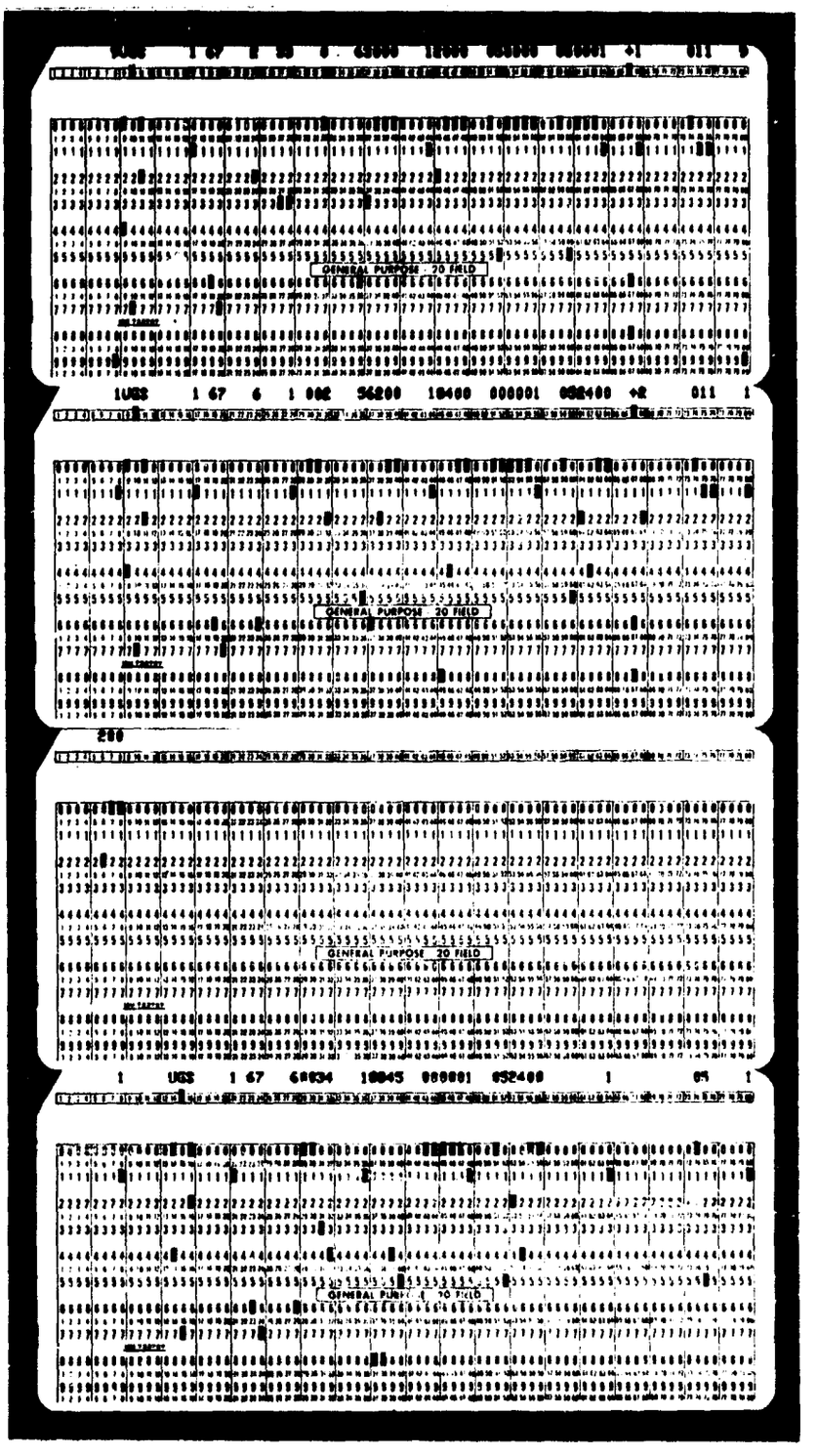
CARD 2	3	1	1- 8	5X,I3
CARD 3	4	1	1- 8	5X,I3
	5	2,3	9-40	16X,2F8.0

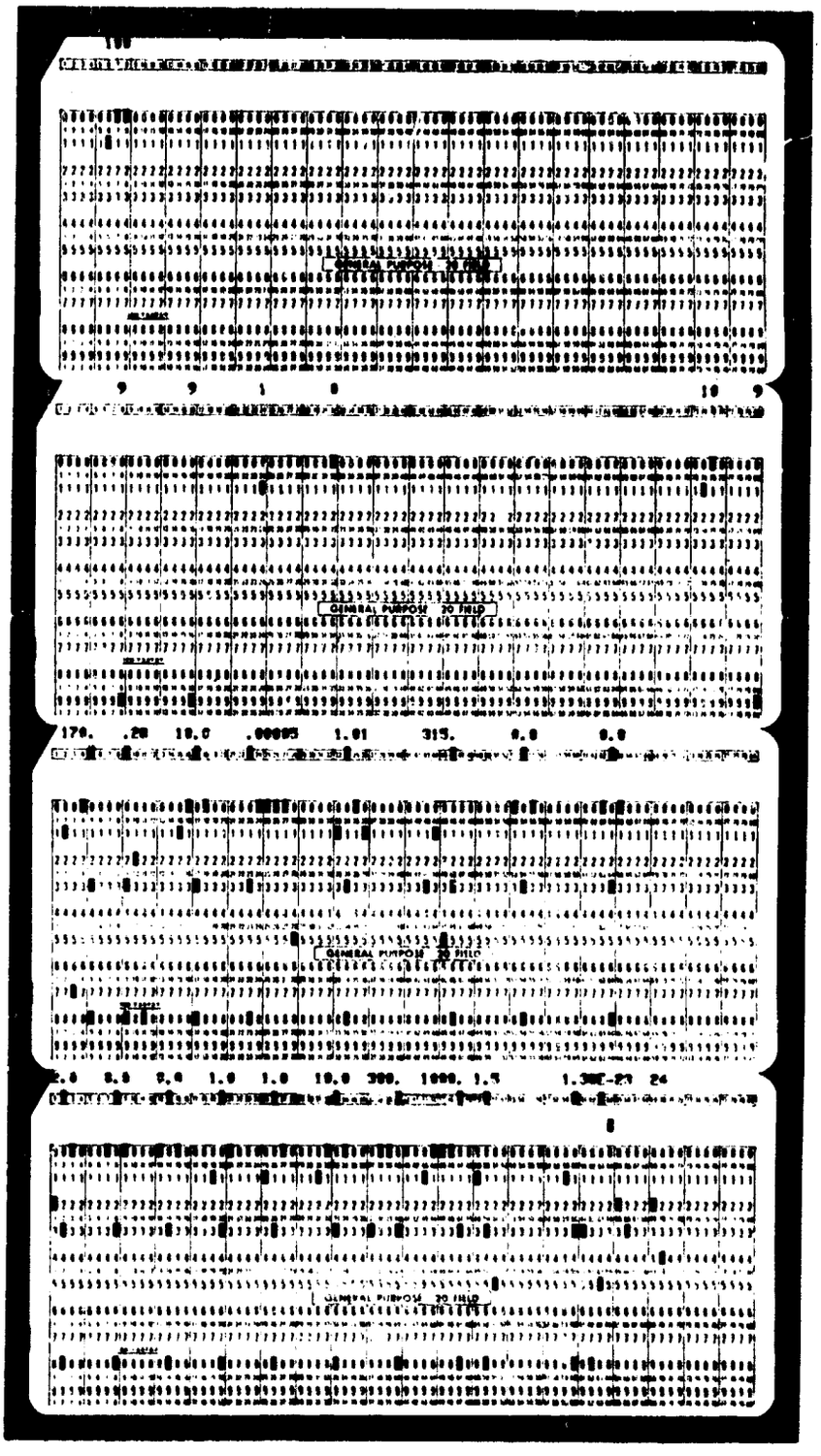
Note: Items 2 and 3 may be repeated for as many sets as desired up to 100 sets.

CARD 4	6	1	1- 8	5X,I3
CARD 5	7	1	1-16	8X,I8
	8	2	17-24	I8
CARD 6	9	1	1- 7	F7.1
	10	2	8-14	F7.1
	11	3	15-21	F7.1
	12	4	22-31	F10.4
	13	5	32-41	F10.4
	14	6	42-51	F10.4
	15	7	52-61	F10.4
	16	8	62-71	F10.4
CARD 7	17	1	1- 6	F6.1
	18	2	7-12	F6.1
	19	3	13-18	F6.1
	20	4	19-24	F6.1
	21	5	25-30	F6.1
	22	6	31-36	F6.1
	23	7	37-42	F6.1
	24	8	43-48	F6.1
	25	9	49-54	F6.1
	26	10	55-66	F12.4
	27	11	67-70	I4

Note: Items 7 through 27 on three cards may be repeated as many times as desired.

A TYPICAL EXAMPLE OF PLANNER INPUT FOR DATA LINK MODEL




GENERAL PURPOSE 20 FIELD
9 9 1 0 10 9
GENERAL PURPOSE 20 FIELD
170. .28 10.0 .00005 1.01 315. 0.0 0.0
GENERAL PURPOSE 20 FIELD
2.0 0.0 0.0 1.0 1.0 10.0 300. 1000. 1.5 1.38E-23 24
8
GENERAL PURPOSE 20 FIELD

APPENDIX F

PLANNER INPUT FOR PRERUN

(SCENARIO SPECIFICATIONS)

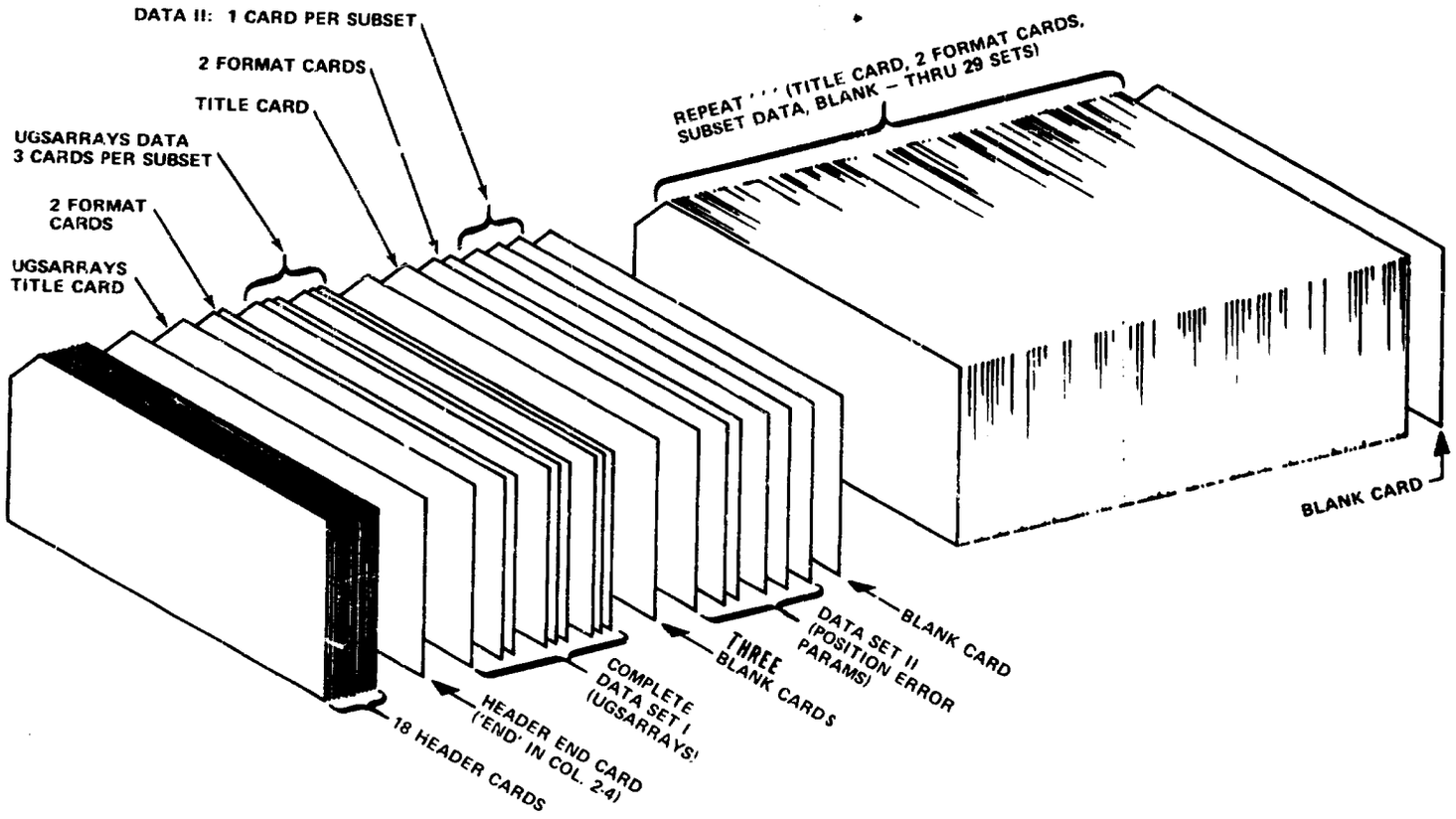
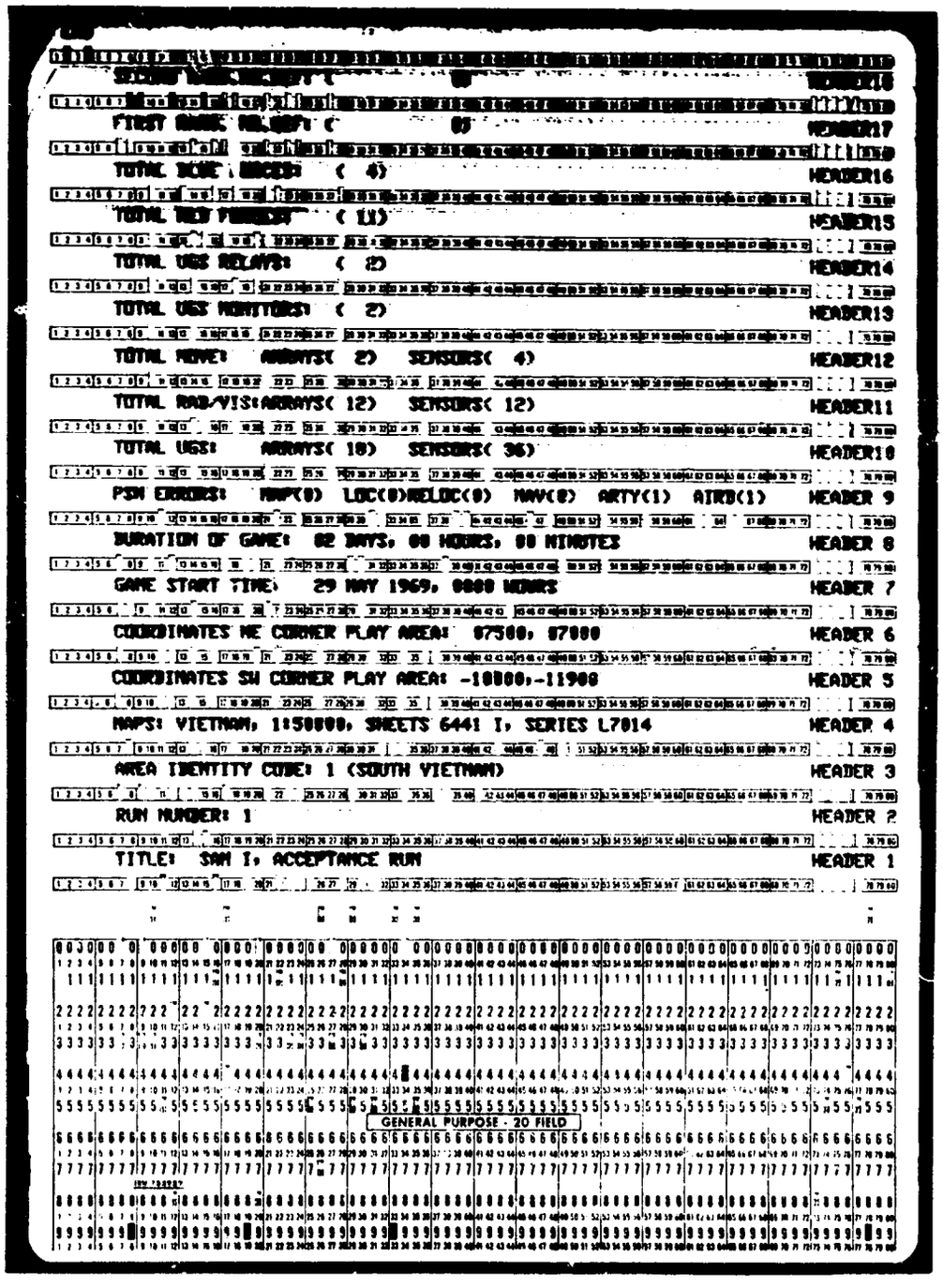


Figure F-1
INPUT CARD DECK FOR PRERUN STEP 0
(HEADER CARDS AND PLANNER SCENARIO CARDS)

DATA SET 0

PRERUN PLANNER INPUT HEADER CARD EXAMPLES
(READ FROM BOTTOM TO TOP)



DATA SET I

ARRAYUGS

Item No.		
1.	ID of array (ARRAYUGS numbered in sequence starting with 1)	
2.	Generic type - prepunch UGS	
3.	Organization - See Note 1	
4.	Number of sensors in array	
5.	ID of first sensor	
	For open location	For path location
6.	0	ID of route
7.	X (Meters)	Leg number
8.	Y (Meters)	Distance along leg (Meters)
9.	Planned up time (__ DDHHMM)	
10.	Planned cease time	
11.	Emplacement technique: [1 for hand emplaced; ±2 for air drop; ±3 for artillery/mortar emplacement; + will denote observed, - unobserved]	
12.	ID of emplacement/reemplacement Position Error Parameter Set	
13.	Number of monitors associated with array [1, 2 or 3]	
14.	ID of first (primary) monitor	
15.	ID of corresponding data link - See Note 2	
16.	ID of second monitor	
17.	ID of corresponding data link	
18.	ID of third monitor	
19.	ID of corresponding data link	
20.	ID of receiver/transmitter parameter set	
21.	Is this array associated with a firetrap ["bYES" or bbNO"]	
22.	ID of the firetrap system, if any	
23.	Probability of aborting an emplacement mission (percent) (See Note 3)	
24.	Number of attempts (mission) allowed per emplacement [ ]	
25.	Number of missions (emplace, reemplace) allowed	

26. Criticali y for reemplacement (minimum number of operating sensors considered acceptable)

27. Shall self-destruct capability of sensors in array be energized. 1 for YES; 0 or blank for NO)

28. Standard deviation for initial up time [code as 0, 1, 2 or 3, with:

0	implies zero standard deviation
1, 2 or 3	causes designer values to be used corresponding respectively to small, medium and large values. A "1" would correspond to emplacements easily accessible to field personnel (e.g., perimeter defenses); a "3" would correspond to long-distance travel on foot over difficult terrain)] See Note 4.

29. Nominal reemplacement time interval [hours]

30. Standard deviation, for variations from nominal value specified in 29. [Again, code as 0, 1, 2 or 3 as defined in 28. Generally, the value here would be one less than value given in 28, when planner feels that less vagueness in time would exist once a previous emplacement has already been executed.]

31. Scheduled routine maintenance interval [days]

32. Randomness selection for scheduled maintenance [0, 1, according to: (See Note 5)

0	no randomness about value given in 31
1	randomness played, using designer (internal) value for standard deviation

---

Notes:

1. (Item 3) Eight spaces are provided. The first space is not used. The second space is alphanumeric and may be used to show mission of the sensor array (i.e., F for firetrap L for listening post). The third space is numeric and designates the platoon level unit responsible for the array. The fourth space is alphanumeric and shows the company/troop/battery to which the platoon reports. The fifth through eighth spaces are

Notes (Continued)

alphanumeric and designate parent battalion. If the array is assigned to a company, the third space will be blank. If the array is assigned to the battalion, the third and fourth spaces will be left blank.

2. (Items 15, 16, 17, 18, 19 and 20) These fields are left blank if the sensor to monitor link is DIRECT (i.e., by wire or collocated).

3. (Item 23) No aborts considered for artillery/mortar emplacement; this field ignored for that emplacement.

4. (Items 28, 30) Tentative designer values corresponding to the choices 1, 2 and 3 are respectively 0.25 hours, 0.75 hours and 2.0 hours.

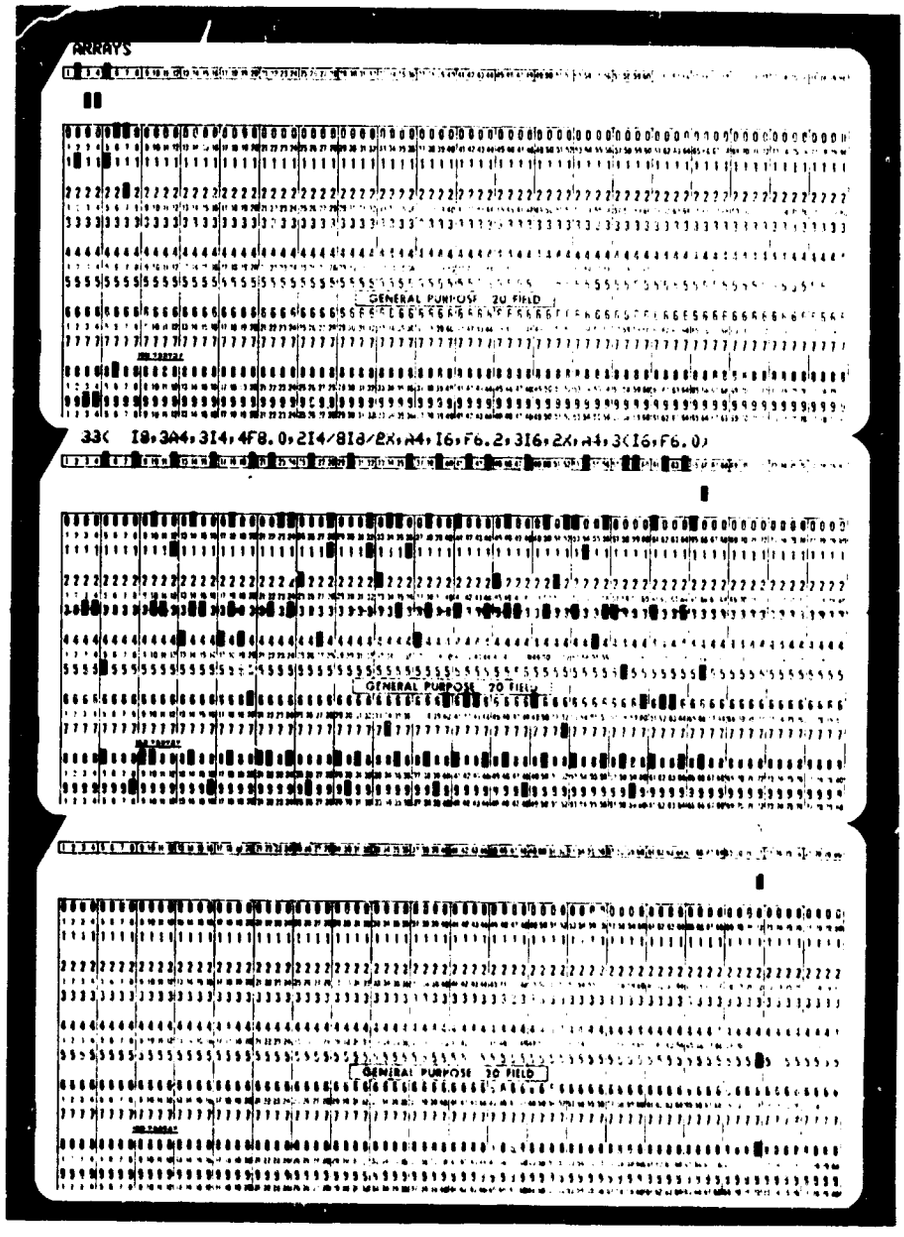
5. (Item 32) Tentative designer value = 1.0 day for the "1" choice.

CARD FORMATS FOR ARRAYUGS

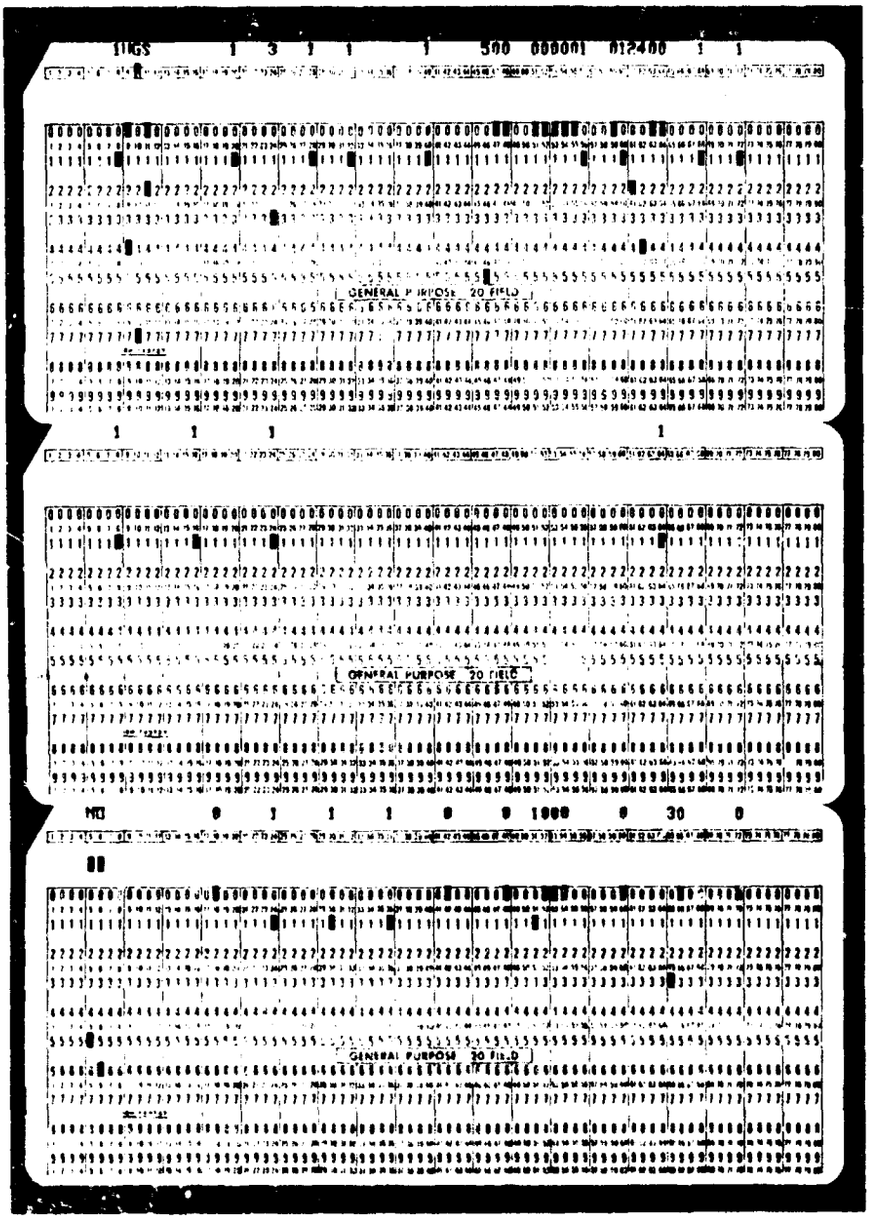
CARD	ITEM	WORD	COLUMNS	READ FORMAT
	1	1	1- 8	I8
	2	2	9-12	A4
	3	3,4	13-20	2A4
	4	5	21-24	I4
	5	6	25-28	I4
	6	7	29-32	I4
	7	8	33-40	F8.0
	8	9	41-48	F8.0
	9	10	49-56	F8.0
	10	11	57-64	F8.0
	11	12	65-68	I4
	12	13	69-72	I4
CARD 2	13	1	1- 8	I8
	14	2	9-16	I8
	15	3	17-24	I8
	16	4	25-32	I8
	17	5	33-40	I8
	18	6	41-48	I8
	19	7	49-56	I8
	20	8	57-64	I8
CARD 3	21	1	1- 6	2X, A4
	22	2	7-12	I6
	23	3	13-18	F6.2
	24	4	19-24	I6
	25	5	25-30	I6
	26	6	31-36	I6
	27	7	37-42	2X, A4
	28	8	43-48	I6
	29	9	49-54	F6.0
	30	10	55-60	I6
	31	11	61-66	F6.0
	32	12	67-72	I6

THREE CARDS PRECEDING ARRAYUGS DATA

(FIRST CARD ILLUSTRATIVE-ANY ALPHANUMERIC TEXT MAY BE USED. NEXT TWO CARDS CONTAIN VARIABLE FORMAT FOR THE DATA READ STATEMENT.)



A TYPICAL DATA SUBSET FOR ARRAYUGS



DATA SET II

POSITION ERROR PARAMETER SET

Comments:

These parameter sets are keyed to Item 12 under both ARRAYUGS and STASCAN. The format varies according to whether the emplacement method is by hand, by air drop or by artillery/mortar. The formats for these three emplacements are given separately below:

For hand emplacement

Item No.

1. ID of this parameter set
2. 1 (implying hand emplacement)
3. Standard deviation of location error [meters]
4. Relative location error in percent. Suggested values are:

0	for no relative error
5	for placements under "easy" conditions
10	for placements under "difficult" conditions (See Note 1)

For air-drop emplacement

1. ID of this parameter set
2. ± 2 (implying air drop)
   [use +2 for "observed" drop, i.e., visual control; use -2 for "unobserved" drop, e.g, drop based on navigation system only]
3. Type of navigation system
   [two digits: first gives generic type of navigation system; second specifies what version (parameter variations) within the generic type, See Note 2.
4. Aircraft type [1 = helicopter; 2 = prop; 3 = jet]
5. x, start of flight, meters
6. y, start of flight, meters

7. Drop speed, knots

8. Drop altitude, feet

For artillery/mortar emplacement

1. ID of this parameter set

2. $\pm$3 (implying artillery/mortar emplacement)
   [use +3 for observed fire, -3 for unobserved]

3. Standard deviation of gun location error [meters]

4. Weapon code type designation [planner code on input card to be as follows:

155	indicates 155 mm howitzer	(1)
105	indicates 105 mm howitzer	(2)
8	indicates 8" howitzer	(3)
81	indicates 81 mm mortar	(4)
42	indicates 4.2" mortar	(5)

The values 1 through 5 in parentheses will be the internal-storage codes.]

5. x
6. y } of gun position (meters)

Notes:

1. (Item 4, hand emplacement) First sensor in array has certain absolute location errors (e.g., map errors); other sensors in array, however, are assumed to be referenced to a key sensor (the first), with location errors in relative location assumed proportional to the distance from the key sensor. A value of 10 in this field, would, for example, imply that this relative error has a standard deviation that is 10% of the distance from key sensor.

2. (Item 3, air-drop) Coding for generic type is:

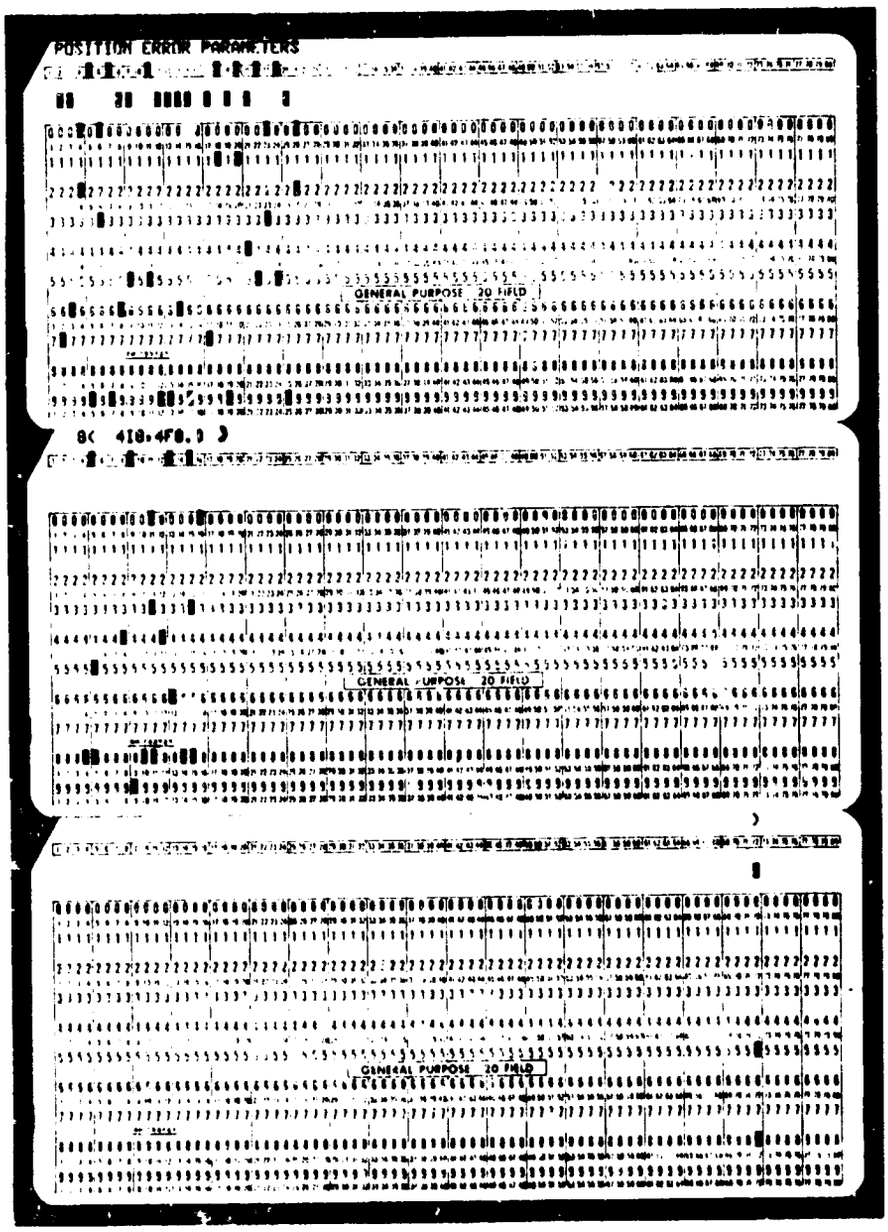
0	"Perfect" system, no navigation errors
1	Hyperbolic
2	Rho-Theta
3	Doppler
4	Normer (no physical type of navigation system explicitly assumed, but Gaussian errors randomly played using designer values for standard deviations.)

CARD FORMATS FOR POSITION ERROR PARAMETER SET

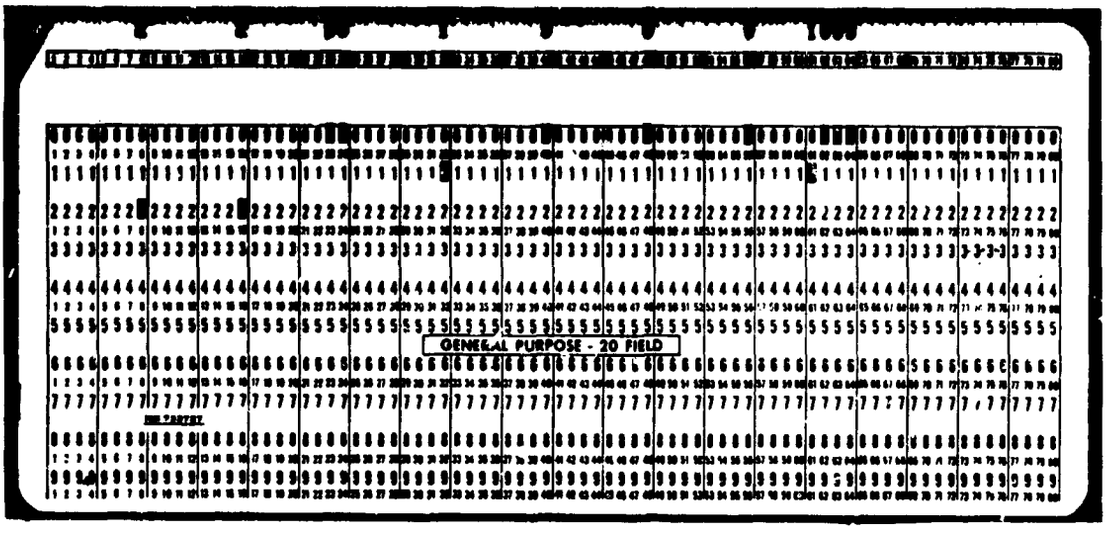
CARD 1	ITEM	WORD	COLUMNS	READ FORMATS
	1	1	1- 8	I8
	2	2	9-16	I8
	3	3	17-24	I8
	4	4	25-32	I8
	5	5	33-40	F8.0
	6	6	41-48	F8.0
	7	7	49-56	F8.0
	8	8	57-64	F8.0

THREE CARDS PRECEDING POSITION ERROR PARAMETER DATA

(FIRST CARD ILLUSTRATIVE - ANY ALPHANUMERIC TEXT MAY BE USED. NEXT TWO CARDS CONTAIN VARIABLE FORMAT FOR THE DATA READ STATEMENT.)



A TYPICAL DATA SUBSET FOR POSITION ERROR PARAMETER DATA



DATA SET III

SENSORS

Item No.		
1.	ID of this sensor	
2.	ID of array containing this sensor (from data set I, XIX or XX)	
3.	Type of sensor [alphanumeric] See Note 1.	
4.	ID of Sensor Descriptor Parameter Set	
	Location specification (blank for moving sensor)	
	"open"	"path"
5.	0	ID of route
6.	x meters	Leg number
7.	y meters	Distance along leg
8.	blank	Offset from path meters [See Note 2]
9.	Orientation [in mils from North, positive direction clockwise,] See Note 3	
10.	Auxiliary or Primary sensor? [alphanumeric: the letters AUX for auxiliary, PRI for primary] See Note 4.	
11.	ID of Coverage/Scan Parameter Set. If left blank appropriate values from data set IV will be used. However, cover/scan code must be included if sensor is moving.	
12.	If AND logic is used, enter 1. If not used, enter 0 (or blank). (Note: AND logic applies between a primary and its auxiliary only. Not meaningful (leave blank) for moving sensor.)	

Notes:

1. SEISMIC, ACOUSTIC, MAGNETIC, PASSIVIR, BREAKWIR, IMAGE, THERMVEW, RADAR or ARFBUOY.

2. Magnitude of this number is distance in meters to offset of sensor from path. If "which side of path" is significant, the following sign convention applies:"

   \+ sensor to left of path (when path is traveled in implied positive direction, from lower to higher node values)

   \- sensor to right of path

3. For open location, orientation is absolute (relative to north). For path-type specification of location, orientation is relative to path.

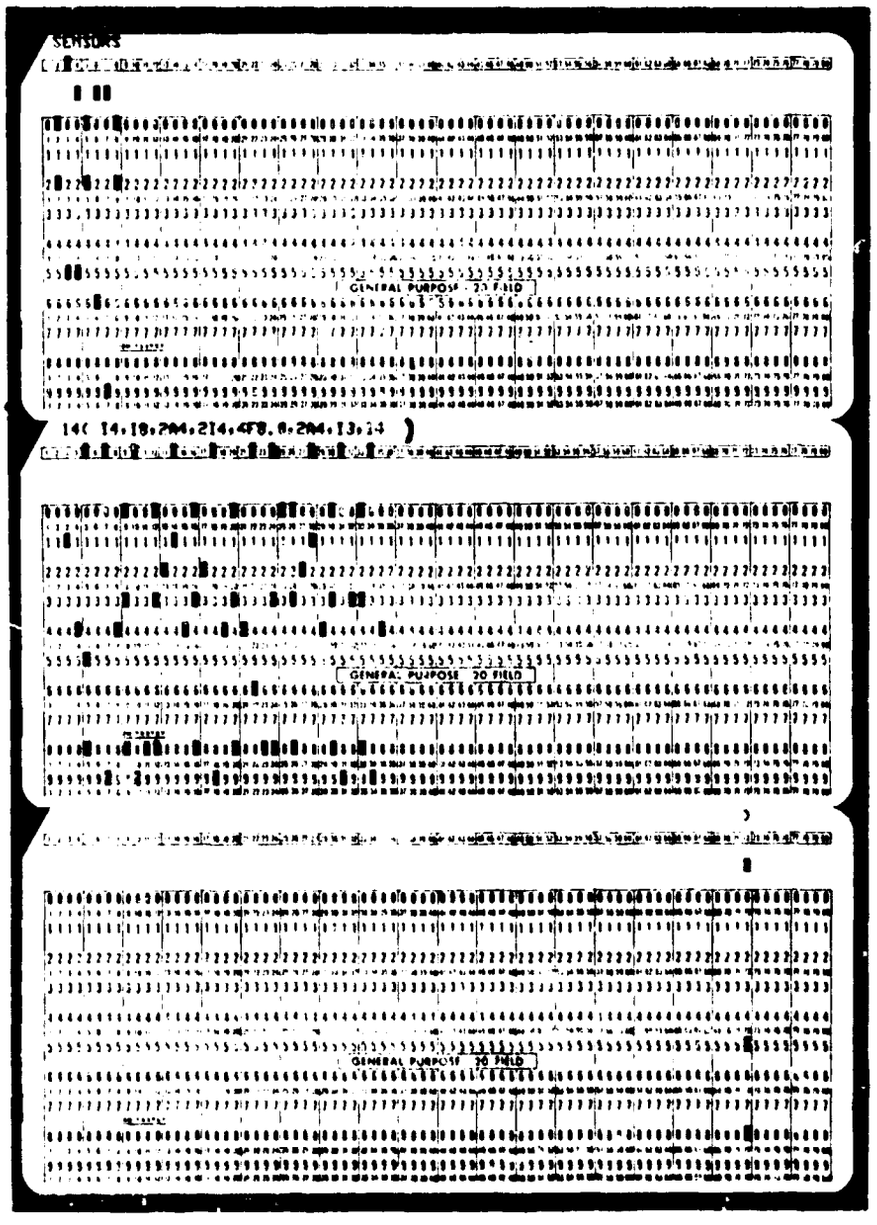
4. If a sensor is an auxiliary sensor, its ID must immediately follow its corresponding primary sensor.

CARD FORMAT FOR SENSORS

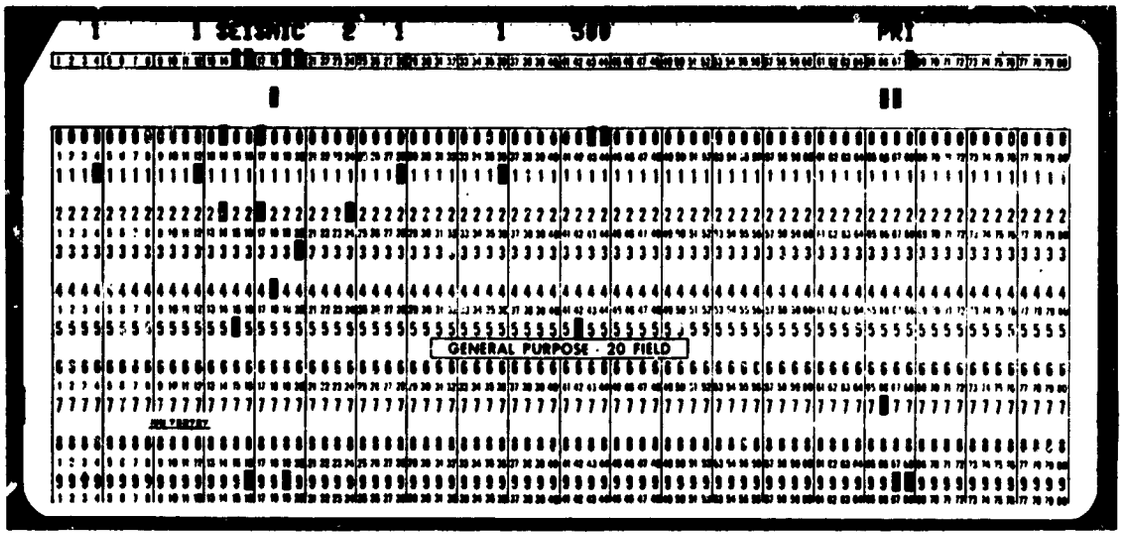
CARD 1	ITEM	WORD	COLUMNS	READ FORMAT
	1	1	1- 4	I4
	2	2	5-12	I8
	3	3,4	13-20	2A4
	4	5	21-24	I4
	5	6	25-28	I4
	6	7	29-36	F8.0
	7	8	37-44	F8.0
	8	9	45-52	F8.0
	9	10	53-60	F8.0
	10	11,12	61-68	2A4
	11	13	69-71	I3
	12	14	72-75	I4

THREE CARDS PRECEDING SENSOR DATA

(FIRST CARD ILLUSTRATIVE - ANY ALPHANUMERIC TEXT MAY BE USED. NEXT TWO CARDS CONTAIN VARIABLE FORMAT FOR THE DATA READ STATEMENT.)



A TYPICAL DATA SUBSET FOR SENSOR DATA



DATA SET IV

SENSOR DESCRIPTOR PARAMETER SET

Item No.		
1.	ID of this parameter set	
2.	Generic type of sensor [alphanumeric; 8 columns]	
3.	Specific type/model [alphanumeric; 8 columns]	
4.	MTBF (mean time between failures; days; F6.1 format] See Note 0	
5.	MBLT (mean battery life time; days; F6.1 format] See Note 0	
6.	Standard deviation for battery life time [days; F4.1]	
7.	Does this sensor have a self-destruct capability or not? [1 if it does; blank if not]	
8.	Auxiliary or primary sensor [1 if auxiliary, 0 if primary]	
9.	Probability of emplacement survival [integer, 0 through 100 (%); a sensor intended for hand emplacement must have the value 100 punched here]	
	For Items 10 through 15, See Note 1.	
	Sensors with Sector Coverage	Sensors with Rectangular Coverage
10.	enter 9999	Cross-track component of vector from sensor to rectangle center. + if to left, - if to right with respect to direction of movement of sensor platform or from lower number node if stationary (meters).
11.	Maximum coverage angle for this equipment (mils).	Along-track component of vector from sensor to rectangle center. + if forward, - if rearward with respect to direction of movement of sensor platform or from lower number node if stationary (meters).
12.	Minimum range capability of this equipment (meters).	Maximum along-track length of rectangle against any target (meters).
13.	Maximum range capability of this equipment against personnel (meters)	Cross-track dimension of rectangle against personnel (meters).

14. Maximum range capability of this equipment against vehicles and boats (meters). — Cross-track dimension of rectangle against vehicles and boats (meters).

15. Maximum range capability of this equipment against aircraft and munitions (meters). — Cross-track dimension of rectangle against aircraft and munitions (meters).

Card 2

16. Specific type/model of generic type of sensor for which parameter set applies, whichever is most useful to user. This item is for reference only. This entry should be compatible with Items 2 or 3 on Card 1 alphanumeric, 8 columns, 2 computer words (See note 2 and 3)

17. a. Radar — Precipitation improvement factor code (PRIMFR).

1	no precipitation improvement played
2	precipitation improvement played

b. Imaging device

0	or blank for human eye or binocular
1	image intensification device (or daylight TV)

c. ARMED JOY

0	or blank for Magnetic Button Bomblets (MBB)
1	Noiseless Button Bomblets (NBB)

d. Thermal Viewer

Leave blank

e. Magnetic Devices

Leave blank

f. Seismic — Gain level code (IFIXGN)

0	or blank for automatic gain control (AGC should be used for MINISID, MICROSID, ADSID III and MODS)
1-5	Specific gain settings desired, PSID
6	gain settings computed and set at lowest setting above background noise level, PSID
Negative No.	gain settings fixed for game

18. a. Radar — Clutter improvement factor (CLIMFR)

1	clutter improvement not played
2	clutter improvement played

b. Image device

blank	If Item 17 is blank or 0 (eye or binocular)
0	If Item 17 is set at 1 (image intensification device); used at night
1	daylight (daylight TV) (Item 17 is set at 1)

c. ARFBUOY — Geometry of bomblet pattern

1	open circle
2	open line
3	along road or trail

d. Thermal — Leave blank

e. Magnetic — Leave blank

19. a. Radar — Wavelength, meters (RAMBDA)

b. Image device

Leave blank; human eye or binocular
Enter time constant (TIMCON for image intensification devices (seconds))

Must be consistent with Item 17.

c. ARFBUOY — Diameter of seeded area, if circle; or length of longest side of rectangle, if rectangle (meters), (DIMMAX)

d. Thermal — Leave blank

e. Magnetic — Leave blank

20. a. Radar — Filter band thermal noise, (FNB)

b. Image device

focal length	(FOCALL) if equipment is an image intensifier (mm)
1.5	human eyes (DEVCAL)
0.1	binoculars (DEVCAL)

c. ARFBUOY — Enter width of seeded area (meters), for rectangle area, (WIDTH), blank for circular area

d. Thermal — Focal length (mm) (FOCALL)

e. Magnetic — Leave blank

21. a. Radar — Radar characteristics (RADCAR)[watts/(meter)^2]

Note: RADCAR is a composite of peak power, transmitter antenna gain, transmitter losses, receiver antenna gain, receiver losses, wavelength squared and a constant

b. Image device

Enter value for average resolution, (XMTF) if equipment is an image intensifier

0.5 for human eyes [area of aperture (ALPHA), (mm^2)]

33 for 7x50 binoculars [area of aperture (ALPHA), (mm^2)]

c. ARFBUOY — Leave blank

d. Thermal — Resolution of detector element (radians) (RESOL)

e. Magnetic — Threshold, gauss - this is the last entry on this card for magnetic devices (THRESH)

22. a. Radar — Scan rate (SCANRT) mils/sec

b. Image — Enter f-number if equipment is image intensifier, (FNUMBR) is the focal length divided by the diameter of aperture

1.0 for human eye, magnification factor (AMAG)

7.0 for 7x50 binoculars, magnification factor (AMAG)

c. ARFBUOY — Number of bomblets, (NBMBLT) - this is the last entry on this card for Arfbuoys

d. Thermal — f-number (focal length divided by diameter of aperture diameter) (FNUMBR) - this is the last entry on this card for thermal devices

23. a. Radar — Code for radars, (ICOH)

0 or blank for coherent

1 noncoherent

b Image — Code for direct searchlight, (ISERCH)

0 no searchlight
1 visible light used
2 searchlight with pink filter

Note: If searchlight used, (ISERCH = 1 or 2), then additional searchlight parameters are to be provided on Card 3. The remaining items on this card apply to radar only.

24. Azimuth beamwidth (BEAMAZ), mils

25. Elevation beam angle (BEAMEL), mils

26. Range gate (RGATE), meters

27. Standard deviation for radar instability (clutter power) (SIGSTB)

28. Filter lower cutoff frequency (FCUTLO), Hz

29. Filter upper cutoff frequency (FCUTHI), Hz

30. Antenna or aircraft height (HGTANT) = feet above ground

(if aircraft, this entry should be the same as Item 12 in Data Set XX, Blue Forces input).

31. Probability of False Alarm (PFA) (actual value, not percent)

Card 3

Items 32 through 35 apply only for image sensors with searchlight (ISERCH = 1, 2, Item 23)

32. XSRCH — Coordinates of searchlight location

33. YSRCH

34. BWIDTH, searchlight beamwidth, degrees

35. CPOWER, searchlight candlepower

Items 36 and 37 left blank, unless daily up/down time cycling is to be played.

36. Time of day device to be activated (HHMM)

37. Duration of up time (hours)

Notes

0 Items 4 or 5 must not be zero.

1. Corresponding values in coverage/scan parameter set (XIV), if provided, will override the values inserted for items 10 thru 15.

2. (Item 16) The cards in this category generally can be prepunched with "normal" values established by the designer. That is, planner generally can select appropriate cards for the physical equipment without being required to manually insert numerical values (assuming pre-punched cards are available).

   There may be occasional exceptions. Certain sensors (e.g., HESID, which requires case-by-case setting of gain) may require explicit planner attention; also, to create hypothetical sensors (as for parametric analysis). Appropriate ID numbers must then be selected to distinguish these changed sets.

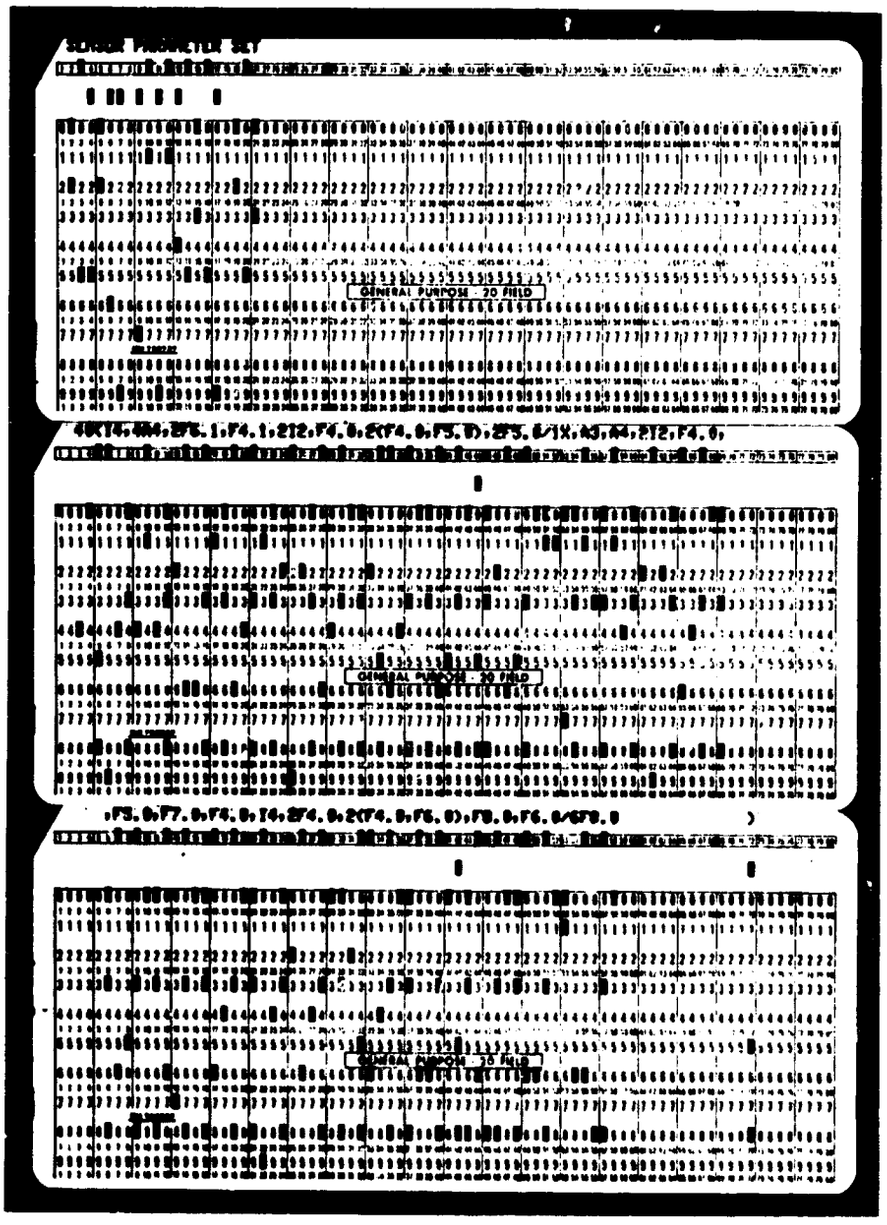
3. (Item 16) There are no entries on second or third cards for acoustic, breakwire or passive infrared sensors.

CARD FORMAT FOR SENSOR DESCRIPTOR PARAMETER SET

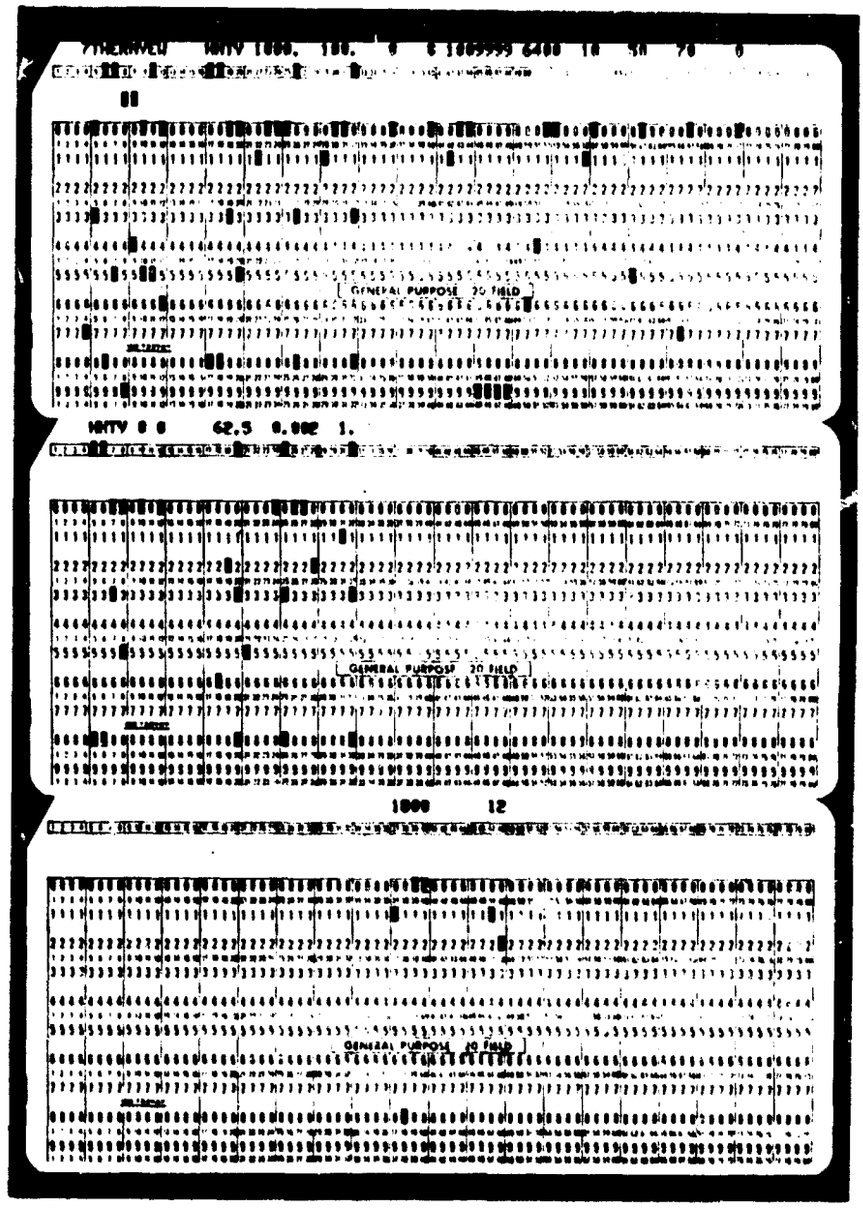
CARD 1	ITEM	WORD	COLUMNS	READ FORMAT
	1	1	1- 4	I4
	2	2, 3	5-12	2A4
	3	4, 5	13-20	2A4
	4	6	21-26	F6.1
	5	7	27-32	F6.1
	6	8	33-36	F4.1
	7	9	37-38	I2
	8	10	39-40	I2
	9	11	41-44	F4.0
	10	12	45-48	F4.0
	11	13	49-53	F5.0
	12	14	54-57	F4.0
	13	15	58-62	F5.0
	14	16	63-67	F5.0
	15	17	68-72	F5.0
CARD 2	16	1, 2	1- 8	1X, A3, A4
	17	3	9-10	I2
	18	4	11-12	I2
	19	5	13-16	F4.0
	20	6	17-21	F5.0
	21	7	22-28	F7.0
	22	8	29-32	F4.0
	23	9	33-36	I4
	24	10	37-40	F4.0
	25	11	41-44	F4.0
	26	12	45-48	F4.0
	27	13	49-54	F6.0
	28	14	55-58	F4.0
	29	15	59-64	F6.0
	30	16	65-72	F8.0
	31	17	73-78	F6.0
CARD 3	32	1	1- 8	F8.0
	33	2	9-16	F8.0
	34	3	17-24	F8.0
	35	4	25-32	F8.0
	36	5	33-40	F8.0
	37	6	41-48	F8.0

THREE CARDS PRECEDING SENSOR DESCRIPTOR PARAMETER DATA

(FIRST CARD ILLUSTRATIVE - ANY ALPHANUMERIC TEXT MAY BE USED. NEXT TWO CARDS CONTAIN VARIABLE FORMAT FOR THE DATA READ STATEMENTS.)



A TYPICAL DATA SUBSET FOR SENSOR DESCRIPTOR PARAMETER DATA



DATA SET V

FIRETRAP SYSTEMS

Item No.	
1.	ID of this firetrap system
2.	ID of associated route
3.	Planned time, begin firetrap operations (_ _ DDHHMM)
4.	Planned time, cease firetrap operations (_ _ DDHHMM)
5.	Number of kill points in system [1 or 2]
6.	Leg number on the route, first kill point
7.	Distance along that leg, first kill point (meters)
8.	Leg number on the route, second kill point
9.	Distance along that leg, second kill point (meters)

Notes:

1. Fields 8 and 9 mav be left blank if only one kill point exists in the system.

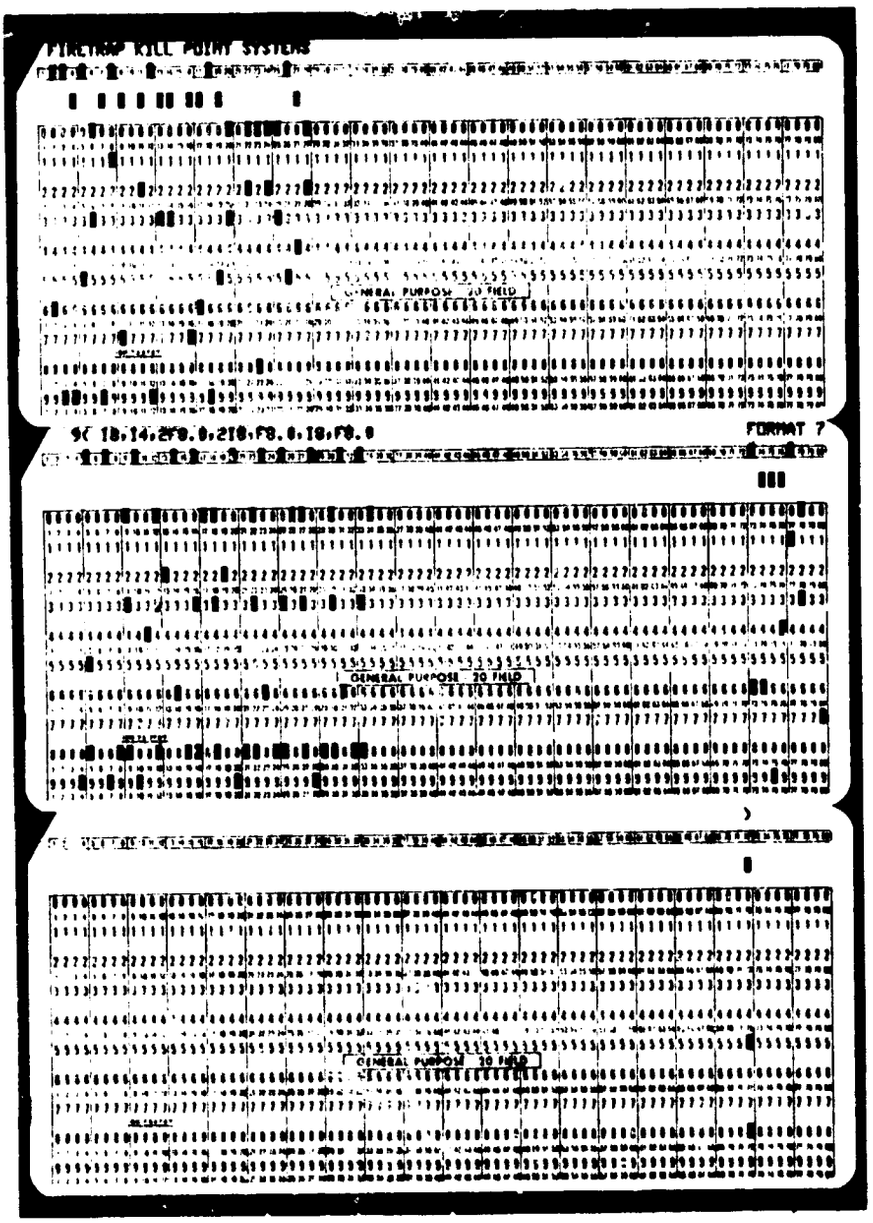
2. (Items 3, 4) These time values refer to the interval during which artillery respond to calls for fire on the kill points. These times may correspond to the corresponding sensor array observation period, but the overall program allows for such an array to have an extended period of observation for non-firetrap purposes.

CARD FORMAT FOR FIRETRAP SYSTEMS

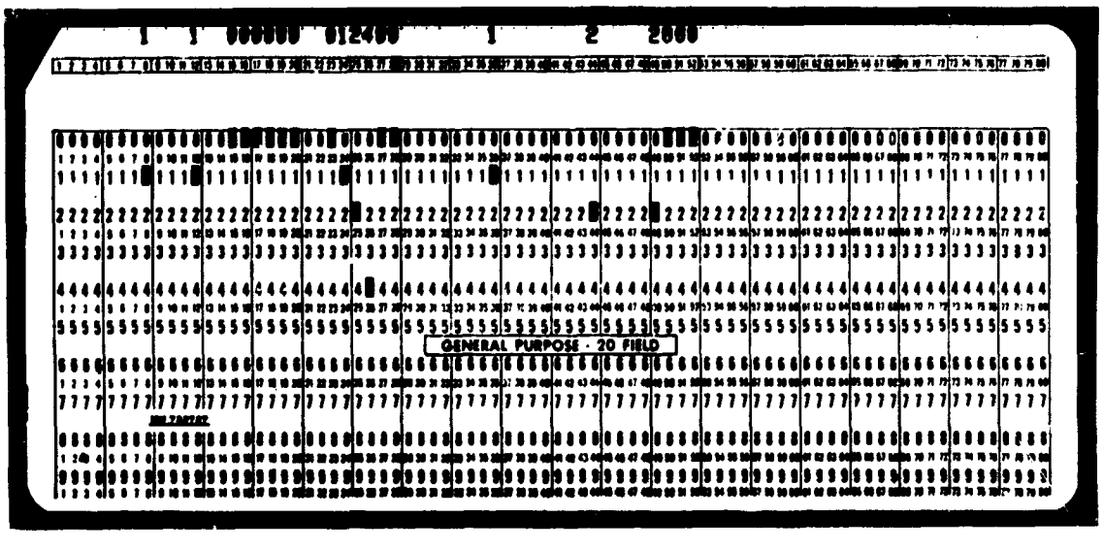
CARD 1	ITEM	WORD	COLUMNS	READ FORMAT
	1	1	1- 8	I8
	2	2	9-12	I4
	3	3	13-20	F8.0
	4	4	21-28	F8.0
	5	5	29-36	I8
	6	6	37-44	I8
	7	7	45-52	F8.0
	8	8	53-60	I8
	9	9	61-68	F8.0

THREE CARDS PRECEDING FIRETRAP SYSTEM DATA

(FIRST CARD ILLUSTRATIVE-ANY ALPHANUMERIC TEXT MAY BE USED. NEXT TWO CARDS CONTAIN VARIABLE FORMAT FOR THE DATA READ STATEMENT.)



A TYPICAL DATA SUBSET FOR FIRETRAP SYSTEM DATA



DATA SET VI
MONITORS

Item No.

1. ID of this monitor
2. Generic type [alphanumeric; 8 columns: this field not used internally except for initial reprint of input information; planner may insert any alphanumeric designation he wishes]
3. Organization [alphanumeric; 8 columns. See Note 1]
4. x, meters
5. y, meters
6. Planned up time (_ _ DDHHMM)
7. Planned down time (_ _ DDHHMM)
8. ID for monitor parameter set (see Note 2)
9. ID for receiver/transmitter parameter set (see Note 3)

Notes:

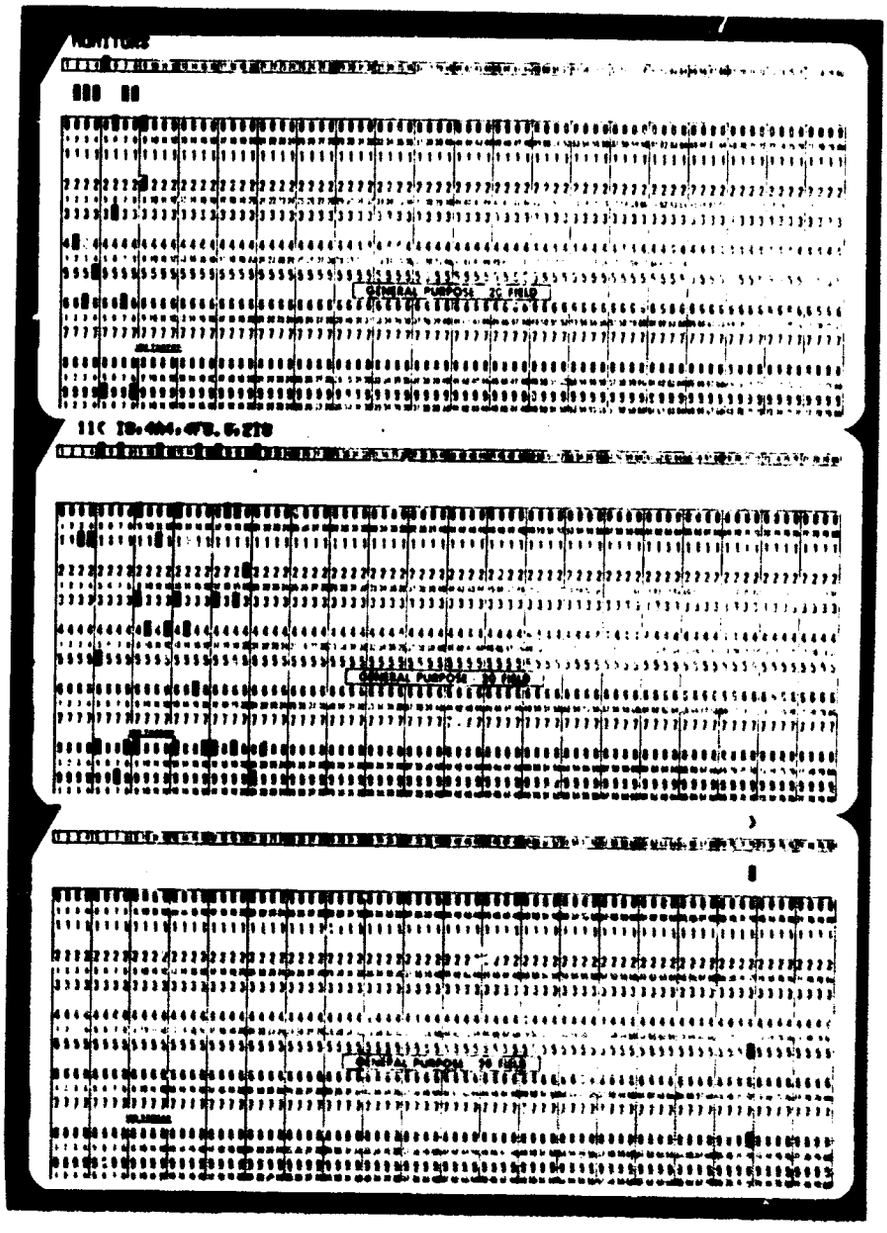
1. Format for organization code, See Note 1 under Data Set I (ARRAYUGS) Page F-6.
2. (Item 8) Monitor parameter set will contain data for statistical reliability parameters. Generally, it is expected that a few monitor parameter lists will suffice for a large number of monitors.
3. (Item 9) Item 6 of the Monitor Parameter Set Inputs (VII) indicates if the sensor to monitor link is by RADIO or DIRECT (i.e., wire or collocated); if this field is DIRECT, Item 9 on this card is left blank.

CARD FORMAT FOR MONITORS

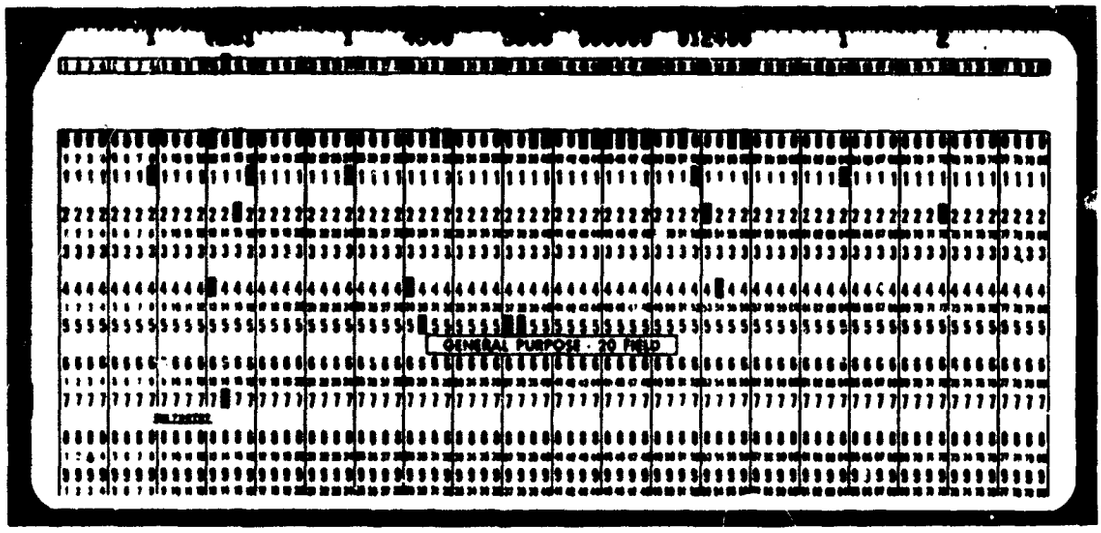
CARD 1	ITEM	WORD	COLUMNS	READ FORMAT
	1	1	1- 8	I8
	2	2, 3	9-16	2A4
	3	4, 5	17-24	2A4
	4	6	25-32	F8.0
	5	7	33-40	F8.0
	6	8	41-48	F8.0
	7	9	49-56	F8.0
	8	10	57-64	I8
	9	11	65-72	I8

THREE CARDS PRECEDING MONITOR DATA

(FIRST CARD ILLUSTRATIVE - ANY ALPHANUMERIC TEXT MAY BE USED. NEXT TWO CARDS CONTAIN VARIABLE FORMAT FOR THE DATA READ STATEMENT.)



A TYPICAL DATA SUBSET FOR MONITOR DATA



DATA SET VII
MONITOR PARAMETER SET

Item No.	
1.	ID of this parameter set
2.	Monitor type (alphanumeric: 8 columns, 2 computer words)
3.	MTBF, hours
4.	MTTR, mean time to replace/repair, hours
5.	Standard deviation of time to repair/replace, hours
6.	Sensor connection direct (i.e., wire or collocated) or radio (alphanumeric; A6 format; 'DIRECT' or 'RADIO'; Note: leave blank before the R in RADIO

Notes:

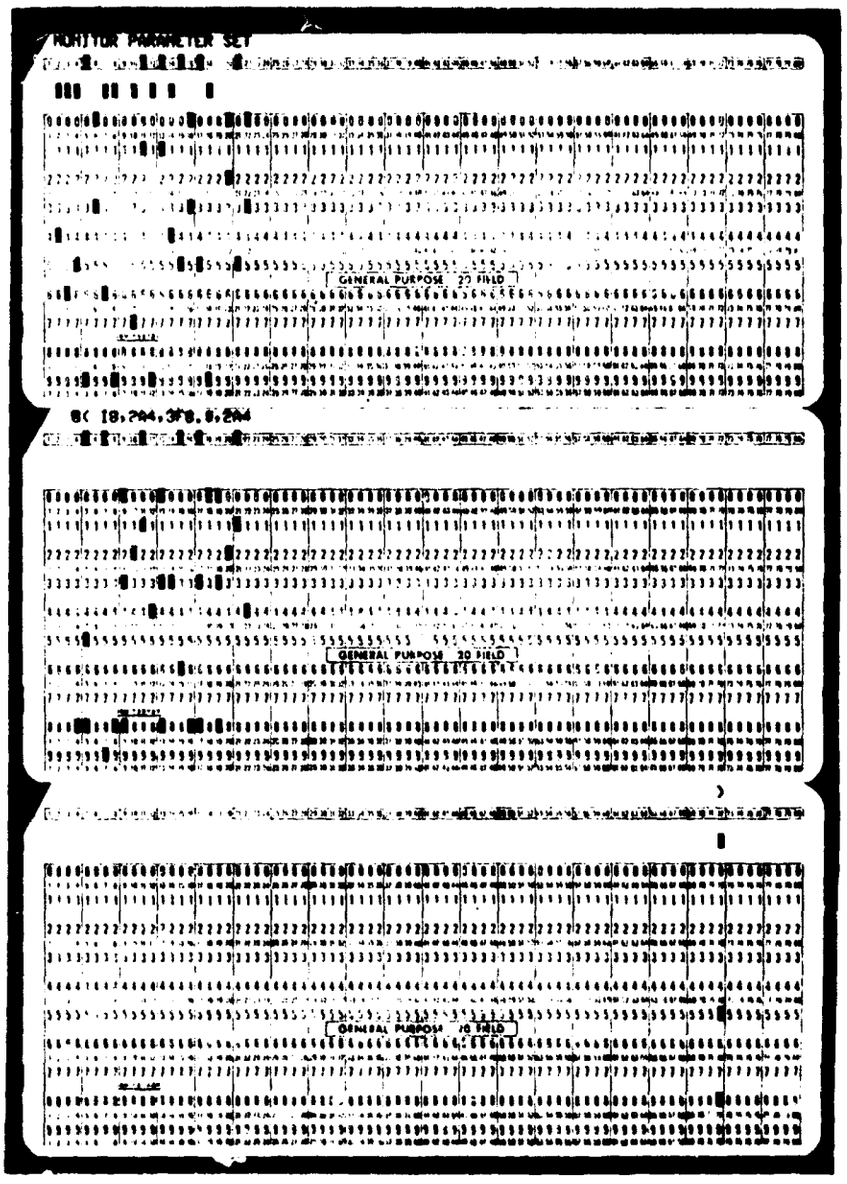
1. Item 3 should never be zero, items 4 and 5 should be left blank to play no failures or repairs.

CARD FORMAT FOR MONITOR PARAMETER SET

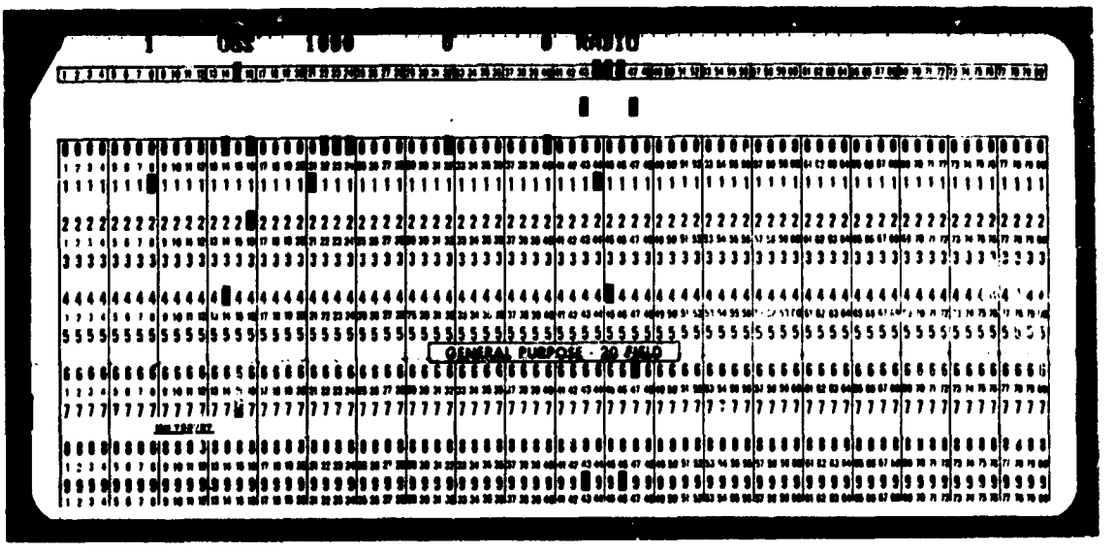
CARD 1	ITEM	WORD	COLUMNS	READ FORMAT
	1	1	1- 8	I8
	2	2, 3	9-16	2A4
	3	4	17-24	F8.0
	4	5	25-32	F8.0
	5	6	33-40	F8.0
	6	7, 8	41-48	2A4

THREE CARDS PRECEDING MONITOR PARAMETER DATA

(FIRST CARD ILLUSTRATIVE - ANY ALPHANUMERIC TEXT MAY BE USED. NEXT TWO CARDS CONTAIN VARIABLE FORMAT FOR THE DATA READ STATEMENT.)



A TYPICAL DATA SUBSET FOR MONITOR PARAMETER DATA



DATA SET VIII

RELAYS

Item No.	
1.	ID of this relay
2.	Relay type (alphanumeric: 8 columns; 2 computer words)
3.	ID of relay reliability parameter set
4.	ID of receiver/transmitter parameter set
5.	x, meters
6.	y, meters
7.	Planned up time (_ _ DDHHMM)
8.	Planned down time (_ _ DDHHMM)
9.	Code for standard deviation of initial emplacement time (0, 1, 2, 3; see Note 1)
10.	Probability of mission abort, percent
11.	Average maintenance interval, days
12.	Code for standard deviation of maintenance interval (0, 1; see Note 2)
13.	Average reemplacement time, hours
14.	Code for standard deviation of reemplacement time (See Note 1)
15.	Number of reemplacement missions allowed
16.	Shall self-destruct capability be energized
	1 Yes
	0 or blank if No

Notes:

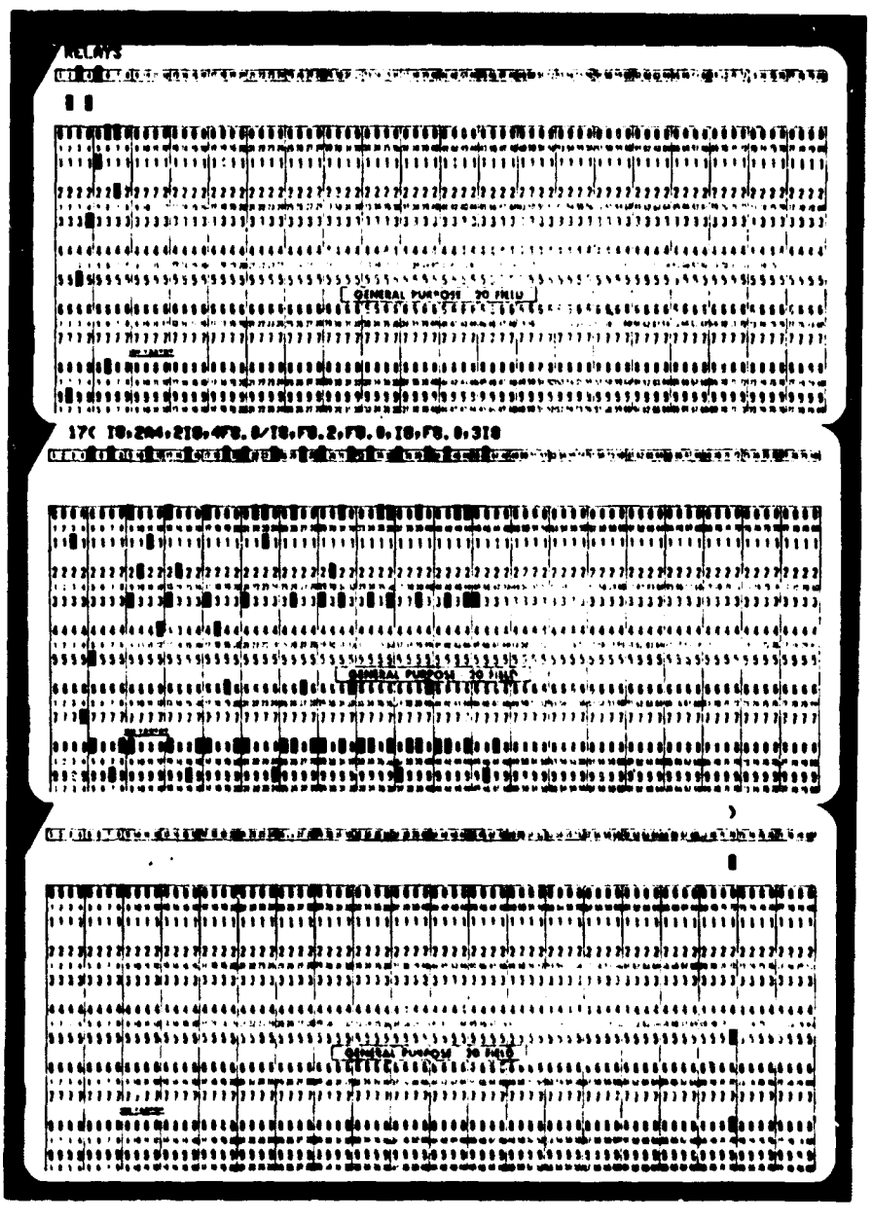
1. 0 implies zero standard deviation
   1 implies .25 hours standard deviation
   2 implies .75 hours standard deviation
   3 implies 2.0 hours standard deviation
2. 0 implies zero standard deviation
   1 implies 1 day standard deviation

CARD FORMAT FOR RELAYS

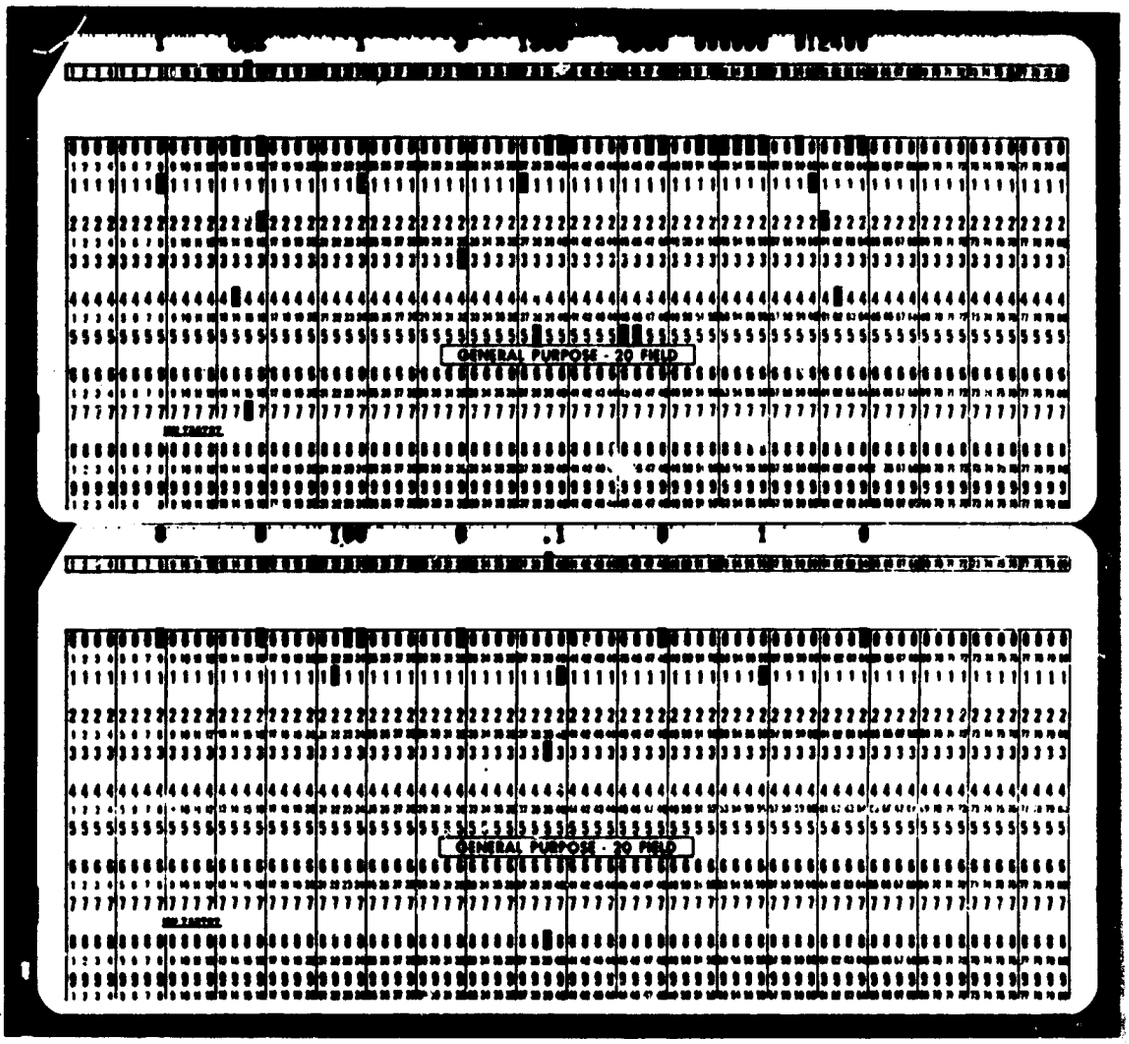
CARD 1	ITEM	WORD	COLUMNS	READ FORMAT
	1	1	1- 8	I8
	2	2,3	9-16	2A4
	3	4	17-24	I8
	4	5	25-32	I8
	5	6	33-40	F8.0
	6	7	41-48	F8.0
	7	8	49-56	F8.0
	8	9	57-64	F8.0
CARD 2	9	1	1- 8	I8
	10	2	9-16	F8.2
	11	3	17-24	F8.0
	12	4	25-32	I8
	13	5	33-40	F8.0
	14	6	41-48	I8
	15	7	49-56	I8
	16	8	57-64	I8

THREE CARDS PRECEDING RELAY DATA

(FIRST CARD ILLUSTRATIVE - ANY ALPHANUMERIC TEXT MAY BE USED. NEXT TWO CARDS CONTAIN VARIABLE FORMAT FOR THE DATA READ STATEMENT.)



A TYPICAL DATA SUBSET FOR RELAY DATA



DATA SET IX
RELAY RELIABILITY PARAMETER SET

Item No.

1. ID of this relay parameter set
2. Relay type (alphanumeric: 8 columns; 2 computer words)
3. MTBF, hours (see Note 1)
4. Average battery life, days (see Note 1)
5. Standard deviation on battery life, days
6. Does self destruct capability exist?
   - 1 if it does exist
   - 0 or blank if not

Notes:

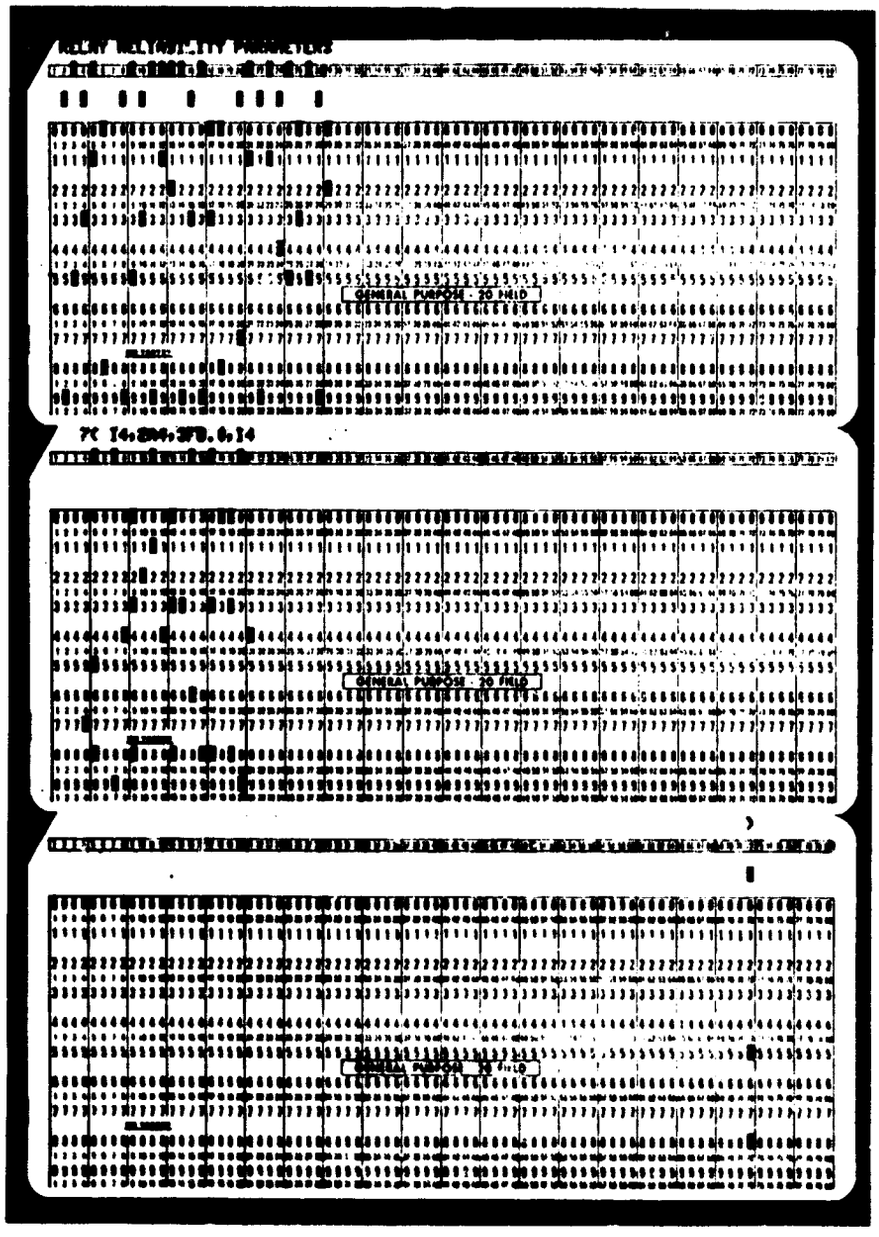
1. Items 3 and 4 should not be zero.

CARD FORMAT FOR RELAY RELIABILITY PARAMETER SET

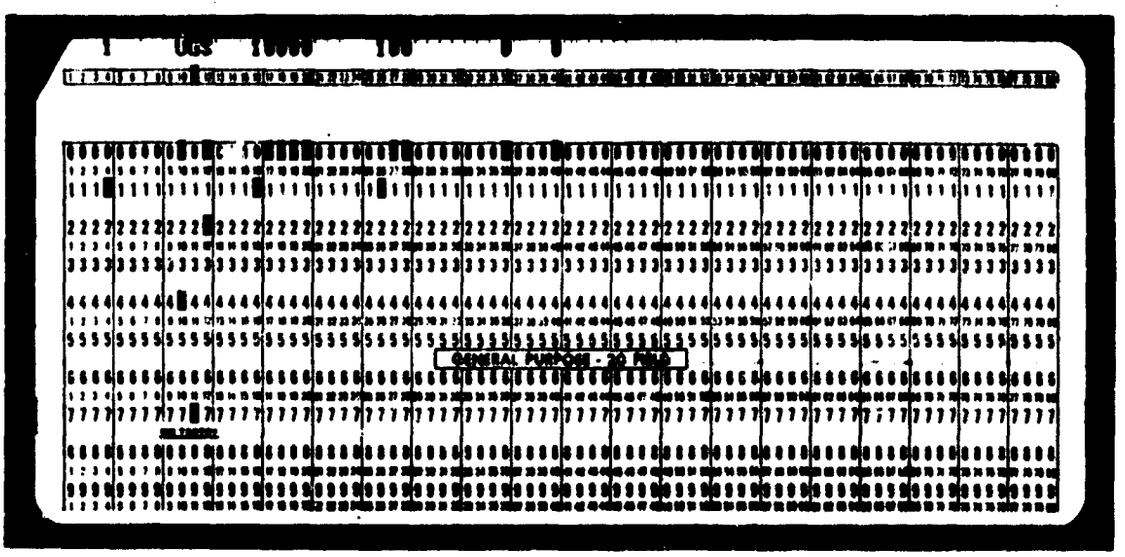
CARD 1	ITEM	WORD	COLUMNS	READ FORMAT
	1	1	1- 4	I4
	2	2,3	5-12	2A4
	3	4	13-20	F8.0
	4	5	21-28	F8.0
	5	6	29-36	F8.0
	6	7	37-40	I4

THREE CARDS PRECEDING RELAY RELIABILITY PARAMETER DATA

(FIRST CARD ILLUSTRATIVE - ANY ALPHANUMERIC TEXT MAY BE USED. NEXT TWO CARDS CONTAIN VARIABLE FORMAT FOR THE DATA READ STATEMENT.)



A TYPICAL DATA SUBSET FOR RELAY RELIABILITY PARAMETER DATA



DATA SET X

DATA LINKS

Item No.

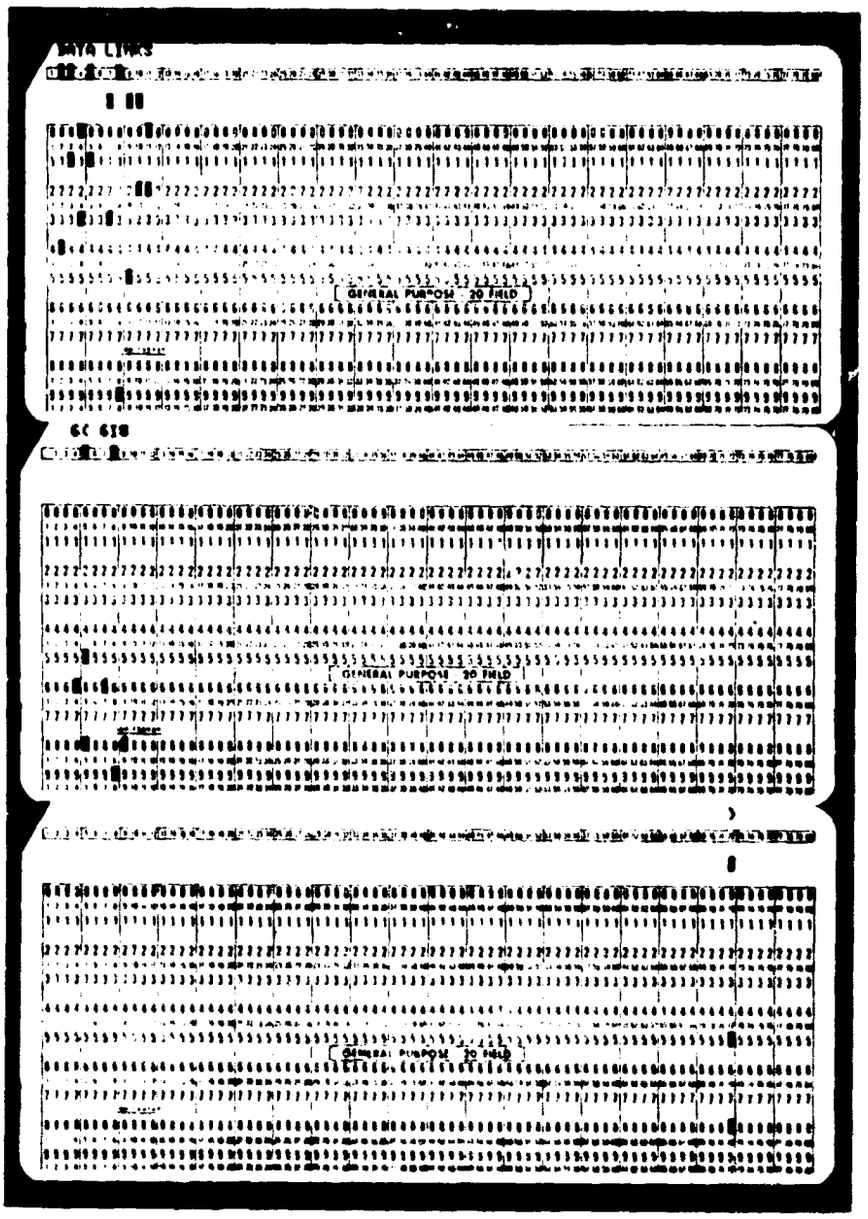
1. ID of this data link
2. ID of associated array
3. ID of associated monitor
4. Number of relays:
   - 0 — no relays, radio link
   - 1 — one relay (radio transmission both legs)
   - 2 — two relays (radio transmission all legs)
5. ID of first relay (one closest to array), if applicable
6. ID of second relay (one closest to monitor), if applicable

CARD FORMAT FOR DATA LINKS

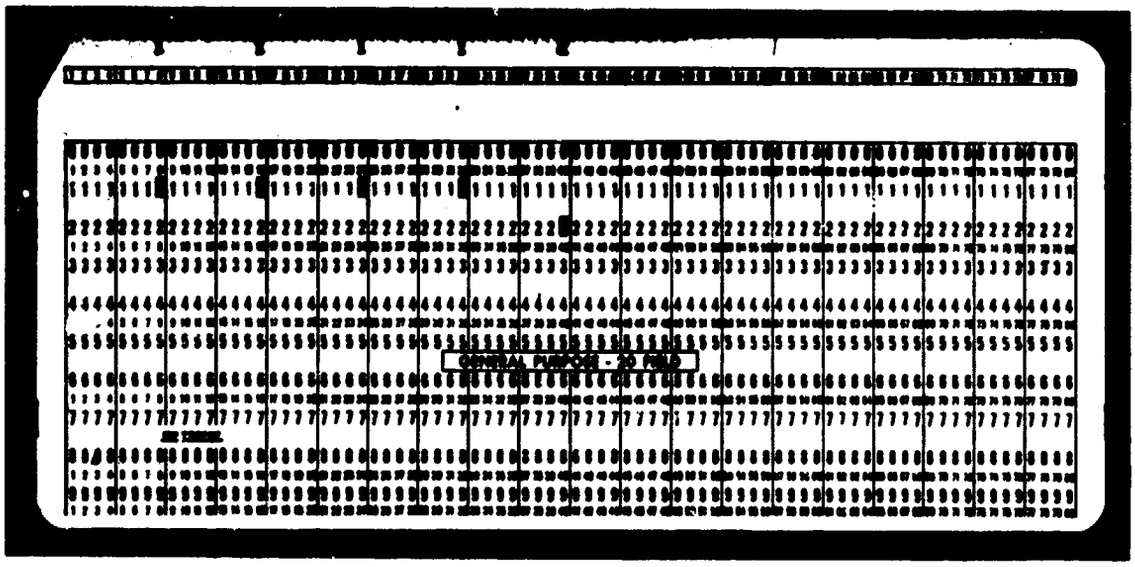
CARD 1	ITEM	WORD	COLUMNS	READ FORMAT
	1	1	1- 8	I8
	2	2	9-16	I8
	3	3	17-24	I8
	4	4	25-32	I8
	5	5	33-40	I8
	6	6	41-48	I8

THREE CARDS PRECEDING DATA LINK DATA

(FIRST CARD ILLUSTRATIVE - ANY ALPHANUMERIC TEXT MAY BE USED. NEXT TWO CARDS CONTAIN VARIABLE FORMAT FOR THE DATA READ STATEMENT.)



A TYPICAL DATA SUBSET FOR DATA LINK DATA



DATA SET XI

RECEIVER/TRANSMITTER PARAMETER SET

Item No.		
1.	User use only.	
2.	ID of this parameter set (numbered sequentially starting with 1).	
3.	Link operating frequency (MHz)	
4.	Antenna height, meters	
5.	Conductivity of propagation surface (mho/meter)(S)	
6.	Relative permittivity of propagation surface (E)	
7.	Minimum monthly surface refractivity normalized to sea level (NO)	
8.	Antenna polarization of link	
	1.0	vertical (common case)
	0.0	horizontal
9.	Transmitter power , watts (PT)	
10.	Antenna gain (dB)	
11.	System Internal RF losses (dB)((ALT for transmitter and (ALR) for receiver))	
12.	Receiver IF bandwidth (Hz)(B)	
13.	Receiver noise figure (ANF)	
14.	Receiver IF bandwidth - time product (BTP)	
15.	Data message bit length (bits) (NAN)	
16.	Maximum allowable message error probability (PEMMAX)	

Notes:

1. (Item 4)

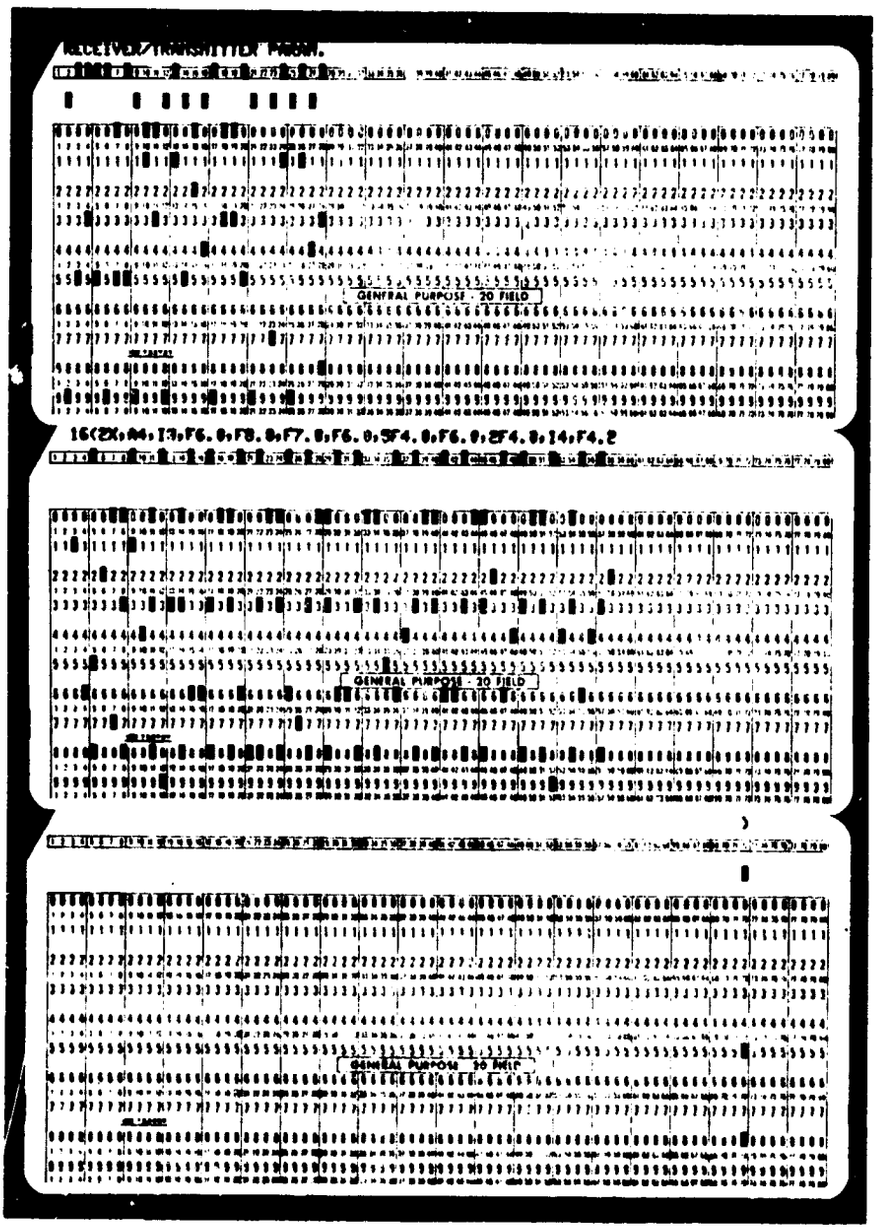
0	height of tree canopy to be selected from UNTER Table
+	before the value entered indicates height above ground
-	before the value entered indicates distance below top of canopy

CARD FORMAT FOR RECEIVER/TRANSMITTER PARAMETER SET

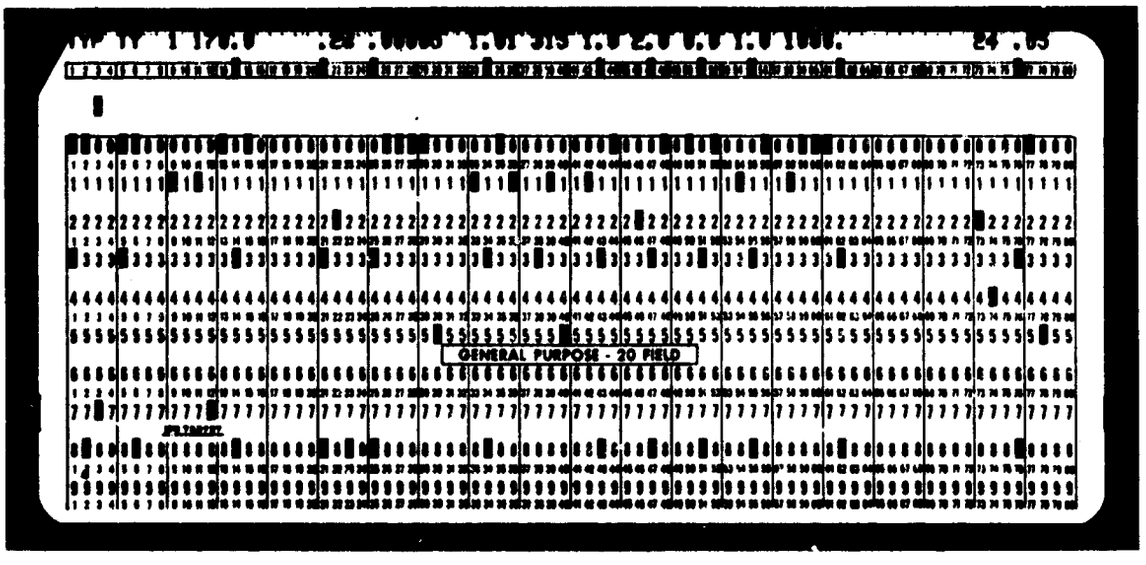
CARD 1	ITEM	WORD	COLUMNS	READ FORMAT
	1	1	1- 6	2X, A4
	2	2	7- 9	I3
	3	3	10-15	F6.0
	4	4	16-23	F8.0
	5	5	24-30	F7.0
	6	6	31-36	F6.0
	7	7	37-40	F4.0
	8	8	41-44	F4.0
	9	9	45-48	F4.0
	10	10	49-52	F4.0
	11	11	53-56	F4.0
	12	12	57-62	F6.0
	13	13	63-66	F4.0
	14	14	67-70	F4.0
	15	15	71-74	I4
	16	16	75-78	F4.2

THREE CARDS PRECEDING RECEIVER/TRANSMITTER PARAMETER DATA

(FIRST CARD ILLUSTRATIVE - ANY ALPHANUMERIC TEXT MAY BE USED. NEXT TWO CARDS CONTAIN VARIABLE FORMAT FOR THE DATA READ STATEMENT.)



A TYPICAL DATA SUBSET FOR RECEIVER/TRANSMITTER PARAMETER DATA



DATA SET XII PATH DATA

Item No.	
1.	Prepunch PATH
2.	Input source (C = control, B = blue, R = Red)
3.	Route ID
4.	Number of legs*
5.	X-coordinate of first node (node 0), meters
6.	Y-coordinate of first node (node 0), meters Note: Location input on stationary items stop here
7.	Forward speed factor for first leg (Percent without decimal or equivalent decimal fraction)
8.	Reverse speed factor for first leg (Percent without decimal or equivalent decimal fraction)
9.	Leg type**
10.	X-coordinate of second node (node 1), meters
11.	Y-coordinate of second node (node 1), meters
12.	Forward speed factor for second leg (Percent without decimal, I4 format)
13.	Reverse speed factor for second leg (Percent without decimal or equivalent decimal fraction)
14.	Leg type
15.	X-coordinate of third node (node 2), meters
16.	Y-coordinate of third node (node 2), meters

The five parameters (as for items 7 - 11, or 12 - 16) are repeated for additional legs, up to a maximum nine legs (or ten nodes). For maximum number of legs (9), number of items will be 51. For minimum number of legs (0; i.e., stationary point at node 0), number of items will be 6. Total number of cards is 4 in all cases, with blank cards used if necessary.

---

* Nodes are numbered 0, 1, ..., 9 and legs are numbered 1, 2, ..., 9 where leg 1 is between nodes 0, 1, etc.

** Leg types are specified for each leg by the code: 0 = cross country, 1 = (unimproved) trail, 2 = unimproved road, 3 = gravel road, 4 = hard surface road, 5 = water, 6 = railroad, 7 = airstrip, 8 = coastline and 9 = airroute.

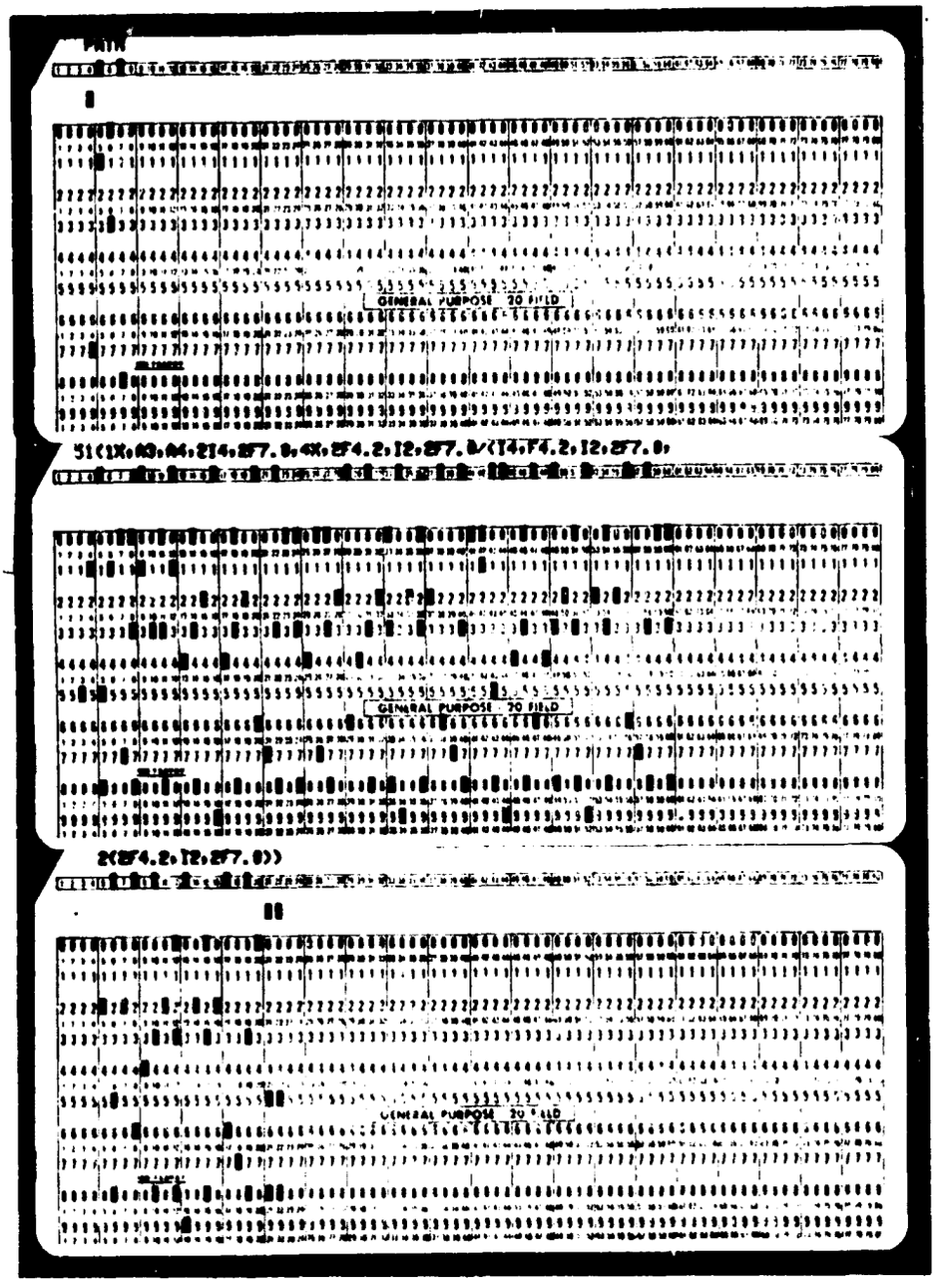
CARD FORMAT FOR PATH DATA

CARD 1	ITEM	WORD	COLUMNS	READ FORMAT
	1	1	1- 4	1X, A3
	2	2	5- 8	A4
	3	3	9-12	I4
	4	4	13-16	I4
	5	5	17-23	F7.0
	6	6	24-30	F7.0
	7	7	31-38	4X, F4.2
	8	8	39-42	F4.2
	9	9	43-44	I2
	10	10	45-51	F7.0
	11	11	52-58	F7.0
CARD 2	12	1	1- 4	I4
	13	2	5- 8	F4.2
	14	3	9-10	I2
	15	4	11-17	F7.0
	16	5	18-24	F7.0
	17	6	25-28	F4.2
	18	7	29-32	F4.2
	19	8	33-34	I2
	20	9	35-41	F7.0
	21	10	42-48	F7.0
	22	11	49-52	F4.2
	23	12	53-56	F4.2
	24	13	57-58	I2
	25	14	59-65	F7.0
	26	15	66-72	F7.0

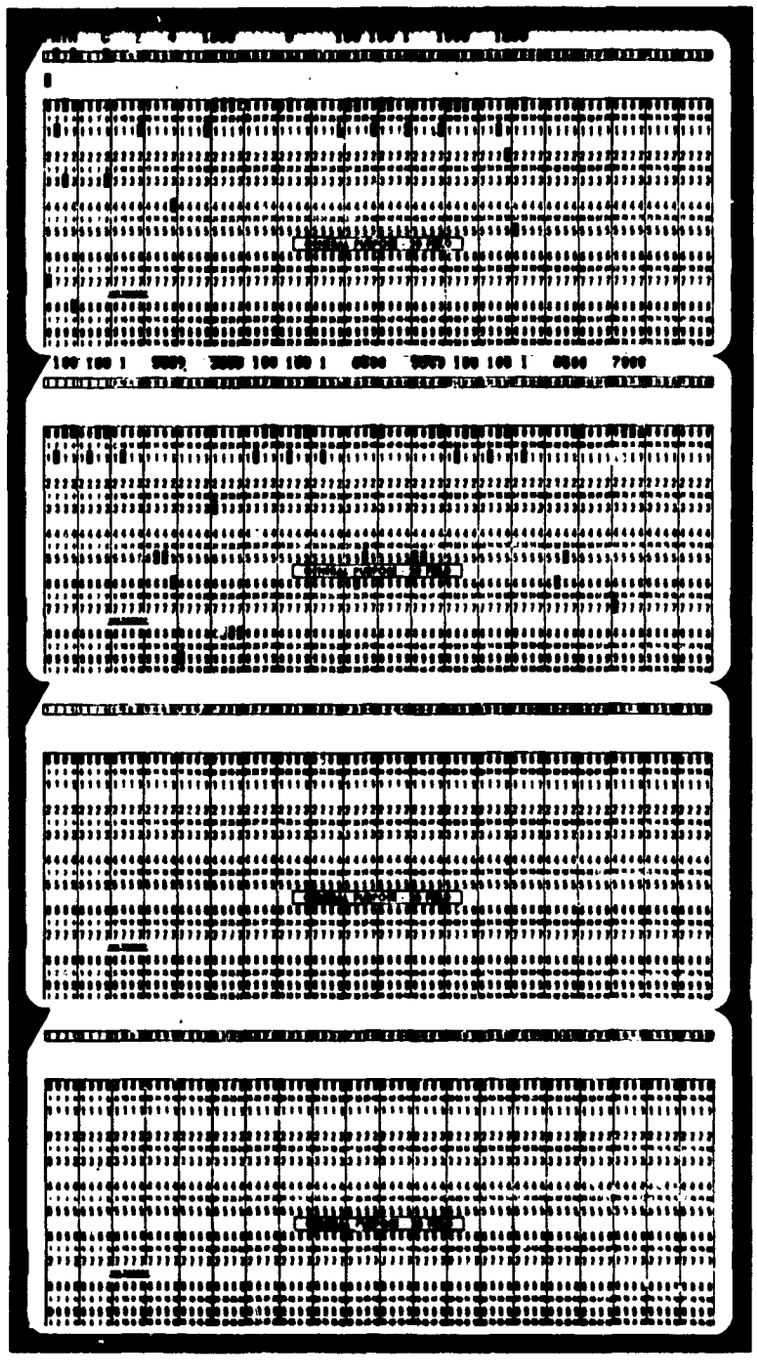
Card 3 and 4 are the same format as Card 2.

THREE CARDS PRECEDING PATH DATA

(FIRST CARD ILLUSTRATIVE - ANY ALPHANUMERIC TEXT MAY BE USED. NEXT TWO CARDS CONTAIN VARIABLE FORMAT FOR THE DATA READ STATEMENT.)



A TYPICAL DATA SUBSET FOR PATH DATA



DATA SET XIII
FORCE-TYPE PARAMETER SET - TARGETS

Item No.

1. ID of parameter set
2. Ferrous metal present
   - 1 yes
   - 0 no
3. Visual security descriptor
   - 0 attempting concealment
   - 1 normal
4. Spacing between elements, meters
5. Formation descriptor (personnel only, otherwise blank)
   - 1 file
   - 2 column of two's
   - 3 randomly within circular area
6. Weight descriptor (personnel only, otherwise blank)
   - 1 light or medium weight men
   - 2 heavy weight men
7. Acoustic descriptor (personnel only, otherwise blank)
   - 1 silent
   - 2 talking

The following five items anticipate future program growth, in which reliability problems would be simulated for moving sensor platforms (MOVARRAYS/BLUE FORCES). The present program does not accept these values, and the entries may be left blank on data cards.

8. MTBF of communication link from the MOVARRAY to monitoring organization , hours
9. Mean time to repair/replace the communication links, hours
10. Standard deviation of communication link's repair/replace time, hours
11. Mean time to repair/replace platform of MOVARRAY, hours
12. Standard deviation of platform's repair/replace time, hours

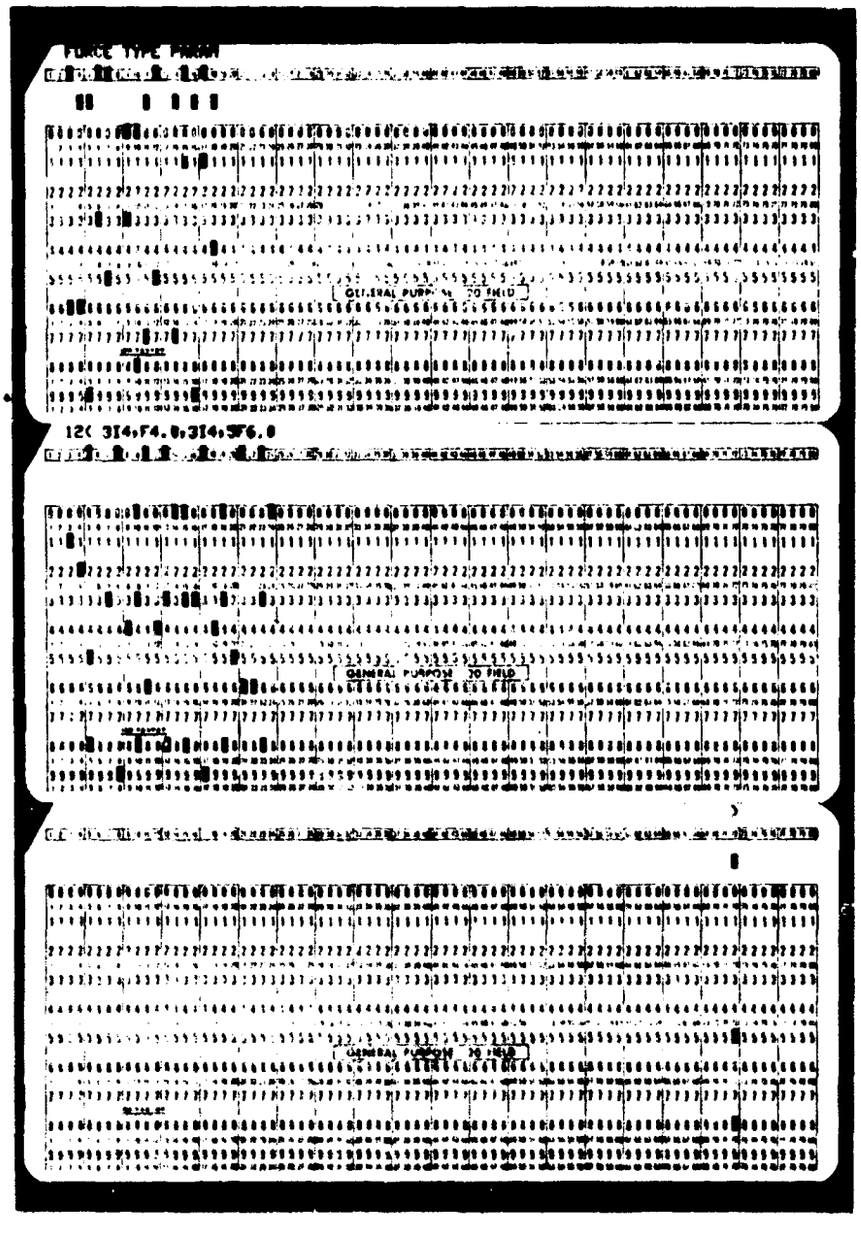
Note: The entries for Items 2, 3, 5, 6, and 7 are values for the target descriptor KSTRNG.

CARD FORMAT FOR FORCE-TYPE PARAMETER SET

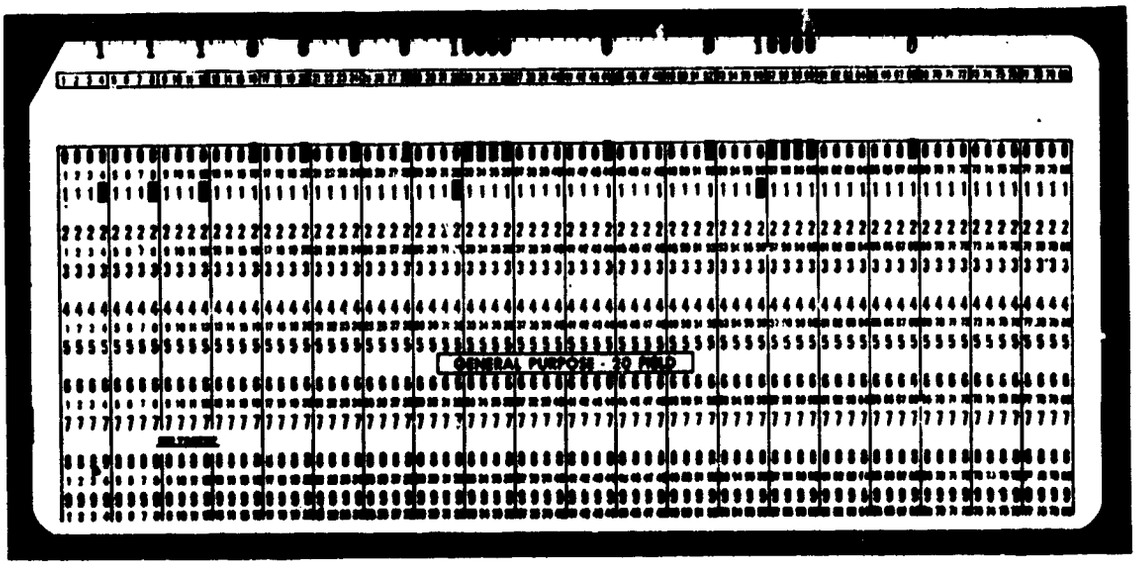
CARD 1	ITEM	WORD	COLUMNS	READ FORMAT
	1	1	1- 4	I4
	2	2	5- 8	I4
	3	3	9-12	I4
	4	4	13-16	F4.0
	5	5	17-20	I4
	6	6	21-24	I4
	7	7	25-28	I4
	8	8	29-34	F6.0
	9	9	35-40	F6.0
	10	10	41-46	F6.0
	11	11	47-52	F6.0
	12	12	53-58	F6.0

THREE CARDS PRECEDING FORCE TYPE PARAMETER DATA

(FIRST CARD ILLUSTRATIVE - ANY ALPHANUMERIC TEXT MAY BE USED. NEXT TWO CARDS CONTAIN VARIABLE FORMAT FOR THE DATA READ STATEMENTS.)



A TYPICAL DATA SUBSET FOR FORCE TYPE PARAMETER DATA



DATA SET XIV

COVERAGE/SCAN PARAMETER SET

Item No.		
1.	ID of this parameter set	
2.	Coverage/scan code	
	1	sector/scan
	2	sector/non-scan
	3	moving rectangle
	4	stationary rectangle
	Note: If 2, 3 or 4 is entered for Item 2, i.e., not scanning, then Items 7, 8, 9 and 10 are left blank.	
	Sector (1 and 2)	Rectangle (3 and 4)
3.	Minimum range selected (RMIN), meters	Along-track dimension (ILONG)-meters
4.	Maximum range selected (RMAX), meters	Cross-track dimension (IWIDE)-meters
5.	Coverage angle selected (CVANGL), mils	Along-track component of vector from sensor to rectangle's center; + if forward - if rearward with respect to direction of movement of sensor platform, (IATD), meters
6.	Blank	Cross-track component of vector from sensor to rectangle's center; + if to left - if to right, (ICTD), meters
	Note: Items 3, 4, 5 and/or 6 are left blank if the equipment coverage limits given in the Sensor Descriptor Parameter Sets (IV) are to be used.	
	Scan in Azimuth*	Scan in Range**
7.	NREPRI, number of repetitions per range increment	0 or blank

---

* Corresponds to SCAN 1 subroutine in MSM (typical radar scan pattern)

** Corresponds to SCAN 2 subroutine in MSM (typical visual scan pattern)

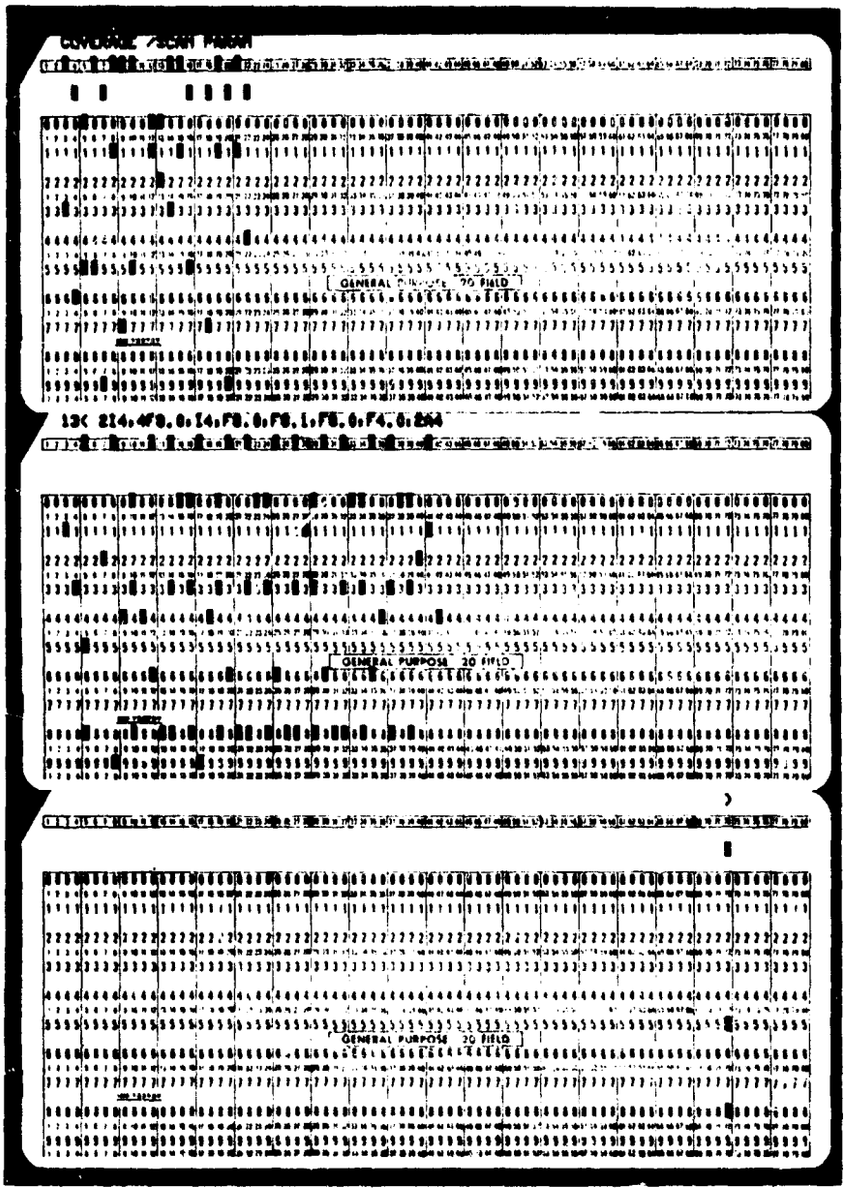
8.	RINCR, range increment, meters	AZINC, azimuth increment, mils
9.	OMEGA, scan rate, mils/sec	DRDT, scan rate, meters/sec
10.	BEAMW, beamwidth, mils	RGATE, range gate, meters
11.	RCLEAR, Foliage-free distance to be assumed in direction of view of (stationary) scanning sensor, meters	
12.	Arbitrary alphanumeric (8 columns) content, for user reference only.	

CARD FORMAT FOR COVERAGE/SCAN PARAMETER SET

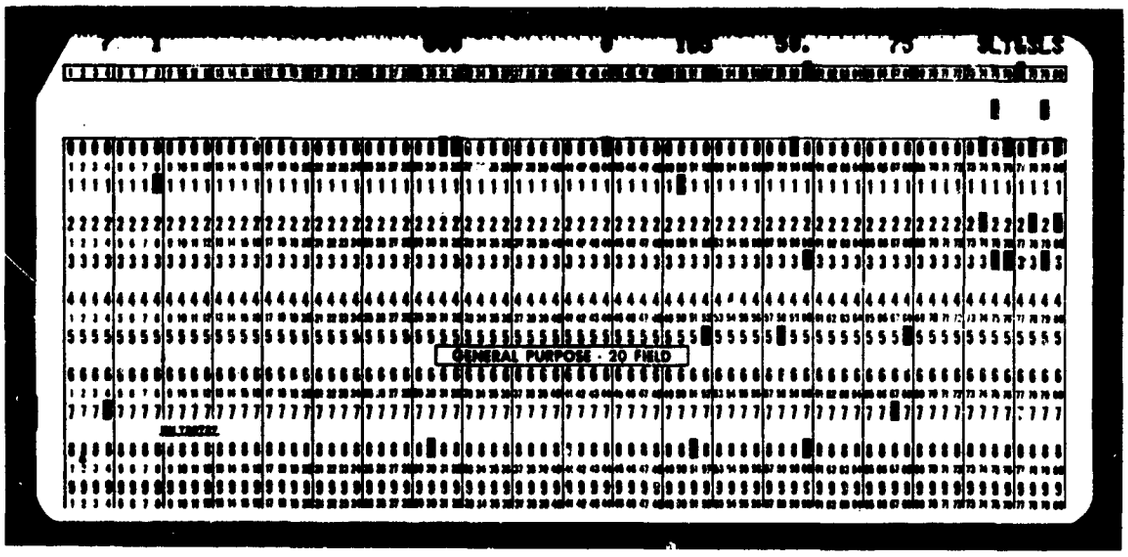
CARD 1	ITEM	WORD	COLUMNS	READ FORMAT
	1	1	1- 4	I4
	2	2	5- 8	I4
	3	3	9-16	F8.0
	4	4	17-24	F8.0
	5	5	25-32	F8.0
	6	6	33-40	F8.0
	7	7	41-44	I4
	8	8	45-52	F8.0
	9	9	53-60	F8.1
	10	10	61-68	F8.0
	11	11	69-72	F4.0
	12	12, 13	73-80	2A4

THREE CARDS PRECEDING COVERAGE/SCAN PARAMETER DATA

(FIRST CARD ILLUSTRATIVE - ANY ALPHANUMERIC TEXT MAY BE USED. NEXT TWO CARDS CONTAIN VARIABLE FORMAT FOR THE DATA READ STATEMENT.)



A TYPICAL DATA SUBSET FOR COVERAGE/SCAN PARAMETER DATA



DATA SET XV
NAVIGATION SYSTEM (HYPERBOLIC)
(PRNV1)

If the hyperbolic navigation system errors are being played, the planner may input up to four sets of navigation parameters to represent the versions of this generic type system that are played in the game. Description of attached card format follows:

Item No.

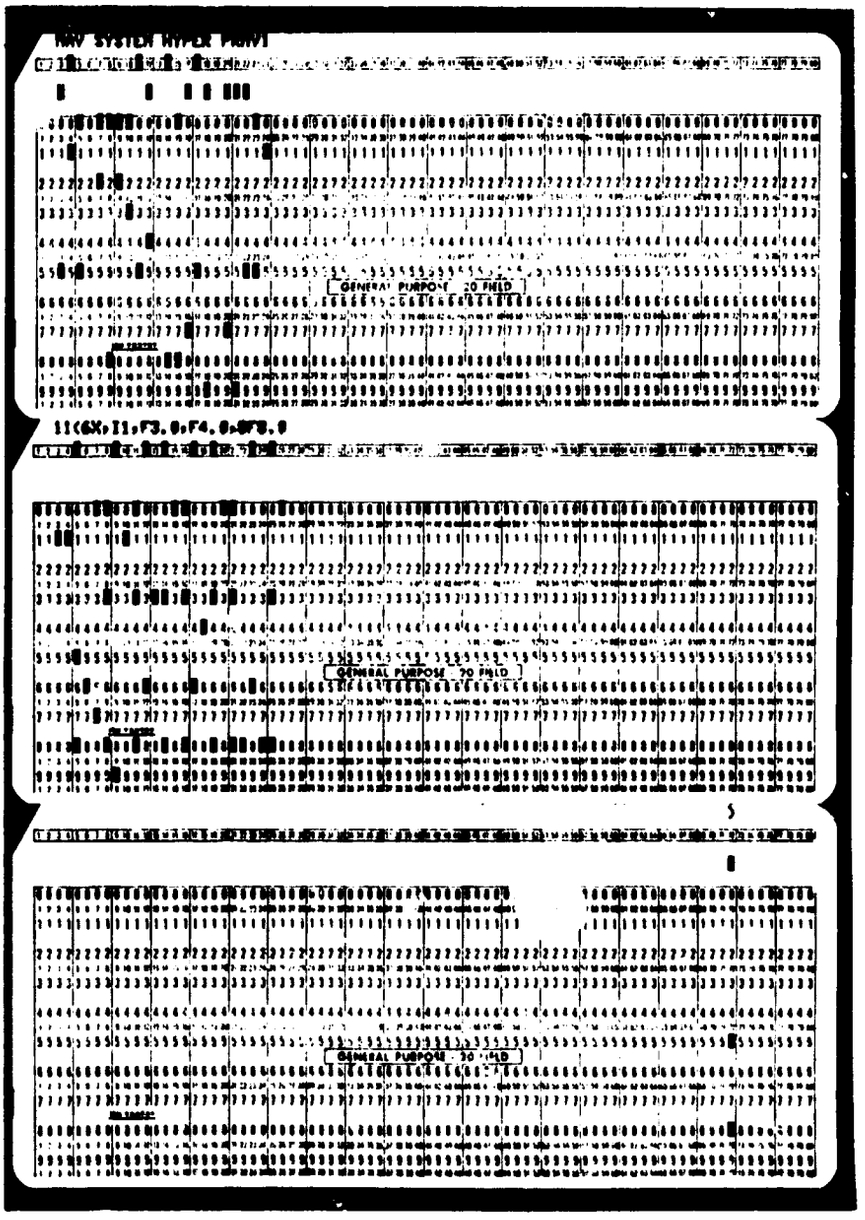
1. "HYPRB" entered for planner ease in identification
2. Code = (1, 2, 3, 4) to indicate to which version of hyperbolic navigation system this parameter set applies.
3. Standard deviation of ground station location error (meters)
4. Standard deviation of system time difference measurement error (microseconds)
5. X-coordinate, Slave Station Number 1 (meters)
6. Y-coordinate, Slave Station Number 1 (meters)
7. X-coordinate, Slave Station Number 2 (meters)
8. Y-coordinate, Slave Station Number 2 (meters)
9. X-coordinate, Slave Station Number 3 (meters)
10. Y-coordinate, Slave Station Number 3 (meters)
11. X-coordinate, Master Station (meters)
12. Y-coordinate, Master Station (meters)

CARD FORMAT FOR NAVIGATION SYSTEM (HYPERBOLIC)

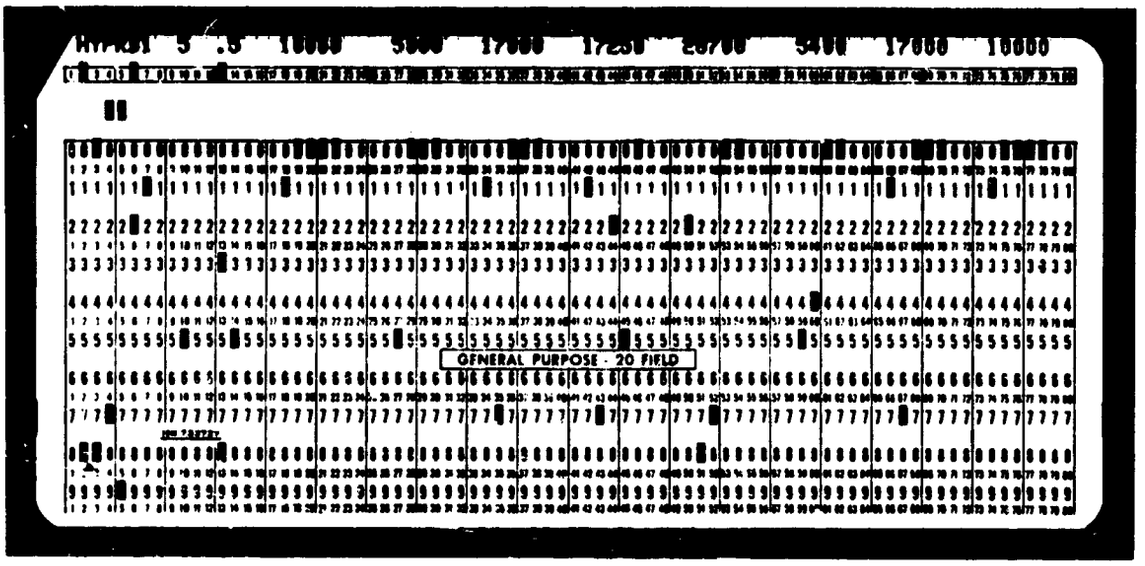
CARD 1	ITEM	WORD	COLUMNS	READ FORMAT
	1		1- 6	6X
	2	1	7- 7	I1
	3	2	8-10	F3.0
	4	3	11-14	F4.0
	5	4	15-22	F8.0
	6	5	23-30	↓
	7	6	31-38	
	8	7	39-46	
	9	8	47-54	
	10	9	55-62	
	11	10	63-70	
	12	11	71-78	F8.0

THREE CARDS PRECEDING NAVIGATION SYSTEM (HYPERBOLIC) DATA

(FIRST CARD ILLUSTRATIVE - ANY ALPHANUMERIC TEXT MAY BE USED. NEXT TWO CARDS CONTAIN VARIABLE FORMAT FOR THE DATA READ STATEMENT.)



A TYPICAL DATA SUBSET FOR NAVIGATION SYSTEM (HYPERBOLIC) DATA



DATA SET XVI
NAVIGATION SYSTEM (RHO THETA)
(PRNV2)

If Rho Theta navigation system errors are being played, the planner may input up to four sets of navigation parameters to represent the versions of this generic type system that are played in the game. Description of attached card format follows:

Item No.

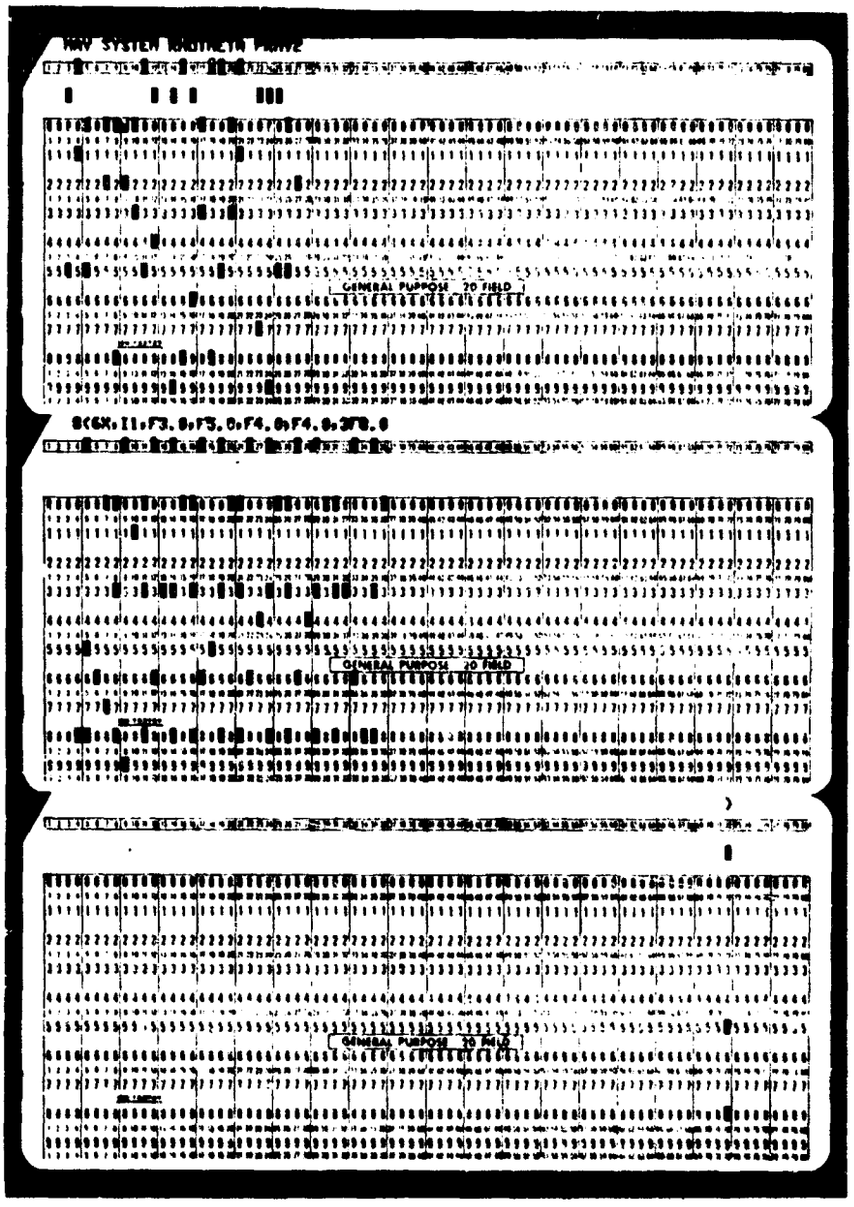
1. "RHOTH" entered for planner case in identification.
2. Code = (1, 2, 3, 4) to indicate to which version of Rho Theta navigation system this parameter set applies.
3. Standard deviation of ground station location error (meters).
4. Standard deviation of system direction resolution error (mils).
5. Standard deviation of system range-resolution error (meters).
6. Standard deviation of altitude-resolution error (meters).
7. X-coordinate of ground station location (meters).
8. Y-coordinate of ground station location (meters).
9. Elevation above MSL of ground station location (meters).

CARD FORMAT FOR NAVIGATION SYSTEM (RHO THETA)

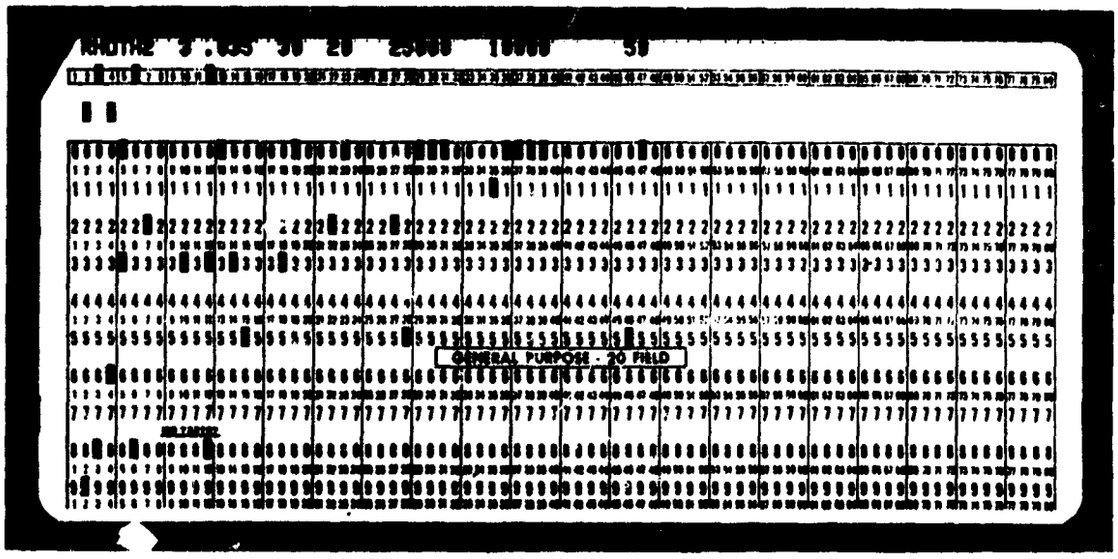
CARD 1	ITEM	WORD	COLUMNS	READ FORMAT
	1		1- 6	6X
	2	1	7- 7	I1
	3	2	8-10	F3.0
	4	3	11-15	F5.0
	5	4	16-19	F4.0
	6	5	20-23	F4.0
	7	6	24-31	F8.0
	8	7	32-39	F8.0
	9	8	40-47	F8.0

THREE CARDS PRECEDING NAVIGATION SYSTEM (RHO THETA) DATA

(FIRST CARD ILLUSTRATIVE - ANY ALPHANUMERIC TEXT MAY BE USED. NEXT TWO CARDS CONTAIN VARIABLE FORMAT FOR THE DATA READ STATEMENT.)



A TYPICAL DATA SUBSET FOR NAVIGATION SYSTEM (RHO THETA) DATA



DATA SET XVII
NAVIGATION SYSTEM (DOPPLER)
(PRNV3)

If Doppler navigation system errors are being played, the planner may input up to four sets of navigation parameters to represent the versions of this generic type system that are played in the game. Description of attached card format follows:

Item No.

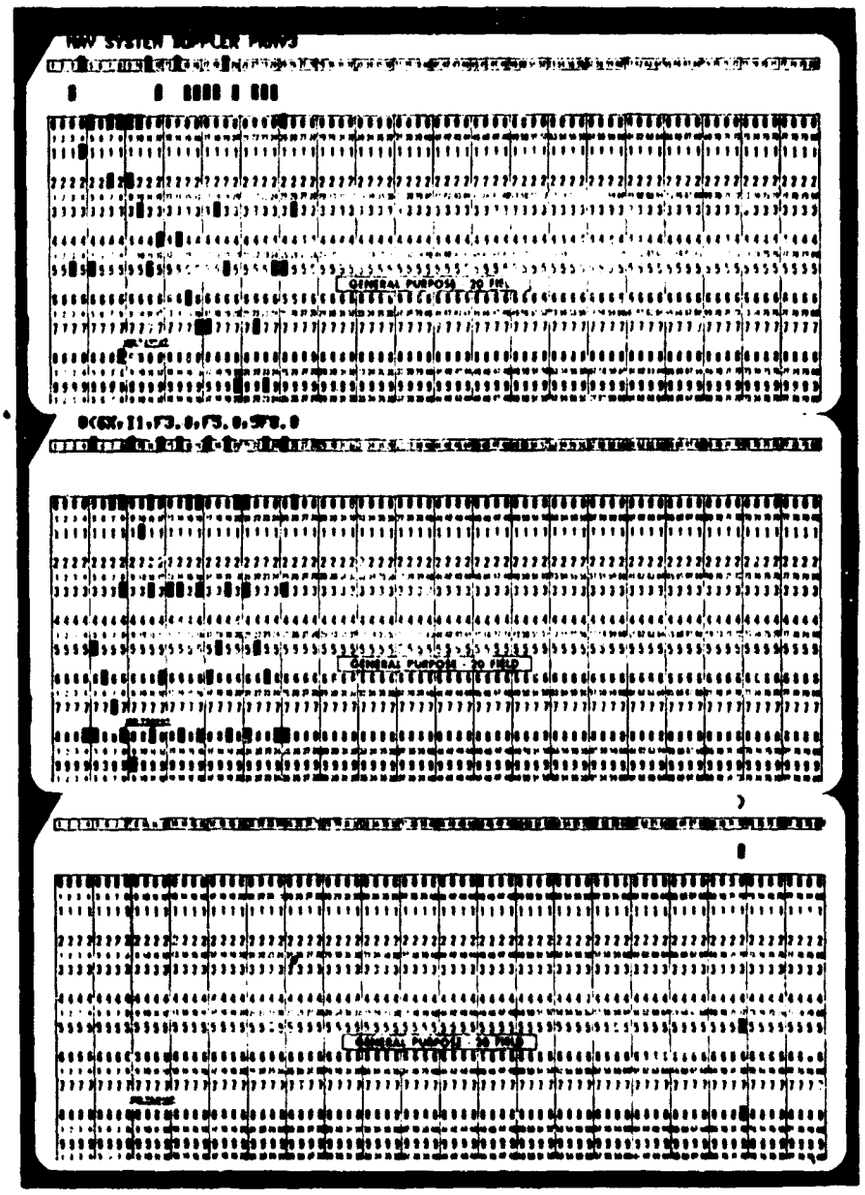
1. "DOPLR" entered for planner ease in identification.
2. Code = (1, 2, 3, 4) to indicate to which version of Doppler navigation system this parameter set applies.
3. Standard deviation of error in registering system at movement initiation point (meters).
4. Standard deviation of flight updating error (Percent/100 that is applied to altitude above ground.)
5. System Noise Bandwidth (1/microsecond).
6. Standard deviation of along-track sensor error (meters).
7. Standard deviation of along-track computer error (meters).
8. Standard deviation of cross-track sensor error (meters).
9. Standard deviation of cross-track computer error (meters).

CARD FORMAT FOR NAVIGATION SYSTEM (DOPPLER)

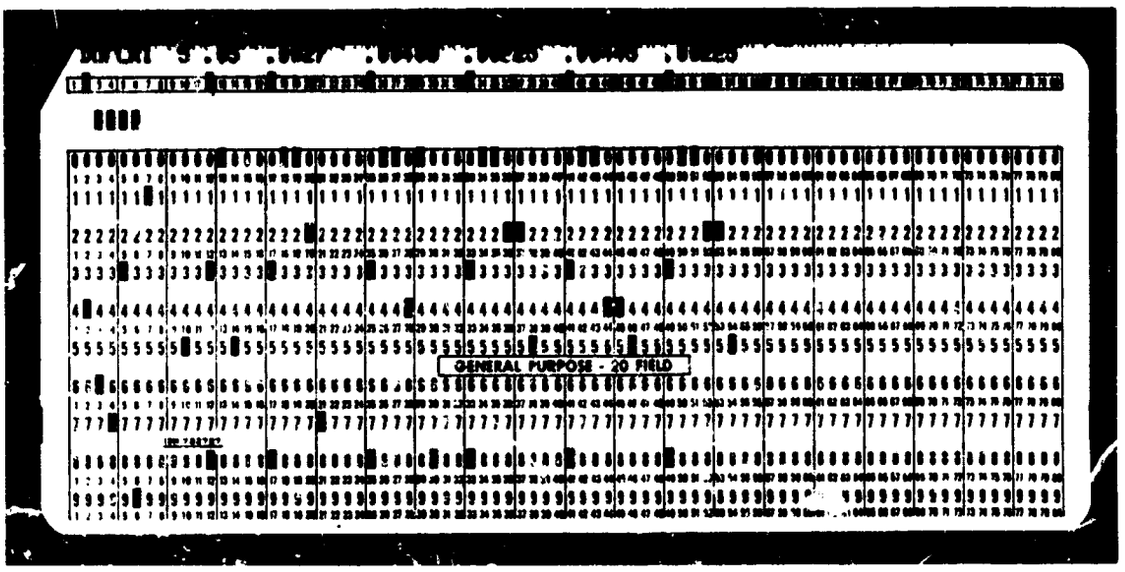
CARD 1	ITEM	WORD	COLUMNS	READ FORMAT
	1		1- 6	6X
	2	1	7- 7	I1
	3	2	8-10	F3.0
	4	3	11-15	F5.0
	5	4	16-23	F8.0
	6	5	24-31	F8.0
	7	6	32-39	F8.0
	8	7	40-47	F8.0
	9	8	48-55	F8.0

THREE CARDS PRECEDING NAVIGATION S :M (DOPPLER) DATA

(FIRST CARD ILLUSTRATIVE - ANY AL ANUMERIC TEXT MAY BE USED. NEXT TWO CARDS CONTAIN VARIABLE FORMAT FOR THE DATA READ STATEMENT.)



A TYPICAL DATA SUBSET FOR NAVIGATION SYSTEM (DOPPLER) DATA



DATA SET XVIII

NAVIGATION SYSTEM (NORMALLY DISTRIBUTED ERRORS)

(PRNV4)

If planner does not desire to play Hyperbolic, Rho Theta or Doppler type navigation system errors, but desires to play some error, he may input up to four sets of parameters to play normally distributed errors. Description of attached card format follows:

Item No.

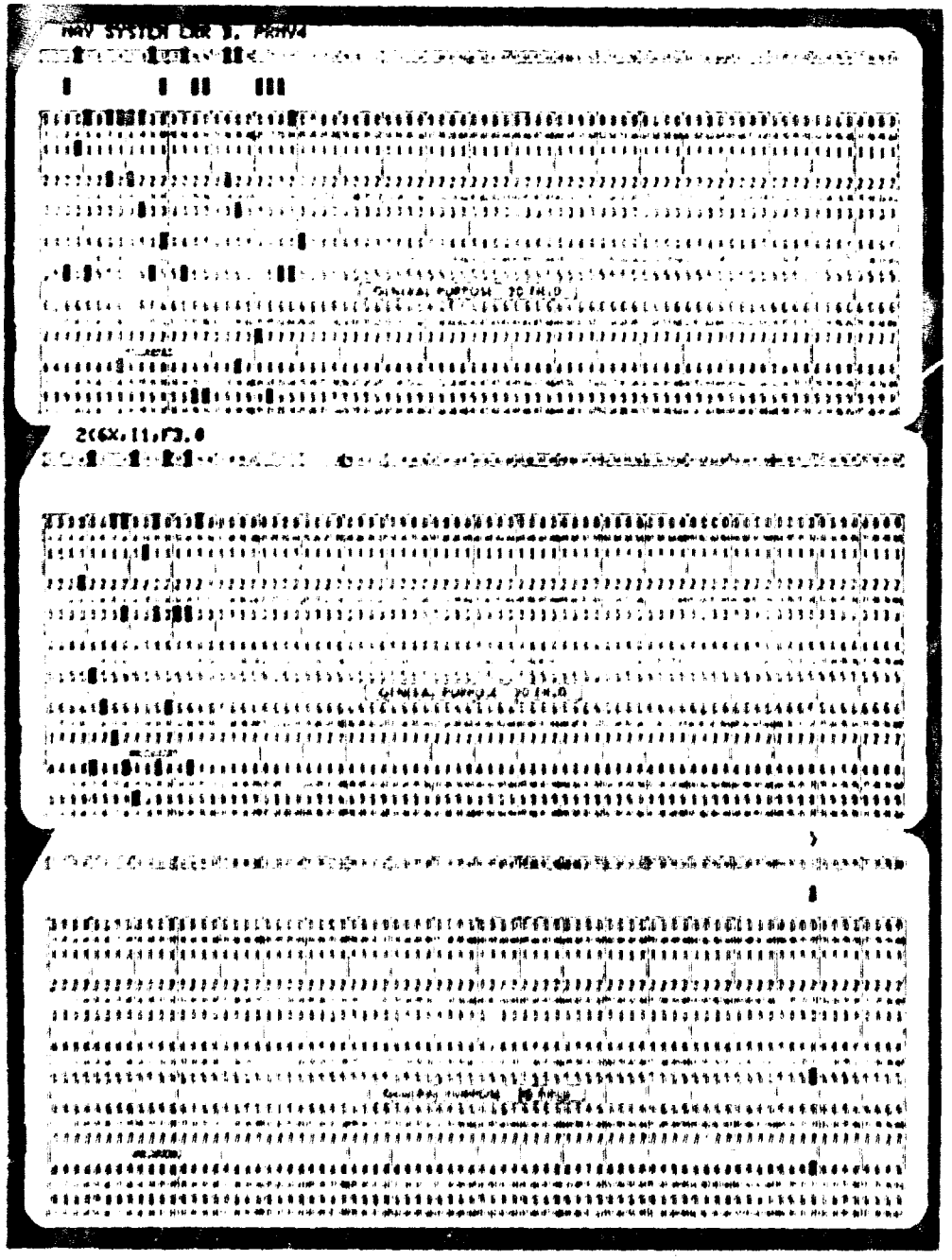
1. "NORMR" entered for planner ease in identification.
2. Code = (1, 2, 3, 4) to indicate ID of parameter set.
3. Standard deviation of the parameter set, (meters).

CARD FORMAT FOR NAVIGATION SYSTEM
(NORMALLY DISTRIBUTED ERRORS)

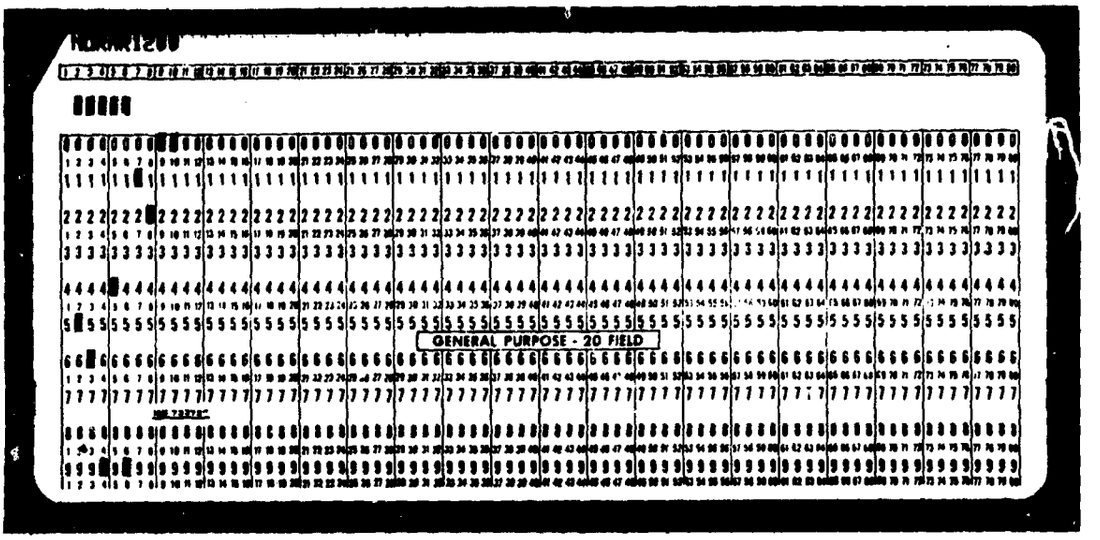
CARD 1	ITEM	WORD	COLUMNS	READ FORMAT
	1		1- 6	6X
	2	1	7- 7	I1
	3	2	8-10	F3.0

THREE CARDS PRECEDING NAVIGATION SYSTEM (NORMALLY DISTRIBUTED ERROR) DATA

(FIRST CARD ILLUSTRATIVE - ANY ALPHANUMERIC TEXT MAY BE USED. NEXT TWO CARDS CONTAIN VARIABLE FORMAT FOR THE DATA READ STATEMENT.)



A TYPICAL DATA SUBSET FOR NAVIGATION SYSTEM (NORMALLY DISTRIBUTED ERROR) DATA



DATA SET XIX

STASCAN ARRAYS

(RADAR AND VISUAL)

Item No.		
1.	ID of this STASCAN array. (numbered sequentially starting with the number following the last ARRAYUGS ID number, see Data Set I).	
2.	Generic type - prepunch VISS	
3.	Organization - see Note 1	
4.	Number of sensors in this array (Note all sensors in a STASCAN array must be of the same type, i.e., either all radars, or all image, and thermal viewer.)	
5.	ID of the first sensor	
	For Open Location	For Path Location
6.	0	ID of route
7.	x, meters	leg number
8.	y, meters	distance along leg, meters
9.	Planned up time (_ _ DDHHMM)	
10.	Planned down time (_ _ DDHHMM)	
11.	Prepunch 1 for hand emplaced.	
12.	ID of Position Error Parameter Set.	
13.	Is this array associated with a firetrap? [YES or NO]	
14.	ID of the firetrap system, if any.	
15.	Standard deviation for initial up time [Code as 0, 1, 2, or 3] see Note 2.	
16.	Nominal reemplacement time interval [hours]	
17.	Standard deviation, for variations from nominal value specified in 16. [Again, Code as 0, 1, 2 or 3 as defined in 15. Generally, the value here would be one less than value given in 15, when planner feels that less vagueness in time would exist once a previous emplacement has already been executed.]	
18.	Scheduled routine maintenance interval [days].	
19.	Randomness selection for scheduled maintenance [0 or 1] according to:	
	0	no randomness about value given in 18
	1	randomness played, using designer (interval) value for standard deviation, see Note 3.

Notes:

1. (Item 3) Eight spaces are provided. The first space is not used. The second space is alphanumeric and may be used to show mission of the sensor array (i.e., F for firetrap, L for listening post). The third space is numeric and designates the platoon level unit responsible for the array. The fourth space is alphanumeric and shows the company/troop/battery to which the platoon reports. The fifth through eighth spaces are alphanumeric and designate parent battalion. If the array is assigned to a company, the third space will be blank. If the array is assigned to the battalion, the third and fourth spaces will be left blank.

2. (Item 15) Tentative designer values corresponding to the choices 1, 2 and 3 are respectively 0.25 hours, 0.75 hours, and 2.0 hours.

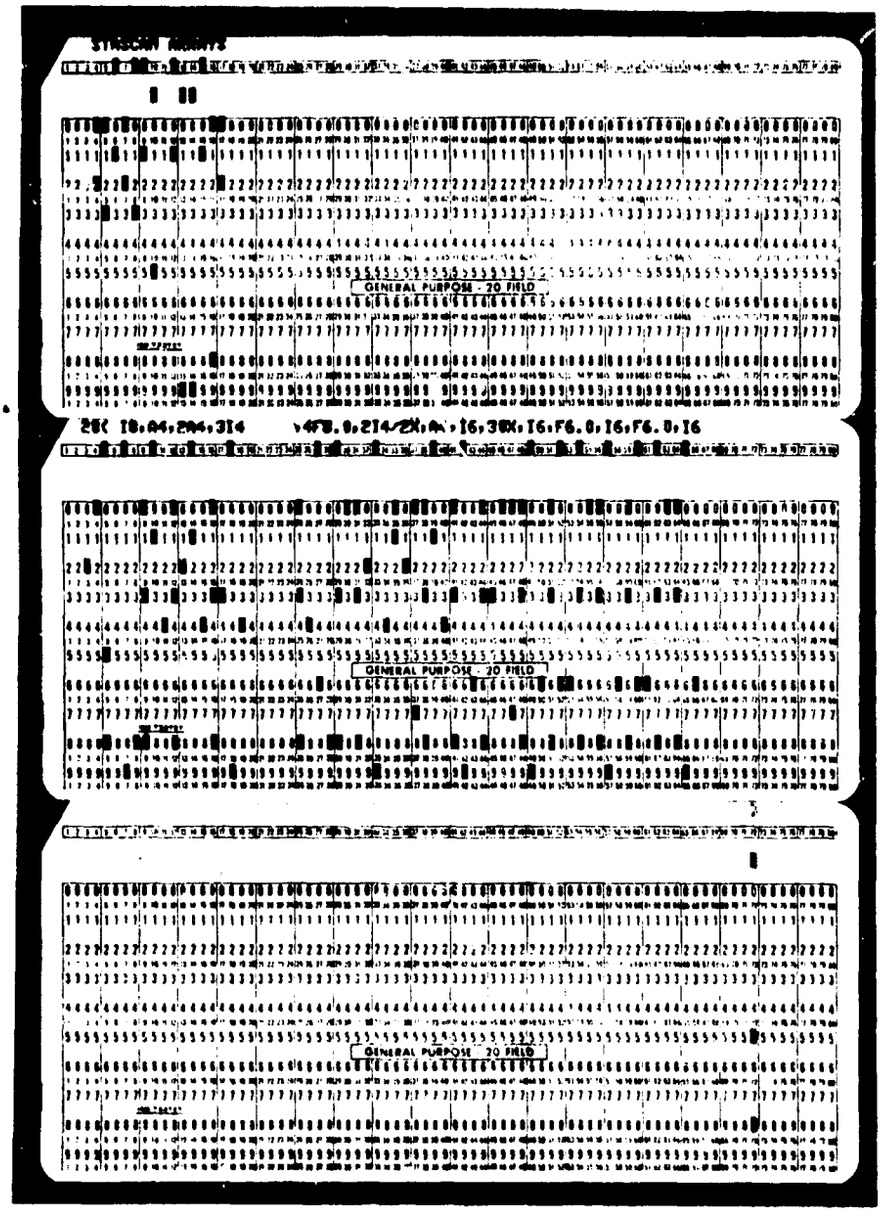
3. (Item 19) Tentative designer value = 1.0 day for the "1" choice.

CARD FORMAT FOR STASCAN ARRAYS

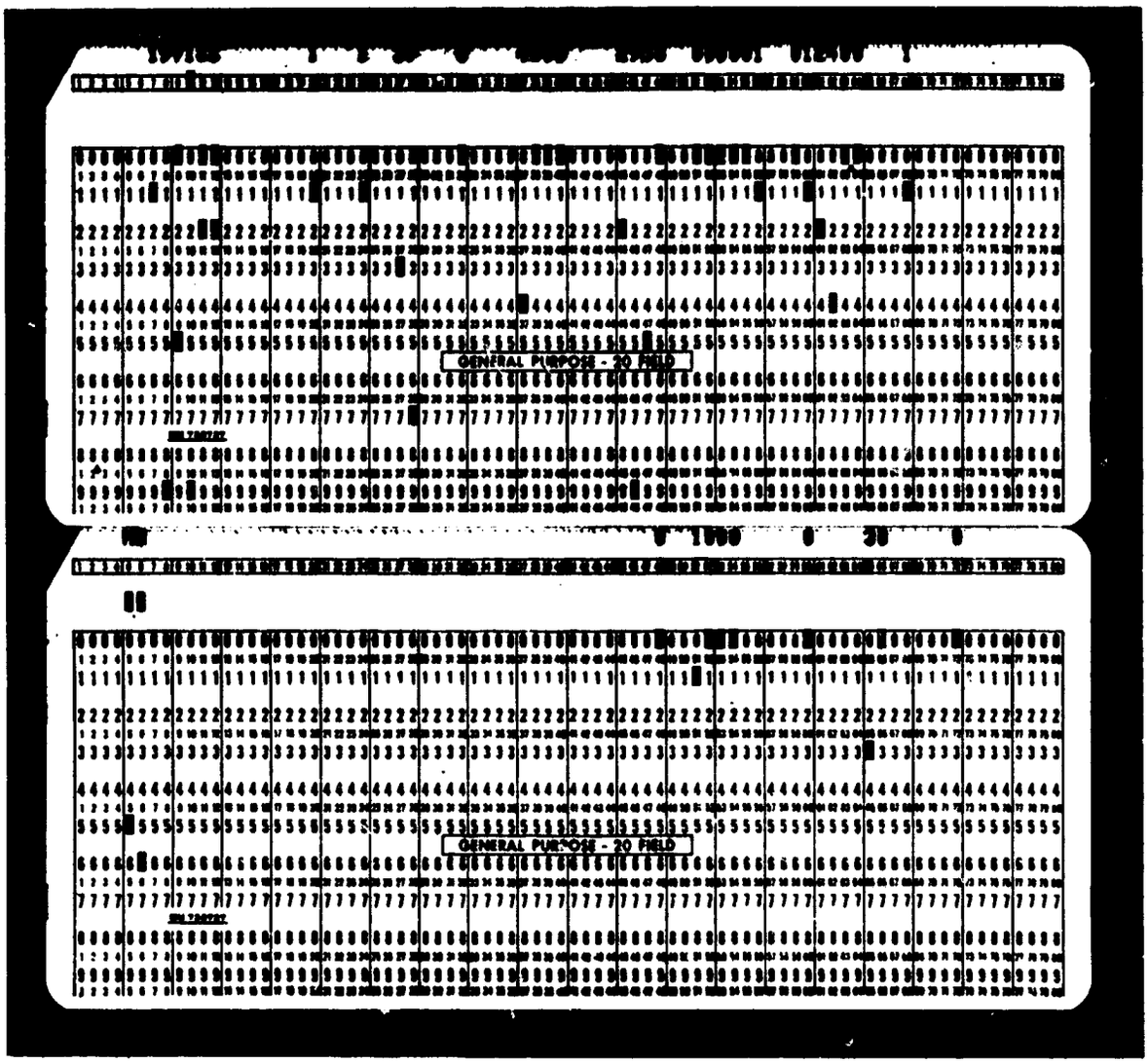
CARD 1	ITEM	WORD	COLUMNS	READ FORMAT
	1	1	1- 8	I8
	2	2	9-12	A4
	3	3,4	13-20	2A4
	4	5	21-24	I4
	5	6	25-28	I4
	6	7	29-32	I4
	7	8	33-40	F8.0
	8	9	41-48	F8.0
	9	10	49-56	F8.0
	10	11	57-64	F8.0
	11	12	65-68	I4
	12	13	69-72	I4
CARD 2	13	1	1- 6	2X, A4
	14	2	7-12	I6
	15	3	13-48	30X, I6
	16	4	49-54	F6.0
	17	5	55-60	I6
	18	6	61-66	F6.0
	19	7	67-72	I6

THREE CARDS PRECEDING STASCAN ARRAY DATA

(FIRST CARD ILLUSTRATIVE - ANY ALPHANUMERIC TEXT MAY BE USED. NEXT TWO CARDS CONTAIN VARIABLE FORMAT FOR THE DATA READ STATEMENT.)



A TYPICAL DATA SUBSET FOR STASCAN ARRAY DATA



DATA SET XX

MOVARRAY

MOVING SENSORS, TARGETS AND SOME FALSE TARGETS

Item No.

1. ID of MOVARRAY (ID of MOVARRAY follows sequentially the last ID number of the STASCAN Arrays - Data Set XIX).

2. Generic Type - prepunch MOVE.

3. Organization - see Note 1.

4. Number of sensors in this array (Planner may input 1 - 3 sensors in each MOVARRAY).

5. ID of first sensor in this array (ID of the first sensor in MOVARRAY follows sequentially the last STASCAN sensor ID number).

6. ID of the BLUE force that is the alias of this MOVARRAY ID.

7. Code to indicate type of navigation system associated with this MOVARRAY:

0	Perfect (no navigation errors to be played)
1	Hyperbolic
2	Rho Theta
3	Doppler
4	Normal Errors

8. Code (1, 2, 3, 4) that indicates which version of this navigation system that is applicable to this MOVARRAY (Planner may input 1-4 versions of this type navigation system by using the appropriate data set from sets XV, XVI, XVII, XVIII; if Item 7 is 0, this item is blank.

9. Probability of mission abort due to causes other than day/night timing of mission, sensor failure, or weather visibility conditions. (percent without decimal or equivalent decimal fraction)

10. Day/night mission restraint code (DAYO)

0	daylight only
1	night only
2	no restraints

11. Minimum ceiling (feet) which will result in the mission being cancelled. (KSKY)

12. Minimum visibility (meters) that will result in the mission being cancelled. (KSEE)

Note:

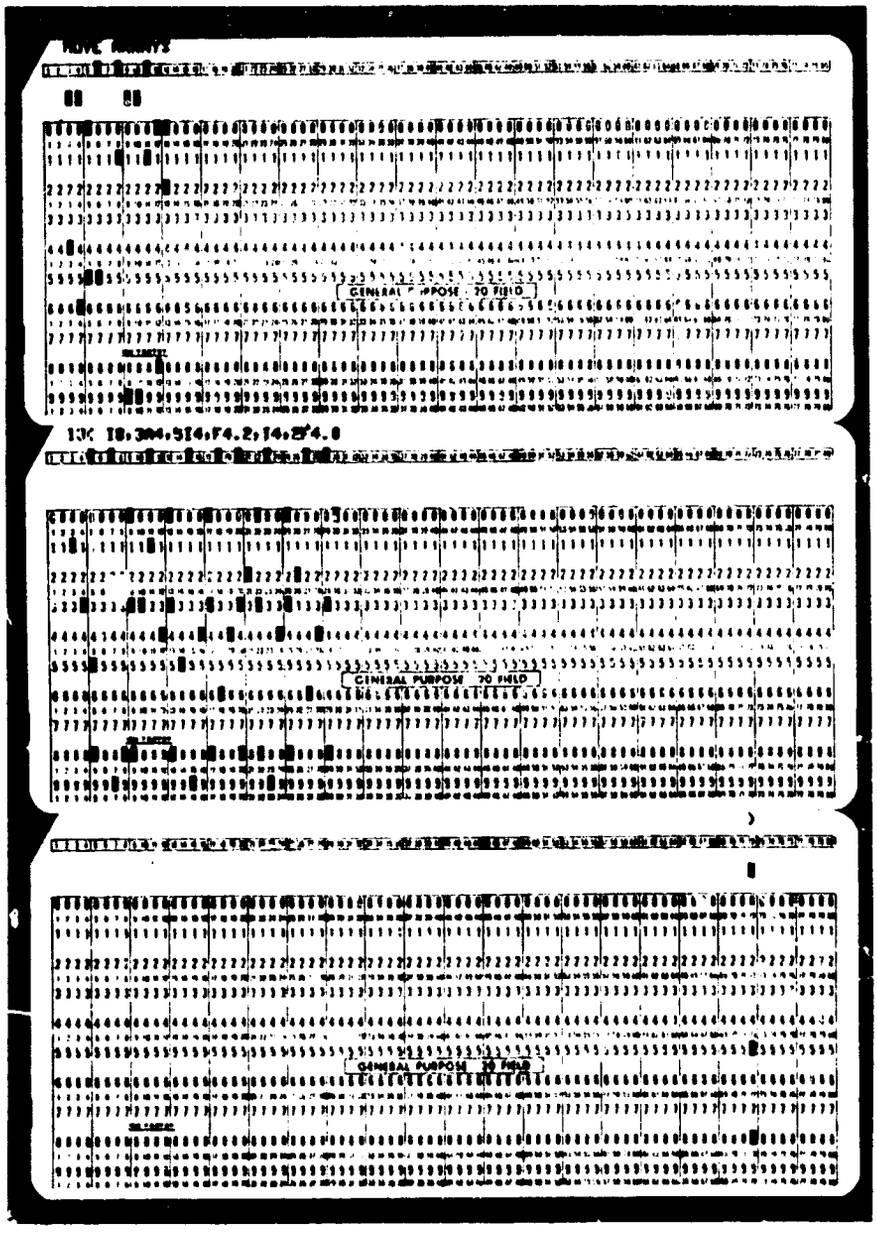
1. (Item 3) Eight spaces are provided. The first space is not used. The second space is alphanumeric and may be used to show mission of the sensor array (i.e., F for firetrap, L for listening post). The third space is numeric and designates the platoon level unit responsible for the array. The fourth space is alphanumeric and shows the company/troop/battery to which the platoon reports. The fifth through eighth spaces are alphanumeric and designate parent battalion. If the array is assigned to a company, the third space will be blank. If the array is assigned to the battalion, the third and fourth space will be left blank.

CARD FORMAT FOR MOVE ARRAYS

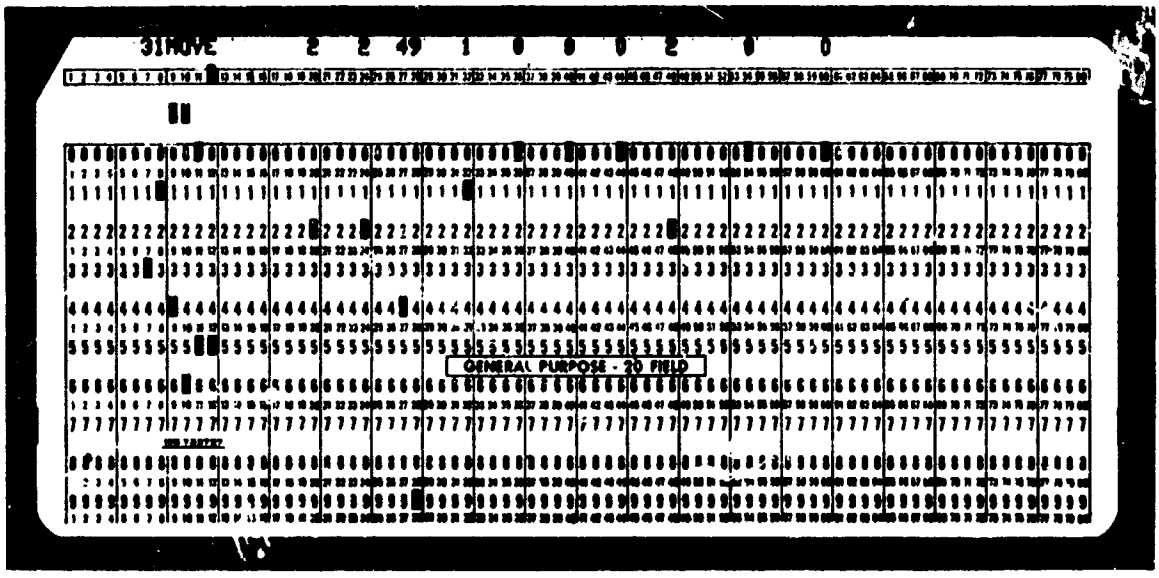
CARD 1	ITEM	WORD	COLUMNS	READ FORMAT
	1	1	1- 8	I8
	2	2	9-12	A4
	3	3,4	13-20	2A4
	4	5	21-24	I4
	5	6	25-28	I4
	6	7	29-32	I4
	7	8	33-36	I4
	8	9	37-40	I4
	9	10	41-44	F4.2
	10	11	45-48	I4
	11	12	49-52	F4.0
	12	13	53-56	F4.0

THREE CARDS PRECEDING FORCES (MOVARRAY) DATA

(FIRST CARD ILLUSTRATIVE - ANY ALPHANUMERIC TEXT MAY BE USED. NEXT TWO CARDS CONTAIN VARIABLE FORMAT FOR THE DATA READ STATEMENT.)



A TYPICAL DATA SUBSET FOR FORCES (MOVARRAY) DATA



DATA SET XXI
BLUE FORCES

Data sets XXI and XXII are the target inputs; however, some BLUE "targets" are moving sensor arrays and are identified as sensor arrays by the MOVARRAY ID number data set XX.

Item No.

1. Prepunch BLU
2. ID of this force numbered sequentially, starting with 1.
3. Organization (see Note 1).
4. Category

INDIV	SMVEH	TRAIN	RAFT
SQD	HVYTRK	HELO	OUTBRD
PLAT	TANK	LTA/C	PTBOAT
CO		JETA/C	

5. Number of elements.
6. Start operations time (__ DDHHMM)
7. ID of the Force Type Parameter Set
8. Blank
9. ID of route
10. AB, see Note 2
11. Nominal speed, km/hr
12. Altitude of aircraft, feet. (Blank if not aircraft)

Notes:

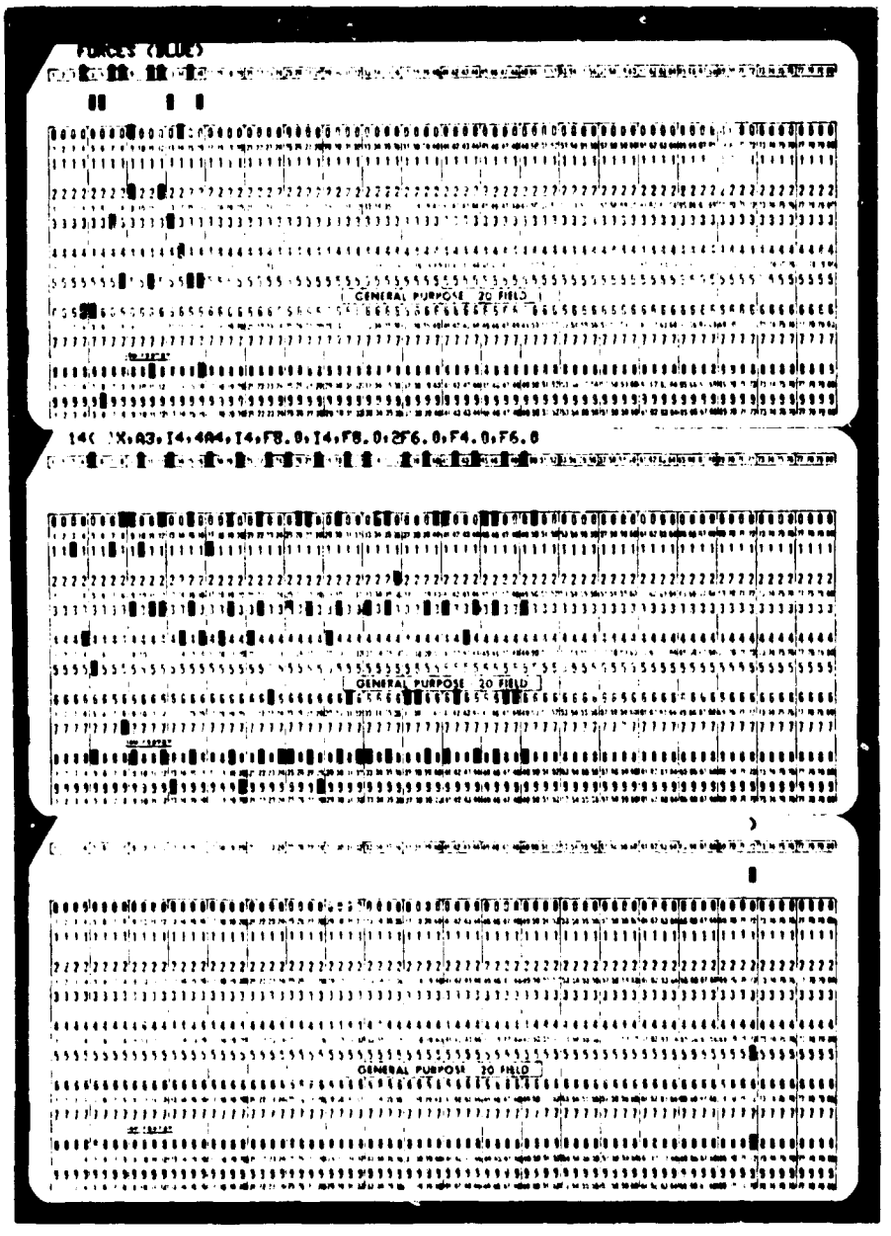
1. (Item 3) Eight spaces are provided. The first space is not used. The second space is alphanumeric and may be used to show mission of the sensor array (i.e., F for firetrap, L for listening post). The third space is numeric and designates the platoon level unit responsibile for the array. The fourth space is alphanumeric and shows the company/troop/battalion to which the platoon reports. The fifth through eighth spaces are alphanumeric and designate parent battalion. If the array is assigned to a company, the third space will be blank. If the array is assigned to the battalion, the third and fourth spaces will be left blank.
2. A is the number of the node where force starts move and B is the number of the node where force ends move.

CARD FORMAT FOR FORCES (BLUE OR RED)

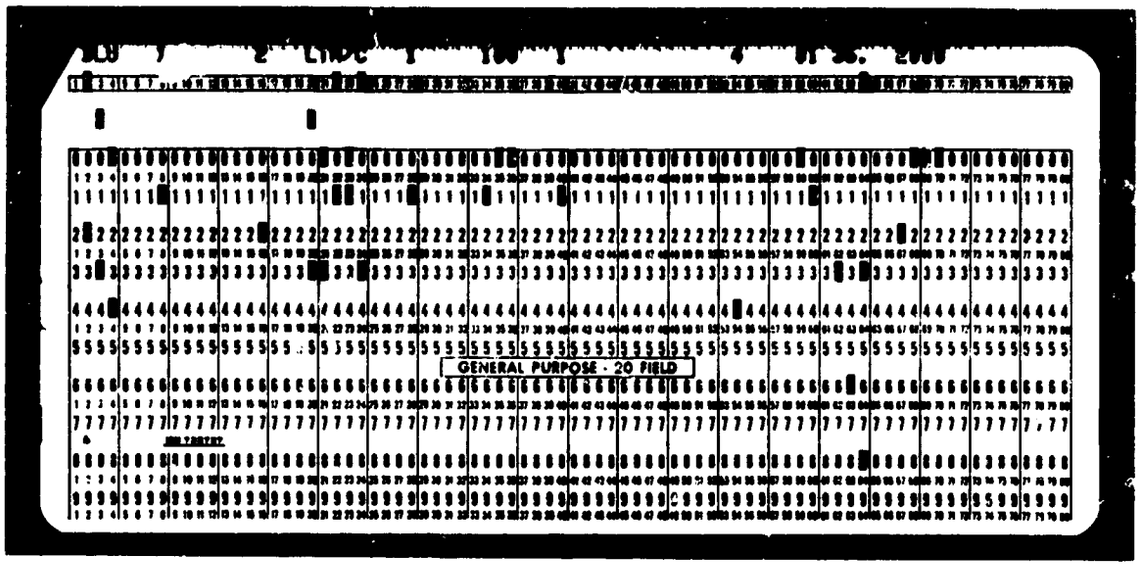
CARD 1	ITEM	WORD	COLUMNS	READ FORMAT
	1	1	1- 4	1X, A3
	2	2	5- 8	I4
	3	3, 4	9-16	2A4
	4	5, 6	17-24	2A4
	5	7	25-28	I4
	6	8	29-36	F8.0
	7	9	37-40	I4
	8	10	41-48	F8.0
	9	11	49-54	F6.0
	10	12	55-60	F6.0
	11	13	61-64	F4.0
	12	14	65-70	F6.0

THREE CARDS PRECEDING BLUE FORCES DATA

(FIRST CARD ILLUSTRATIVE - ANY ALPHANUMERIC TEXT MAY BE USED. NEXT TWO CARDS CONTAIN VARIABLE FORMAT FOR THE DATA READ STATEMENT.)



A TYPICAL DATA SUBSET FOR BLUE FORCES DATA



DATA SET XXII

RED FORCES

Item No.

1. Prepunch RED

2. ID of this force; ID of first RED force follows sequentially the last BLUE force ID number.

3. Organization, see Note 1

4. Category

INDIV	SMVEH	TRAIN	RAFT
SQD	HVYTRK	HELO	OUTBRD
PLAT	TANK	LTA/C	PTBOAT
CO		JETA/C	

5. Number of elements

6. Start operations time (_ _ DDHHMM)

7. ID of the Force Type Parameter Set

8. If this force is stationary, enter cease operations time, (_ _ DDHHMM), if moving, leave blank.

   Note: If stationary there must be some entry in the day/hour/minute group.

	For stationary	For moving
9.	x, meters	ID of route
10.	y, meters	AB (Note 2)

11. Nominal speed if moving, km/hr (blank if stationary)

12. Altitude of aircraft, feet (blank if not aircraft).

Notes:

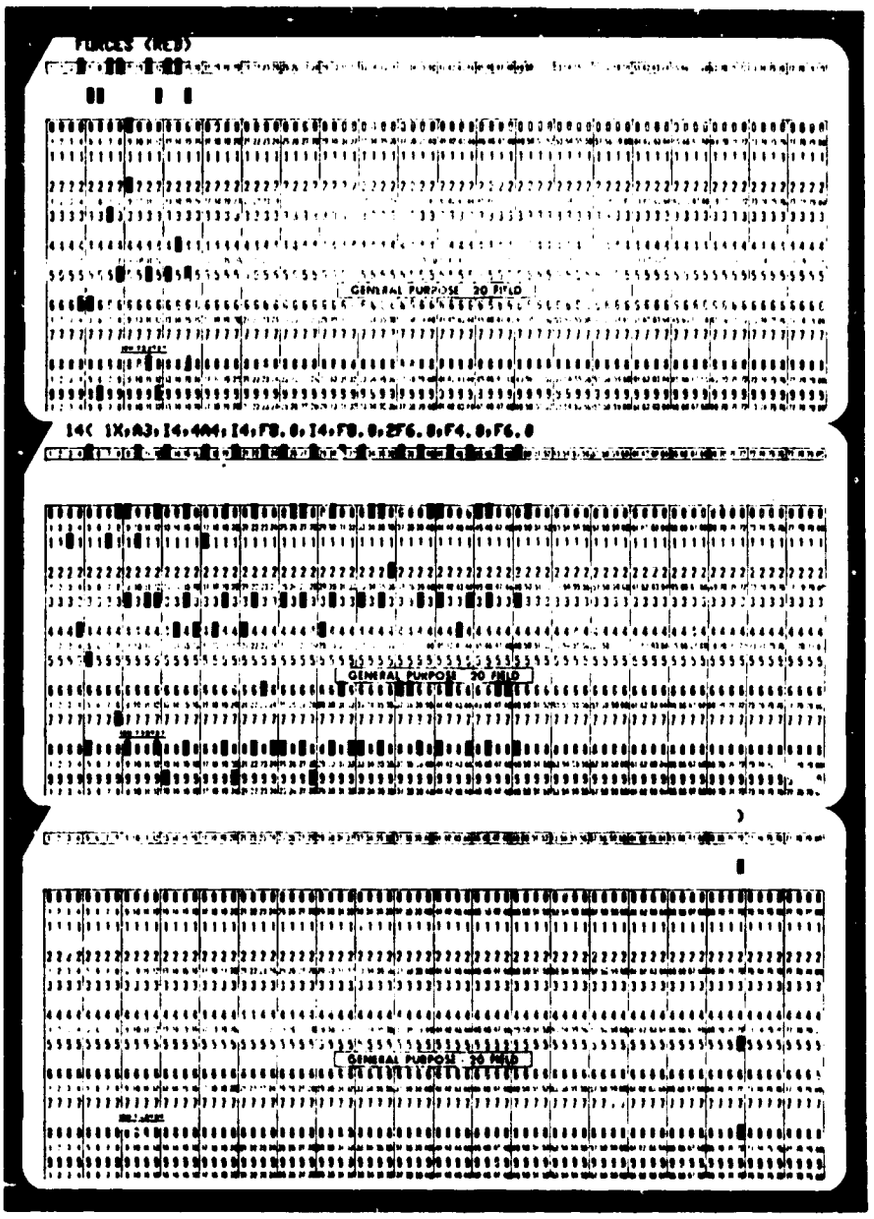
1. Same as for BLUE forces, Data Set XXI

2. Same as for BLUE forces, Data Set XXI

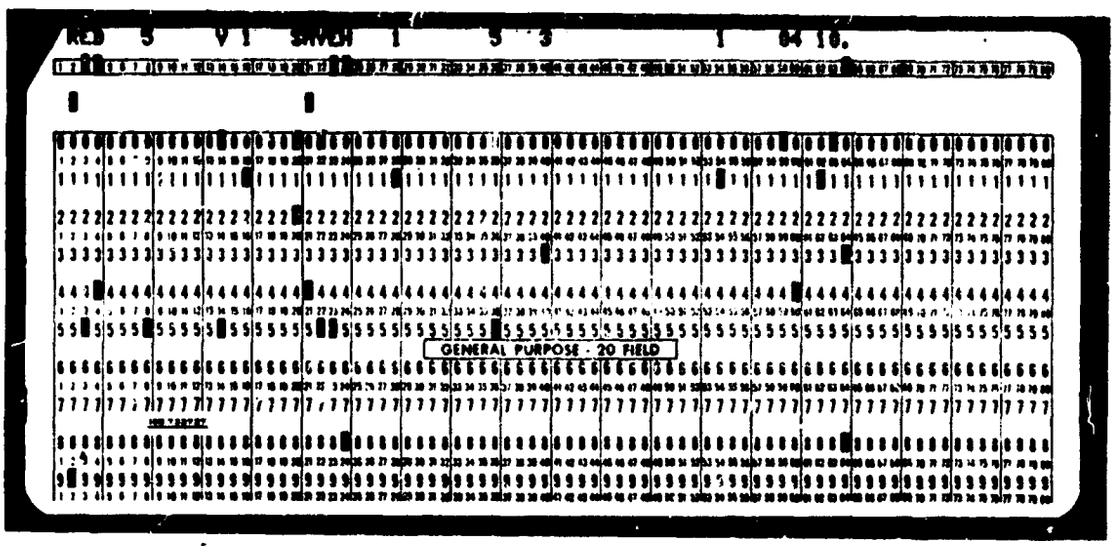
For card format, use same format as for BLUE Forces (Data Set XXI).

THREE CARDS PRECEDING RED FORCES DATA

(FIRST CARD ILLUSTRATIVE - ANY ALPHANUMERIC TEXT MAY BE USED. NEXT TWO CARDS CONTAIN VARIABLE FORMAT FOR THE DATA READ STATEMENT.)



A TYPICAL DATA SUBSET FOR RED FORCES DATA



DATA SET XXIII
BATTLE PIEVT TABLE
(PLANNER INPUT EVENTS SET)

Each event in the Battle Subroutine is fully described by a four digit number referred to as EVID. The first two digits indicate the general type of event, such as a vehicle, an aircraft, or an artillery round impacting. The third digit describes the class of the event, such as a light vehicle, a heavy tracked vehicle, etc. The fourth digit indicates whether the event is generated by enemy (0) or friendly (1) activities. The following EVID Table lists the event types and class considered in Battle. As an example, consider that a friendly 4.2-inch mortar is fired. The EVID to describe this event would be 0221. The first two digits, 02, designate the event as a mortar firing. The third digit, 2, designates the class of mortar as a 4.2-inch. The suffix, 1, designates that it is a friendly mortar. As a further example, an enemy 60-mm mortar impact would be designated by the EVID 0310.

The event classes listed in the table are suggested categories to be used by the planners. Other categories may be substituted as desired by the planner provided the substituted class behaves in a similar manner. That is other vehicles may be substituted for those shown, but whatever is substituted must behave like a vehicle.

Item No.

1. Index of this planner input event numbered sequentially from 0001 to number of input events.

2. This particular EVID (Event ID). (See table following for EVID descriptions.) Those EVIDswith the first two digits of 02, 04, 06, 08 and 10 will not be listed in this item. If the planner desires a specific weapon type, item 11 below will be used, where appropriate.

3. Day that this EVID is to occur. (Two digits, 01 for first day.)

4. Period and time that this EVID is to occur. A six digit number is used here. The first digit will be a 1, 2,3 or 4 to indicate the quarter of the day; midnight to 0600, 0600 to noon, noon to 1800 and 1800 to midnight, respectively. The next five digits will designate the number of whole seconds past the start of the quarter and can equal but not exceed 21599.

Note: The entries in items 1-4 must be completed for all planner input events. The entries in the remaining items may be completed if desired by the planner. Any entry in these remaining items will override any random selection. If the item entry is not completed, the program will randomly select an appropriate and compatible entry.

In items 5-15, the item entries are different depending upon the EVID type which is described by the first two digits of the EVID listed in item 2 (see Note 1).

Item No.

5. For EVID types 01-16, the X coordinate of the position where the event occurs.

   For EVID types 17-18, the X coordinate of the starting point of the event.

6. For EVID types 01-16, the Y coordinate of the position where the event occurs.

   For EVID types 17-18, the Y coordinate of the path starting point of the event.

7. Not used for EVID types 01, 12, 13, 14, 15, 16 and 18. For EVID types 03, 05, 07, 09, 11, the X coordinate of the center of the weapons firing.

   For EVID type 17, the X coordinate of the end of the first leg on the flight path.

8. Not used for EVID types 01, 12, 13, 14, 15, 16 and 18.

   For EVID types 03, 05, 07, 09 and 11, the Y coordinate of the center of weapons firing.

   For EVID type 17, the Y coordinate of the end of the first leg on the flight path.

9. Not used for EVID types 01, 12, 13, 14, 15, 16 and 18.

   For EVID types 03, 05, 07, 09 and 11, the range in meters between the event location (items 5 and 6) and the weapons firing (items 7 and 8).

   For EVID type 17, the X coordinate of the stopping point on the path. (Same value as in item 7, if only one leg is desired)

10. For EVID types 03, 05, 07, 09 and 11, the time of projectile flight in seconds.

    Not used for EVID types 01, 12, 13, 14, 15, 16 or 18.

    For EVID type 17, the Y coordinate of the stopping point on the path. (Same value as item 8, if only one leg is desired)

11. Not used for EVID types 01, 12, 13, 14, or 16. For EVID types 03, 05, 07, 09 and 11, this is the weapon type doing the firing.

11. continued

For EVID type 15, the altitude above ground of illumination (meters)

For EVID type 17, this is the aircraft speed in meters per second on the first leg of the path between the coordinates listed in items 5 and 6 and those in items 7 and 8.

For EVID type 18, this is the roadway or path identification number.

12. For EVID types 01 through 14, the number of explosions in a sequence or number of volleys fired by a weapon or group of weapons.

For EVID types 15 and 16, the duration or persistance of the event in seconds.

For EVID type 17, the aircraft speed in meters per second on the second leg of the path between the coordinates listed in items 7 and 8 and items 9 and 10.

For EVID type 18, the vehicle speed in meters per second.

13. For EVID types 01-14, the time in seconds between each of the explosions or volleys. If only one volley (or one explosion) is listed in item 12, enter a zero here.

For EVID type 15, the amount of light in candle power.

For EVID type 18, use AB. See note 2.

Not used for EVID types 16.

14. For EVID types 01-14, the number of simultaneous explosions from the same point (e.g., the number of rounds fired in a single volley).

For EVID types 15, the number of illuminating shells.

For EVID types 16 and 17, not used.

For EVID type 18, the space between vehicles in convoy expressed in the nearest meter.

15. For EVID types 01, 12, 13, 15 or 17, not used.

For EVID types 03, 05, 07, 09, 11 and 14, the height above ground at which event occurs expressed to the nearest meter.

For EVID type 18, the number of vehicles in convoy.

Note 1: Since EVID types 02, 04, 06, 08 and 10 are not included in this data set items 5-15 do not apply to these EVIDS.

2: A is the number of the node where event starts move and B is the number of the node where event ends move.

CARD FORMAT FOR BATTLE PIEVT TABLE

CARD 1	ITEM	WORD	COLUMNS	READ FORMAT
	1	1	1- 4	I4
	2	2	5- 9	F5.0
	3	3	10-12	F3.0
	4	4	13-19	F7.0
	5	5	20-25	F6.0
	6	6	26-31	F6.0
	7	7	32-37	F6.0
	8	8	38-43	F6.0
	9	9	44-49	F6.0
	10	10	50-55	F6.0
	11	11	56-60	F5.0
	12	13	61-65	F5.0
	13	13	66-71	F6.0
	14	14	72-76	F5.0
	15	15	77-80	F4.0

EVID DESCRIPTIONS FOR SUBROUTINE BATTLE

Event No.	Type Event	Event Class 1	2	3	4	5
01	Small arms firing	7.62mm 30 cal	12.7mm 14.5mm 50 cal	20mm 23mm	30mm	(Spare)
02	Mortar firing	45-50mm 60mm 81-82mm	4.2-inch 107mm 120mm	155mm 160mm	240mm	420mm
03	Mortar impacting	45-50mm 60mm 81-82mm	4.2-inch 107mm 120mm	155mm 160mm	240mm	420mm
04	Artillery firing	76-94mm 100-105mm-Chg 2 122mm-Low Chg	100-105mm-Chg 5 122mm-Med Chg 152-155mm-Chg 2	100-105mm-Chg 7 122mm-High Chg 152-155mm-Chg 5	152-155mm-Chg 7 175mm-Med Chg 8-inch-Med Chg	175mm-High Chg 8-inch-High Chg 310mm
05	Artillery impacting	76mm 94mm	100mm 105mm 122mm	152mm 155mm	175mm 8-inch	310mm
06	Direct Fire (Firing)	37-40mm 57mm	85-88mm 90mm	100mm	115mm 122mm	152mm
07	Direct Fire (Impacting)	37-40mm 57mm	85-88mm 90mm	100mm	115mm 122mm	152mm
08	Rockets & Missiles (Firing)	3.5-inch REDEYE RPG 2 & 7	82mm RL 115mm RL 130mm RL 140mm	TOW SS-11 Shillelagh	250mm 318mm (LJ) 400mm	600mm 762mm (HJ) 850mm

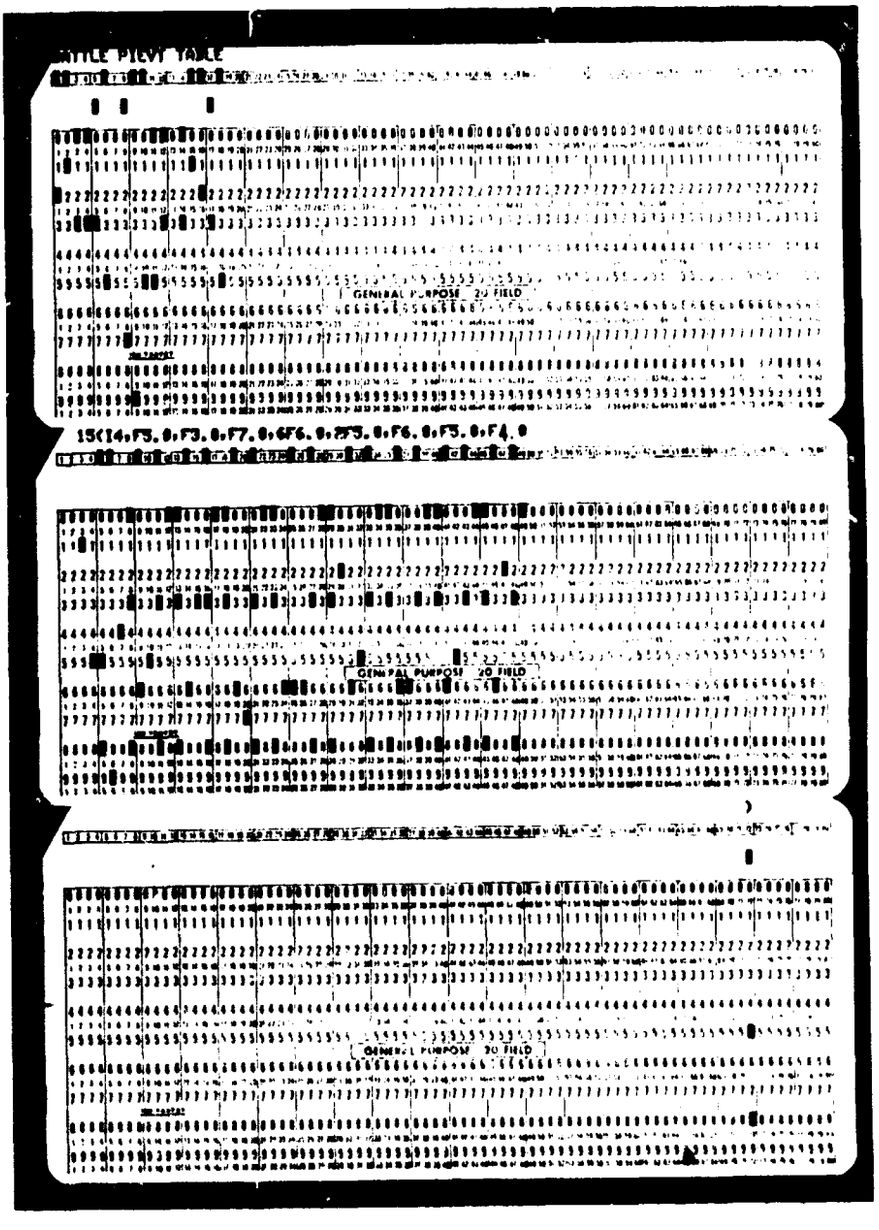
EVID DESCRIPTIONS FOR SUBROUTINE BATTLE (Continued)

Event No.	Type Event	Event Class 1	2	3	4	5
09	Rockets & Missiles (Impacting)	3.5-inch REDEYE 40mm (RPG)	82mm 115mm 130mm 140mm	TOW SS-11 Shillelagh	250mm 318mm 400mm	600mm 762mm 850mm
10	Recoilless Rifle (Firing)	57mm	75mm 82mm	105mm 107mm	(Spare)	(Spare)
11	RR (Impacting)	57mm	75mm 82mm	105mm 107mm	(Spare)	(Spare)
12	Mines	Hand Grenades, AP mines	10-15 lb AT	105mm (wired)	155mm (wired)	155mm (Cache TNT)
13	Bombs	250 lb	500 lb	750 lb	1000 lb	2000 lb
* 14	Nuclear	Less 2 KT	2-20 KT	20-100 KT	0.1-1 MT	Greater 1 MT
15	Illumination	Trip Flare 45,000 CP 30 sec burn	60mm 250,000 CP 30 sec burn	81 & 105mm 500,000 CP 60 sec burn	155mm 1,000,000 CP 60 sec burn	Photo Flash 120,000,000 CP 0.04 sec burn
* 16	Dust Cloud	Light cal artillery	Med & Hvy cal artillery	250-500 lb bombs	750-2000 lb bombs	Nuclear
17	Aircraft	Light & Med Hel-LOH; UH-1; AH-1G; AH-56	Large Hel-CH-47; CH-54	Fixed-wing LP-OV-1; L-19	Fixed-wing-HP- OV-10; AD-5	Jet Fighters F4; F-100 thru F-106
18	Military Vehicles	Light Wheeled Less 1 Ton	Med Wheeled 1-5 Ton	Hvy Wheeled Greater 5 Ton	Light Tracked Less 20 Ton	Hvy Tracked Greater 20 Ton
19	Spare					
20	Spare					

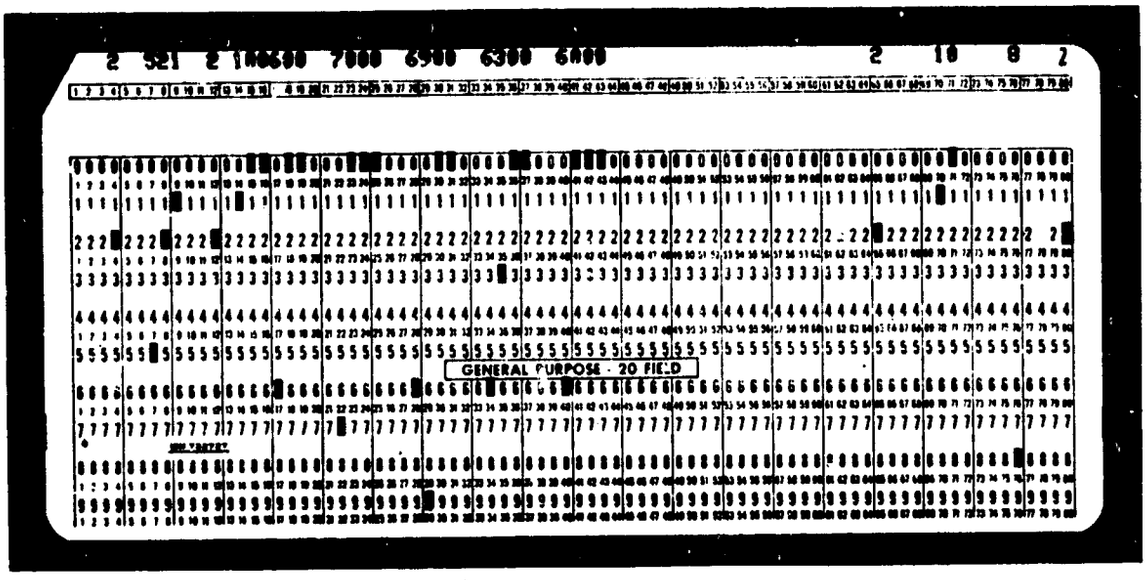
* The present version of the program does not play these.

THREE CARDS PRECEDING BATTLE PIEVT TABLE DATA

(FIRST CARD ILLUSTRATIVE - ANY ALPHANUMERIC TEXT MAY BE USED. NEXT TWO CARDS CONTAIN VARIABLE FORMAT FOR THE DATA READ STATEMENT.)



A TYPICAL DATA SUBSET FOR BATTLE PIEVT TABLE DATA



DATA SET XXIV

BATTLE RSEVT TABLE

(RANDOM EVENTS SET)

Item No.	
1.	ID index for random events to occur for particular EVID.
2.	EVID which will occur randomly. For coupled events, such as weapon firing and impact from this firing, only list the EVID of the impact. Do not list the weapon firing in type events such as 02, 04, 06, 08, or 10.
3.	Number of this type of EVID that will occur randomly on the first day between midnight and 0600 hours.
4.	Number of this type of EVID that will occur randomly on the first day between 0600 and 1200 noon.
5.	Number of this type of EVID that will occur randomly on the first day between 1200 noon and 1800.
6.	Number of this type of EVID that will occur randomly on the first day between 1800 and midnight.
7-10.	Same as 3-6 above, but for second day.
11-14.	Same as 3-6 above, but for third day.
15-18.	Same as 3-6 above, but for fourth day.
etc.	(For as many days as necessary)

Note: To handle more than a 4-day game requires change in the variable format card. Card 2 only applies to games of more than 4 days.

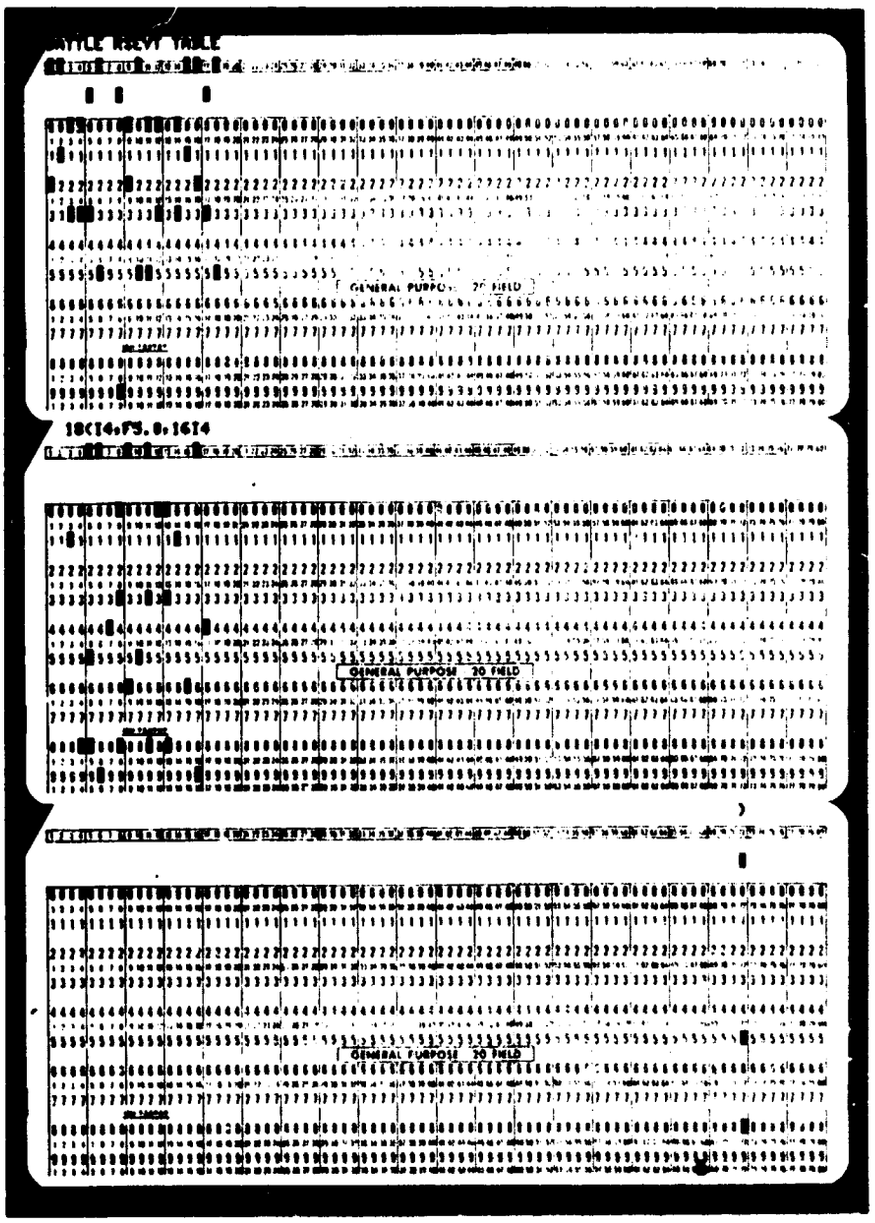
CARD FORMAT FOR BATTLE RSEVT TABLE

CARD 1	ITEM	WORD	COLUMNS	READ FORMAT
	1	1	1- 4	I4
	2	2	5- 9	F5.0
	3	3	10-13	I4
	4	4	14-17	
	5	5	18-21	
	6	6	22-25	
	7	7	26-29	
	8	8	30-33	
	9	9	34-37	
	10	10	38-41	
	11	11	42-45	
	12	12	46-49	
	13	13	50-53	
	14	14	54-57	
	15	15	58-61	
	16	16	62-65	
	17	17	66-69	
	18	18	70-73	I4
CARD 2	19	1	1- 4	I4
	20	2	5- 8	
	21	3	9-12	
	22	4	13-16	
	23	5	17-20	
	24	6	21-24	
	25	7	25-28	
	26	8	29-32	
	27	9	33-36	
	28	10	37-40	
	29	11	41-44	
	30	12	45-48	
	31	13	49-52	
	32	14	53-56	
	33	15	57-60	
	34	16	61-64	
	35	17	65-68	
	36	18	69-72	
	37	19	73-76	
	38	20	77-80	I4

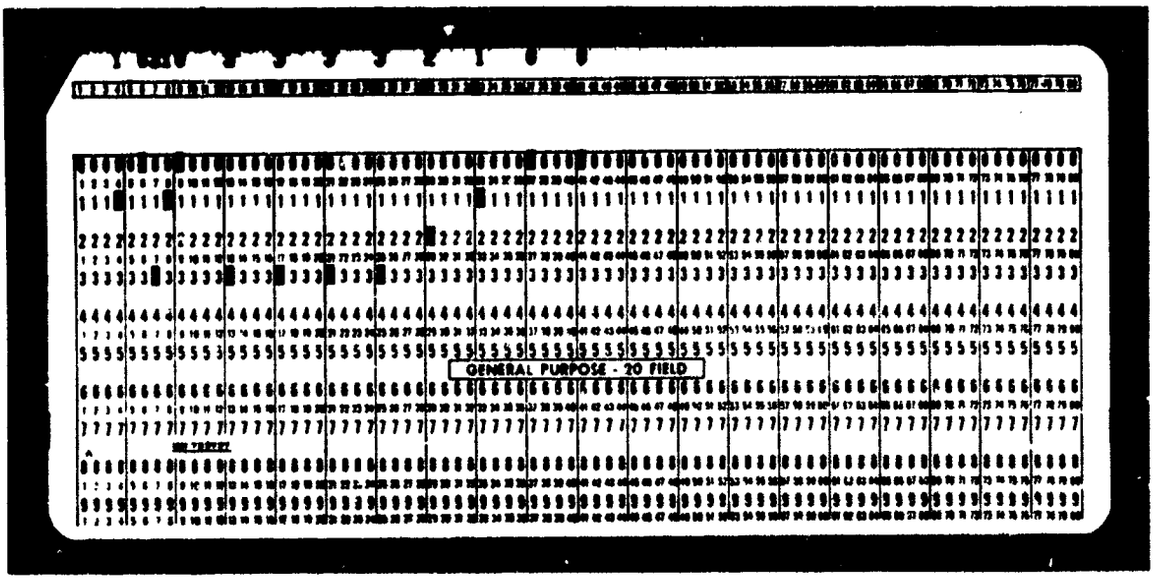
Note: Card 3 - ..., (if necessary) require same format as Card 2.

THREE CARDS PRECEDING BATTLE RSEVT TABLE DATA

(FIRST CARD ILLUSTRATIVE - ANY ALPHANUMERIC TEXT MAY BE USED. NEXT TWO CARDS CONTAIN VARIABLE FORMAT FOR THE DATA READ STATEMENT.)



A TYPICAL DATA SUBSET FOR BATTLE RSEVT TABLE DATA



DATA SET XXV

BATTLE XCLUA TABLE

(EXCLUSION AREA SET)

Item No.

1. ID of this exclusion area. Listed sequentially from 1 to maximum number of exclusion areas. Limited to 20 area.

2. West boundary (minimum X-coordinate to nearest meter) of this exclusion area.

3. East boundary (maximum X-coordinate to nearest meter) of this exclusion area.

4. South boundary (minimum Y-coordinate to nearest meter) of this exclusion area.

5. North boundary (maximum Y-coordinate to nearest meter) of this exclusion area.

Note: All exclusion areas are defined by rectangles with sides parallel to the North-South (X-Y) coordinate axes. Irregular areas may be defined by the union of several contiguous rectangles.

6. Level of safety desired around this exclusion area A one digit number 2, 3 or 4 is entered to designate increasing safety level respectively, in the Designer Input SAFETY Table (see Appendix I).

7. EVID (event identifier) that is excluded from this exclusion area. Excluded EVID's are limited to Event Types 01, 03, 05, 07, 09, 11, 12, 13 and 15.

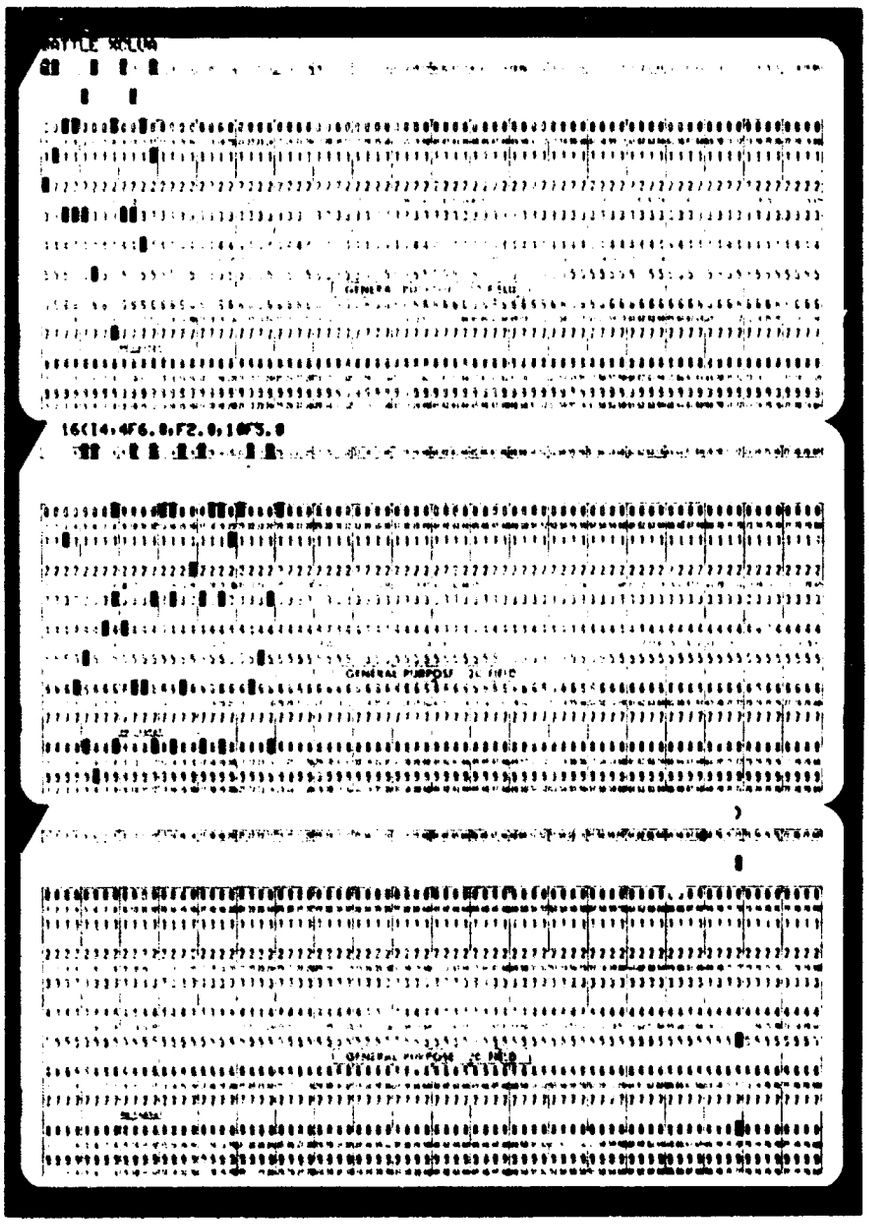
8-16. Additional EVID's excluded from this exclusion area.

CARD FORMAT FOR BATTLE XCLUA TABLE

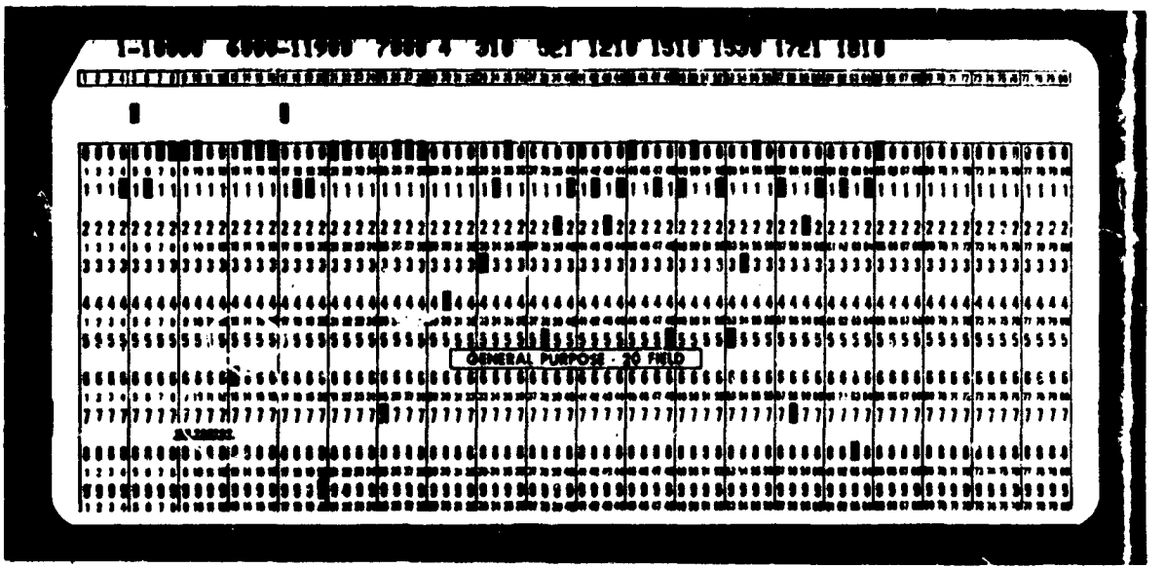
CARD1	ITEM	WORD	COLUMNS	READ FORMAT
	1	1	1- 4	I4
	2	2	5-10	F6.0
	3	3	11-16	F6.0
	4	4	17-22	F6.0
	5	5	23-28	F6.0
	6	6	29-30	F2.0
	7	7	31-35	F5.0
	8	8	36-40	F5.0
	9	9	41-45	F5.0
	10	10	46-50	F5.0
	11	11	51-55	F5.0
	12	12	56-60	F5.0
	13	13	61-65	F5.0
	14	14	66-70	F5.0
	15	15	71-75	F5.0
	16	16	76-80	F5.0

THREE CARDS PRECEDING BATTLE XCLUA TABI E DATA

(FIRST CARD ILLUSTRATIVE - ANY ALPHANUMERIC TEXT MAY BE USED. NEXT TWO CARDS CONTAIN VARIABLE FORMAT FOR THE DATA READ STATEMENT.)



A TYPICAL DATA SUBSET FOR BATTLE XCLUA TABLE DATA



DATA SET XXVI
BATTLE FSPTB TABLE
(FIRESUPPORT BASE SET)

Item No.

1. Index number to identify this fire support base. List of index numbers are sequential from 1 to the maximum number of firing bases.

2. X-coordinate of this fire support base.

3. Y-coordinate of this fire support base.

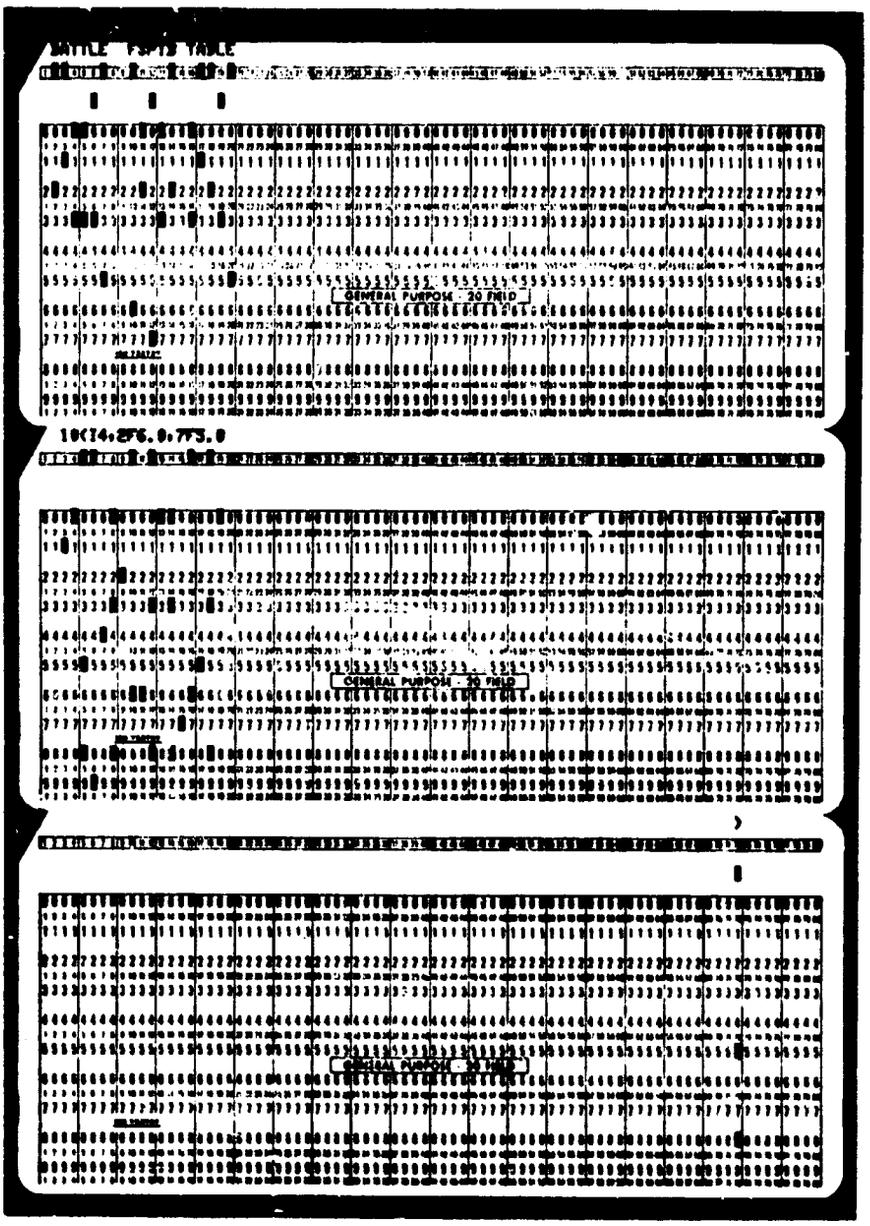
4-10. Event EVID's (weapons) that use this fire base. The impact EVID is listed rather than the specific firing weapon. The only types that may be listed are 051, 052, 053, 054, 055, 094 and 095. The suffix 0 or 1 must be added to distinguish between enemy and friendly weapon bases.

CARD FORMAT FOR BATTLE FSPTB TABLE

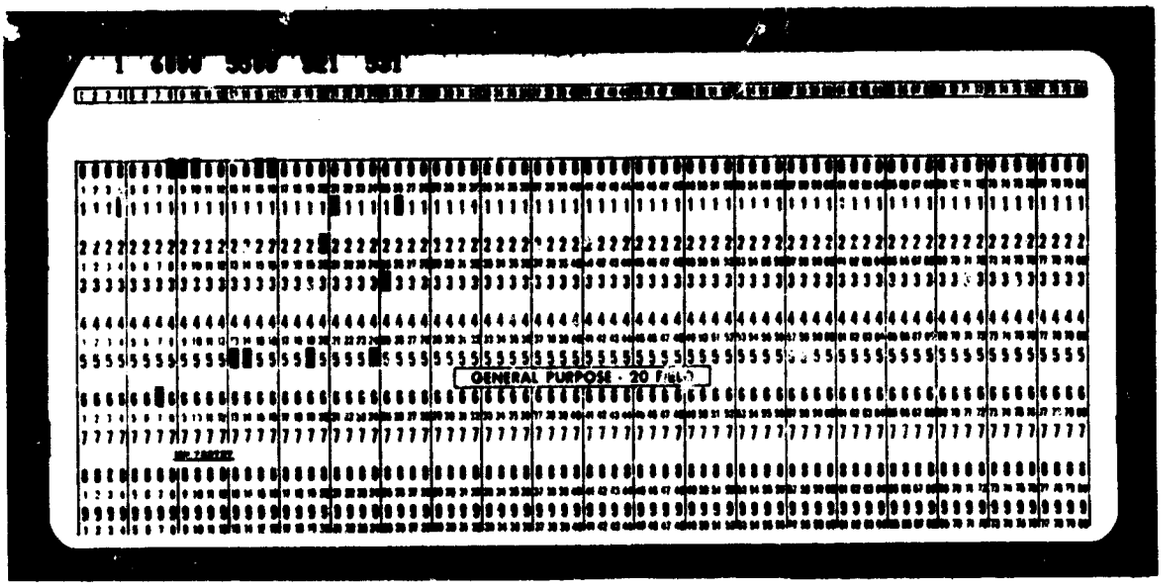
CARD 1	ITEM	WORD	COLUMNS	READ FORMAT
	1	1	1- 4	I4
	2	2	5-10	F6.0
	3	3	11-16	F6.0
	4	4	17-21	F5.0
	5	5	22-26	F5.0
	6	6	27-31	F5.0
	7	7	32-36	F5.0
	8	8	37-41	F5.0
	9	9	42-46	F5.0
	10	10	47-51	F5.0

THREE CARDS PRECEDING BATTLE FSPTB TABLE DATA

(FIRST CARD ILLUSTRATIVE - ANY ALPHANUMERIC TEXT MAY BE USED. NEXT TWO CARDS CONTAIN VARIABLE FORMAT FOR THE DATA READ STATEMENT.)



A TYPICAL DATA SUBSET FOR BATTLE FSPTB TABLE DATA



DATA SET XXVII
CULTURE PCEVT TABLE
(PLANNER EVENT SETS)

Each event in the Culture Subroutine is described by a four digit number referred to as CEVID. The first two digits indicate the general type of event, such as villages, air terminals, or vehicular traffic. The third digit describes the class of events such as a small village, dirt runway with light aircraft, etc. The fourth digit is assigned the value 3 to distinguish the CEVIDs from the EVIDs where the fourth digit indicates that the event is generated by enemy (0) or friendly (1) activities.

The events listed in the Table are suggested categories to be used by the planners. Other categories may be substituted as desired provided the substituted class behaves in a similar manner.

Item No.

1. Index number to identify this particular planner input event, numbered sequentially from 1 to maximum number of planner input events.

2. This particular CEVID. See table following for CEVID type descriptions.

   Notes:

   a. For CEVID types 01, 02 and 03, items 5, 6, 7 and 9 must be completed.

   b. For CEVID types 04 and 05, items 5, 6, 7 and 9 must be completed.

   c. For CEVID 101, columns 5, 6, 7 and 9 must be completed.

   d. For CEVID types 06, 07, 08, 09 and 10 (but not 101), items 3 and 4 must be completed.

3. For CEVID types 01, 02, 03, 04, 05 and CEVID 101, not used.

   For CEVID types 06, 07, 08, 09 and 10 (except CEVID 101) the day is entered. First day of game is 01.

4. Not used for CEVID types 01 to 05, inclusive, and CEVID 101.

   For CEVID types 06 to 10, inclusive (except CEVID 101) this is the period and time that this CEVID will occur. The first digit will be a 1, 2, 3 or 4 to indicate the quarter of the day; i.e., midnight to 0600, 0600 to noon, noon to 1800, and 1800 to midnight, respectively. The next five digits are the number of seconds past the start of the quarter and cannot equal or exceed 21600.

5. For CEVID types 01, 02 and 03 and CEVID 101 the X coordinate of the CEVID or center of the CEVID as represented by a circular area.

For CEVID types 04 and 05 the X coordinates of one end of the CEVID.

For CEVID types 06 to 10, inclusive (except CEVID 101) the starting X coordinate.

6. Same as Item 5 except Y coordinate.

7. For CEVID types 01, 02, 03 and CEVID 101 the radius of the circular area of the CEVID (which may be 0 for point noise sources.)

For CEVID types 04 and 05, the X coordinate of the other end of the source.

For CEVID types 06 - 10, inclusive (except CEVID 101), the X-coordinate at the end of the path.

8. Not used for CEVID types 01, 02 or 03 or CEVID 101.

For all other CEVID types, the same as Item 7 above, except the Y coordinate.

9. For CEVID types 01 to 05 inclusive and CEVID 101, enter 1 or 2 to indicate activity level associated with a curfew or no curfew, respectively. (See TABLE I-23)

For CEVID types 06, 07, 08 and 09 identify the path by 4 digits to designate the trails, railroad, waterway or air corridor to be used by this CEVID. First 2 digits are path I. D., 3d digit is the leg node of the beginning of the route, 4th digit is the leg node at the end of the route.

Not used for CEVID's 102, 103, 104, or 105.

10. For CEVID types 06-09, inclusive and CEVID 101, enter 1, 2 or 3 to indicate a low, medium, or high relative strength factor, respectively. (See TABLE I-23)

For CEVID types 06-10, inclusive (except CEVID 101), the speed in meters per second of the CEVID.

11. For CEVID type 09, the aircraft altitude in meters.

Not used for any other CEVID types.

CARD FORMAT FOR CULTURE PCEVT TABLE

CARD 1	ITEM	WORD	COLUMNS	READ FORMAT
	1	1	1- 4	I4
	2	2	5- 9	F5.0
	3	3	10-12	F3.0
	4	4	13-19	F7.0
	5	5	20-25	F6.0
	6	6	26-31	F6.0
	7	7	32-37	F6.0
	8	8	38-43	F6.0
	9	9	44-47	F4.0
	10	10	48-51	F4.0
	11	11	52-55	F4.0

CEVID DESCRIPTIONS FOR SUBROUTINE CULTURE

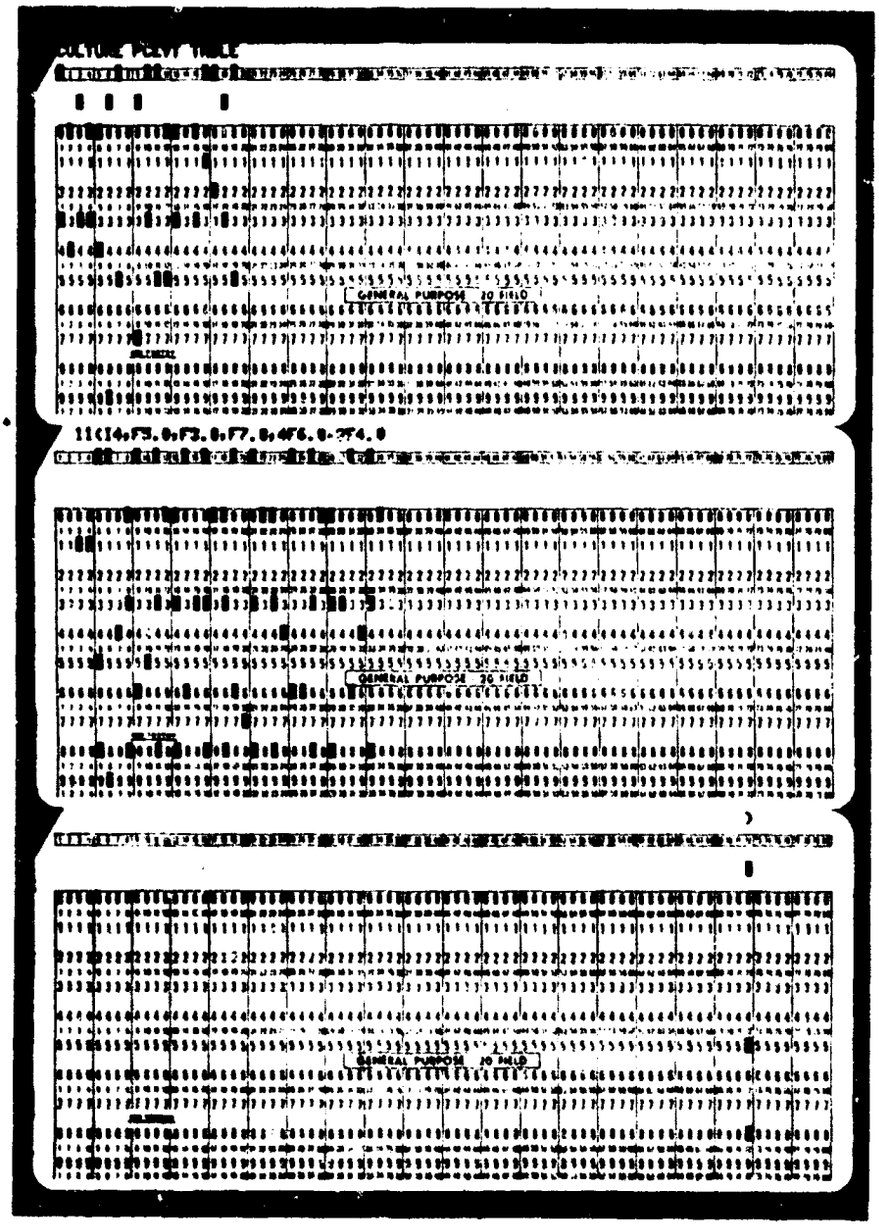
Event No.	Type Event	Event Class 1	2	3	4	5
01	Built-up populated area	Rural Village No Machinary Less than 50 people	Small Village Limited machinary, 50 to 500 people	Large Village Some machinary, limited industry, 500 to 2000 people	Town, with factory, modern facilities and some traffic 2000-10,000	Dense population Dense traffic Industrial Over 10,000
02	Single source noise generators	Small pumps and engines	Water wheels	Small generator, 30 KW	Large generator, 100 KW	Single point power source-pile driver, etc.
03	Air terminals	Dirt runway Light acft	Hard surface Sparse -light and medium acft	Surfaced Moderate, medium acft	Surfaced Heavy traffic, propellor	Surfaced, heavy traffic, mixed
04	Surf	Light lapping waves	Moderate, small waves	Large waves on beach	Large waves against rocks	Turbulent, stormy
05	Vehicle traffic (background)	Bicycles, carts scooters, etc. Less than 500 lbs	Powered light vehicles w/ class 1, less than 2000 lbs	Small cars, light trucks w/ class 2, less than 4000 lbs	Class 3 plus medium trucks up to 2 1/2 ton	Class 4 plus heavy trucks, buses, over 2 1/2 ton
06	Vehicles	"	"	"	"	"
07	Boats	Canoes, gondolas, row boats (no engines)	Sampans, small power boats and rafts	Medium size power boats and speed boats	Large, paddle-wheel type boats and screw prop.	Large, powered, SES and hydrofoil
08	Railroad trains	Hand pump car	Small powered engine	Passenger train-several cars	Engine w/ moderate-size freight train	Diesel powered locomotive and large freight train

CEVID DESCRIPTIONS FOR SUBROUTINE CULTURE (Continued)

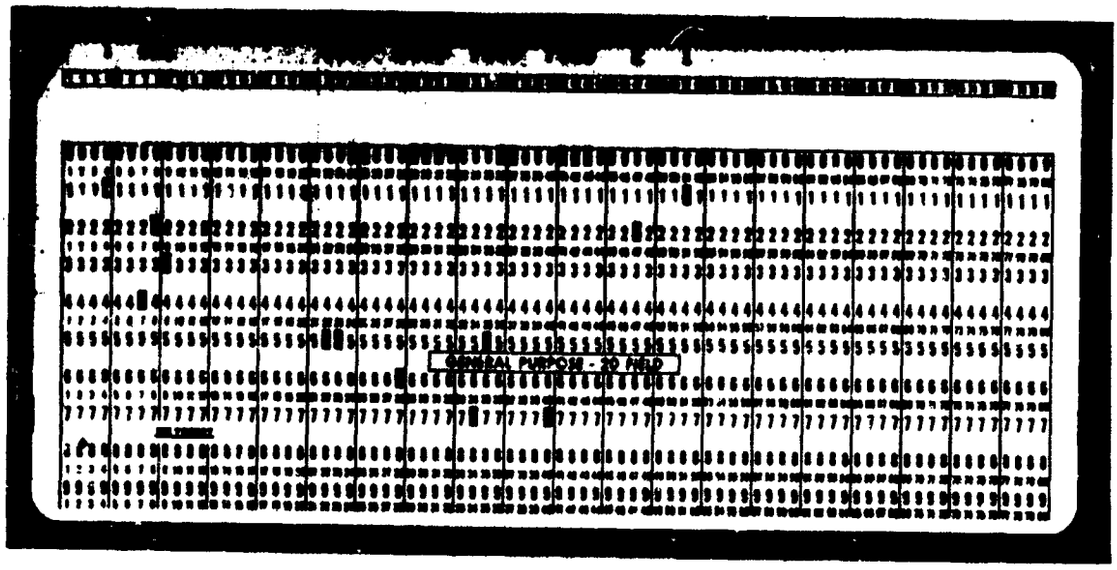
Event No.	Type Event	Event Class				
		1	2	3	4	5
09	Aircraft	Light-cub Single engine	Light-twin engine	Medium size (DC 3) twin engine	Heavy propeller transport DC 6	Heavy jet transport, 707
10	Animals	Small rodents, crickets, birds, and animal noises	Small dogs, cats, rabbits	Wild boar, deer, large dogs, monkeys	Large animals, lion, tigers, bears, apes	Horses, water buffalo, cattle

THREE CARDS PRECEDING CULTURE PCEVT TABLE DATA

(FIRST CARD ILLUSTRATIVE - ANY ALPHANUMERIC TEXT MAY BE USED. NEXT TWO CARDS CONTAIN VARIABLE FORMAT FOR THE DATA READ STATEMENT.)



A TYPICAL DATA SUBSET FOR CULTURE PCEVT TABLE DATA



DATA SET XXVIII

CULTURE RCEVT TABLE

(RANDOM EVENTS)

Item No.

1.	ID index listed sequentially from 1 to maximum number of types for random events to occur of this particular CEVID.
2.	CEVID type and class that can cause false targets which will occur randomly. Random CEVID's are limited to types 06, 07, 08, 09 and 10 except for CEVID 101 which is included as background.
3.	Number of this type of CEVID that will occur randomly on the first day between midnight and 0600 hours.
4.	Same as Item 3 except events that will occur between 0600 and noon.
5.	Same as Item 3 except that events will occur between noon and 1800.
6.	Same as Item 3 except events that will occur between 1800 and midnight.
7-10.	Same as 3-6 above, but for second day.
11-14.	Same as 3-6 above, but for third day.
15-18.	Same as 3-6 above, but for fourth day.
etc.	(For as many days as necessary.)

Note: To handle more than a four-day game requires change in the variable format card.

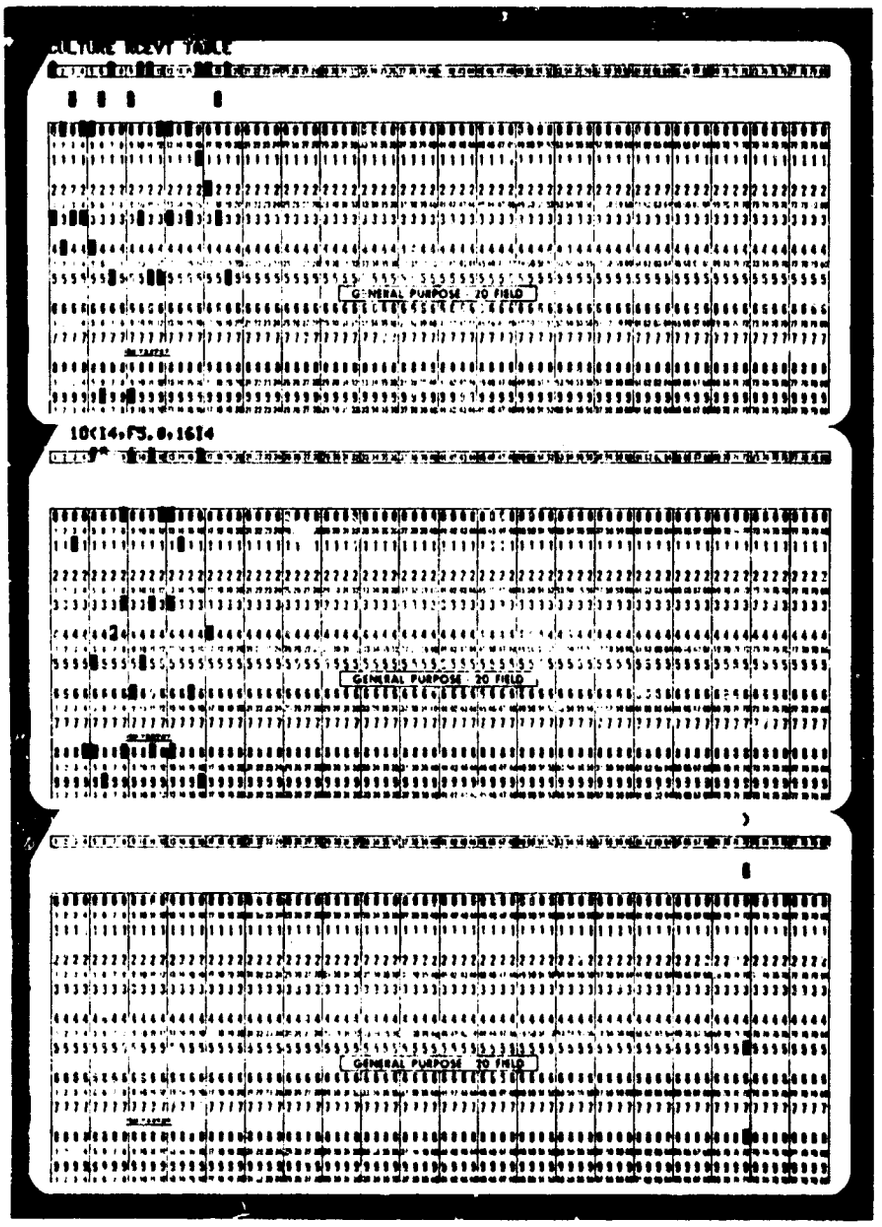
CARD FORMAT FOR CULTURE RCEVT TABLE

CARD	ITEM	WORD	COLUMNS	READ FORMAT
CARD 1	1	1	1- 4	I4
	2	2	5- 9	F5.0
	3	3	10-13	I4
	4	4	14-17	
	5	5	18-21	
	6	6	22-25	
	7	7	26-29	
	8	8	30-33	
	9	9	34-37	
	10	10	38-41	
	11	11	42-45	
	12	12	46-49	
	13	13	50-53	
	14	14	54-57	
	15	15	58-61	
	16	16	62-65	
	17	17	66-69	
	18	18	70-73	I4
CARD 2	19	1	1- 4	I4
	20	2	5- 8	
	21	3	9-12	
	22	4	13-16	
	23	5	17-20	
	24	6	21-24	
	25	7	25-28	
	26	8	29-32	
	27	9	33-36	
	28	10	37-40	
	29	11	41-44	
	30	12	45-48	
	31	13	49-52	
	32	14	53-56	
	33	15	57-60	
	34	16	61-64	
	35	17	65-68	
	36	18	69-72	
	37	19	73-76	
	38	20	77-80	I4

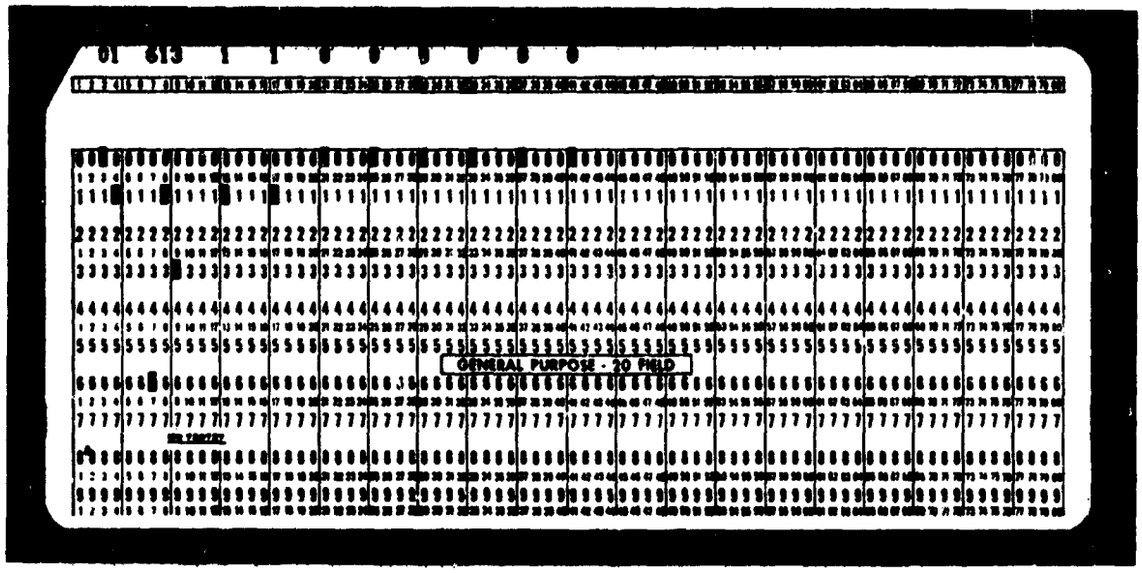
CARD 3 Note: Card 3, ...-n, if necessary require same format as Card 2.

THREE CARDS PRECEDING CULTURE RCEVT TABLE DATA

(FIRST CARD ILLUSTRATIVE - ANY ALPHANUMERIC TEXT MAY BE USED. NEXT TWO CARDS CONTAIN VARIABLE FORMAT FOR THE DATA READ STATEMENT.)



A TYPICAL DATA SUBSET FOR CULTURE RCEVT TABLE DATA



DATA SET XXIX

CULTURE SNFDX-Y TABLE

(SENSOR FIELD X-Y BOUND)

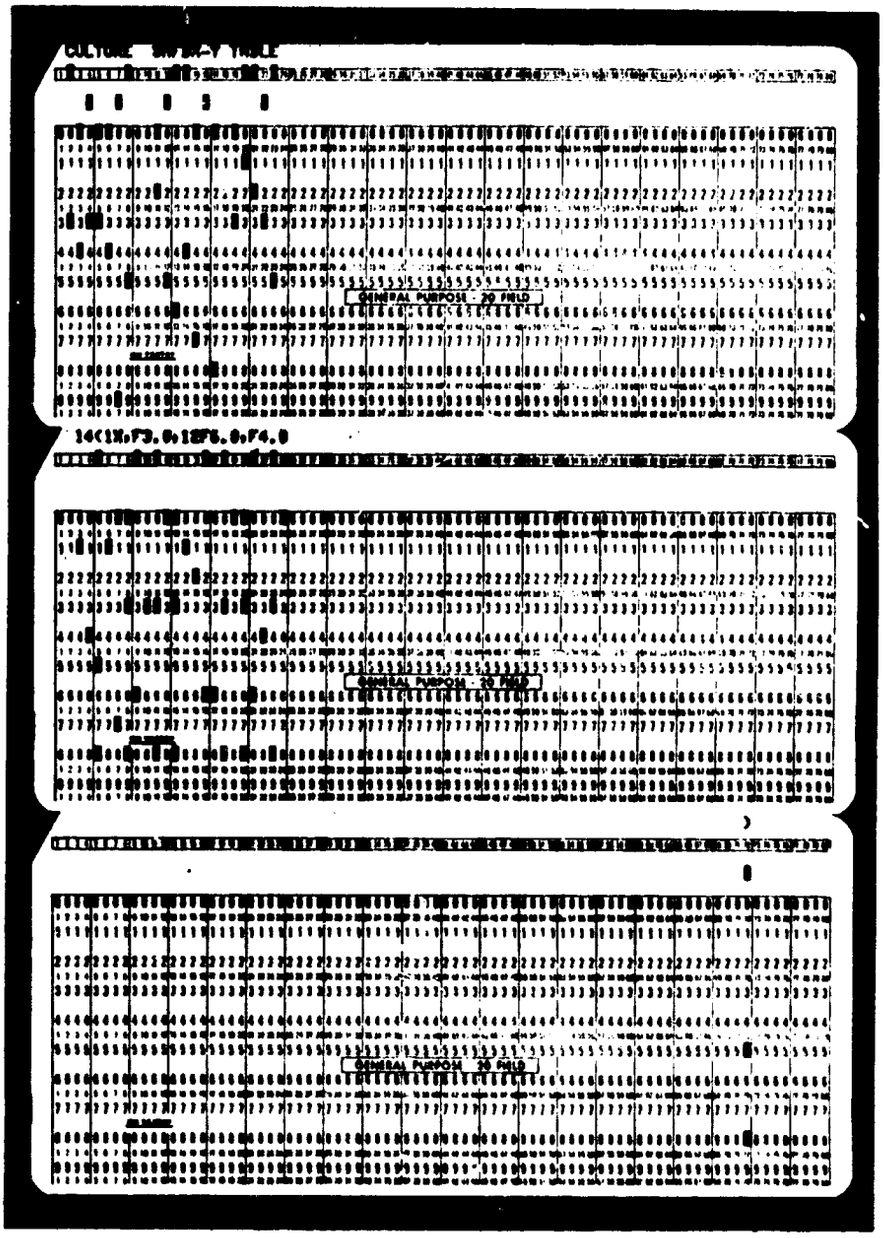
Item No.	
1.	Cultural event type and class (first three digits of CEVID) applicable only to CEVID's 102, 103, 104 and 105.
2.	West boundary (minimum X-coordinate) of first sensor field.
3.	South boundary (minimum Y-coordinate) of first sensor field.
4.	East boundary (minimum X-coordinate) of first sensor field.
5.	North boundary (minimum Y-coordinate) of first sensor field.
6-9.	West, south, east and north boundaries, respectively of second sensor field.
10-13.	West, south, east and north boundaries, respectively of third sensor field.
14.	Count of the number of X-boundaries described.

CARD FORMAT FOR CULTURE SNFDX-Y TABLE

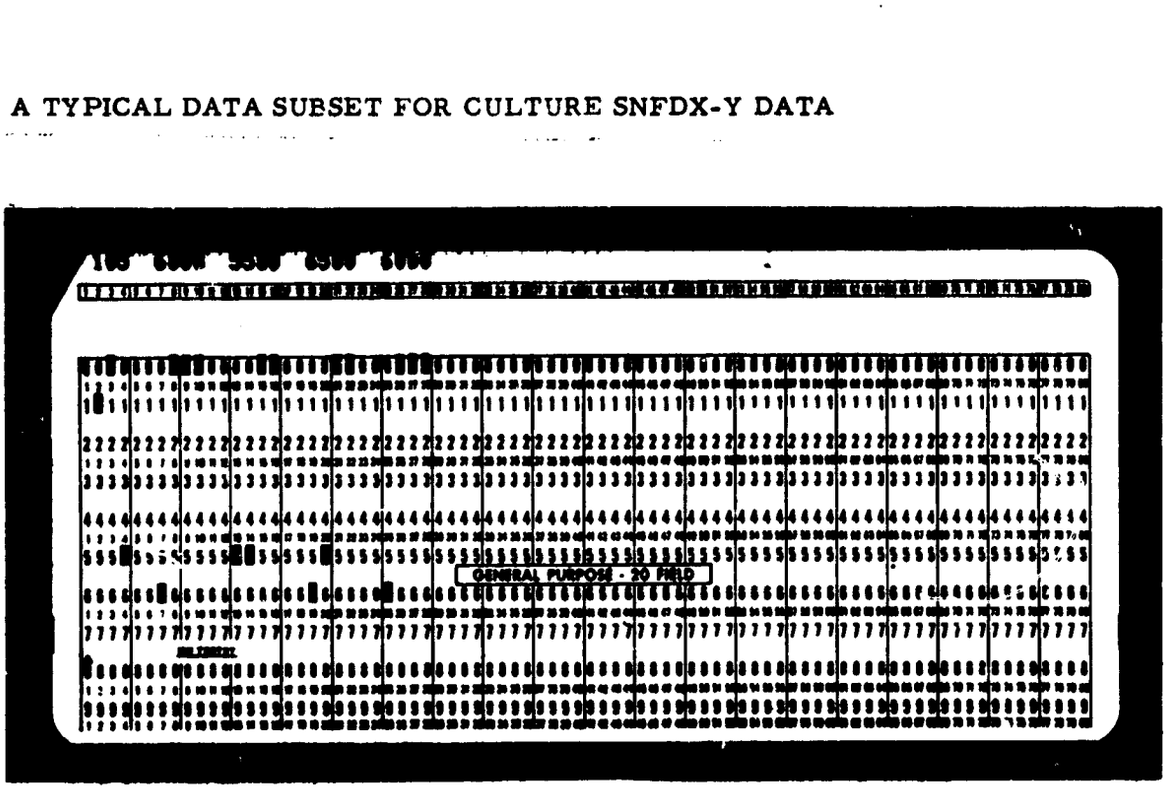
CARD 1	ITEM	WORD	COLUMNS	READ FORMAT
	1	1	2- 4	IX F3.0
	2	2	5-10	F6.0
	3	3	11-16	↓
	4	4	17-22	↓
	5	5	23-28	↓
	6	6	29-34	↓
	7	7	35-40	↓
	8	8	41-46	↓
	9	9	47-52	↓
	10	10	53-58	↓
	11	11	59-64	↓
	12	12	65-70	↓
	13	13	71-76	F6.0
	14	14	77-80	F4.0

THREE CARDS PRECEDING CULTURE SNFDX-Y DATA

(FIRST CARD ILLUSTRATIVE - ANY ALPHANUMERIC TEXT MAY BE USED. NEXT TWO CARDS CONTAIN VARIABLE FORMAT FOR THE DATA READ STATEMENT.)



A TYPICAL DATA SUBSET FOR CULTURE SNFDX-Y DATA



APPENDIX G

PLANNER INPUT FOR UNATTENDED SENSORS ANALYSIS

I INPUT DATA FORMAT FOR UNATTENDED SENSOR REPORT DATA PROCESSING MODEL

The following cards are utilized by the sensor report data processing subroutine CNNECT:

Card No.		
1	MONMAX	Number of monitors in the System
	Note: For each monitor a card representing the following data is required.	
	(The following data represents the first monitor to be described.)	
2	JMAX	Number of sensors attached to each given monitor
	KMAX	Number of firetraps associated with given monitor
	NMAX	Number of given geographical node points representing area under surveillance
	ICNFIG =	Mission/sensor deployment configuration. Example: Configuration = 1 means trail surveillance. Since other configurations have as yet not been provided in program, this parameter must always be 1.

The following cards represent sensor placement data. One card must be provided for each sensor. A total of JMAX cards must be provided for each monitor as indicated below. *

3 4 5 6	*	
etc.		
	JLIST	Sensor identification number

JTYPE	Sensor type number. The type number is the same as utilized in the Main Simulation Model.
	1 Seismic
	2 Acoustic
	3 Pirid
	4 ARFBUOY
	5 Magnetic
	6 Radar
	7 NOD (night observation device)
	8 Visual
JX	Integer X-coordinate of sensor
JY	Integer Y-coordinate of sensor

Note: In the read statement asking for the above parameter, the program seeks additional parameters. These must be left blank since in the current version of this program the additional parameters are computed from the data given above.

The following cards represent firetrap location data: One card must be provided for each firetrap. A total of KMAX cards must be provided for each monitor as indicated below.*

7
8 } *
9
etc.

IDTRAP	Trap identification number
KTYPE	Trap type number
	1 Artillery
	2 Rockets
	3 Machine guns
	4 Mines
	5 Bombs
KXTRAP	Integer X-coordinate of trap
KYTRAP	Integer Y-coordinate of trap

Note: In the read statement asking for the above parameters, the program seeks additional parameters. These must be left blank since in the current version of this program the additional parameters are computed from data given above.

The following cards represent geographical node-point data, in this case trail-node data. A total of NMAX cards must be provided for each monitor as indicated below.*

10
11
12
etc. } *

IDNODE	Node identification number
IBPX	Integer X-coordinate of node
IBPY	Integer Y-coodinate of node

Note 1: The trail data should be read-in in the order that nodes appear along the trail regardless of their identification numbers.

Note 2: In the read statement asking for these parameters, the program seeks additional parameters. These must be left blank at the present time since in the current version of this program the additional parameters are computed from data given above.

Repeat above pattern from Card 2 for as many monitors as there are in the system (this data represents monitors 2, 3, 4, 5, etc.)

The following cards are required to provide detection and decision making threshold values: However, since programming has not yet been provided to implement them, these cards may be left blank at the present time.

13 to 22* inclusive (10 cards required)	DREFS	Detection/decision making threshold values (currently not used).

The following cards, which physically follow the above cards, are utilized by Subroutine LILMSM. These cards represent sensor event data. One card is required for each event.

23
24
25
etc. } As many cards are required as there are events

IT	Integer value of time in seconds
JR	Sensor identification of sensor making report
MR	Monitor identification of monitor receiving report

Note: If a sensor reports to more than one monitor, a separate card must be provided for each monitor reported to by that sensor.

II. CARD FORMAT FOR UNATTENDED SENSOR REPORT DATA PROCESSING MODEL

All of the following data are read according to the format (8I10). This means that entries on the cards are right justified to columns 10, 20 30, etc. depending on the relative position of each entry. The data contained in the cards are as follows:

Card 1	MONMAX
Card 2	JMAX, KMAX, NMAX, ICNFIG
Card 3, 4, 5, 6, etc.	JLIST, JTYPE, JX, JY (JMAX cards of this type)
Card 7, 8, 9, etc.	IDTRAP, KTYPE, KXTRAP, KYTRAP (KMAX cards of this type)
Card 10, 11, 12, etc.	IDNODE, IBPX, IBPY (NMAX cards of this type)

Cards 2-12, etc. will be repeated MONMAX times.

The following cards may be prepared according to the format (10F8.3):

Cards 13-22 inclusive

DREFS (1, 1), DREFS (1, 2), - - - - DREFS (1, 10)
DREFS (10, 1) - - - - - - - - - - DREFS (10, 10)

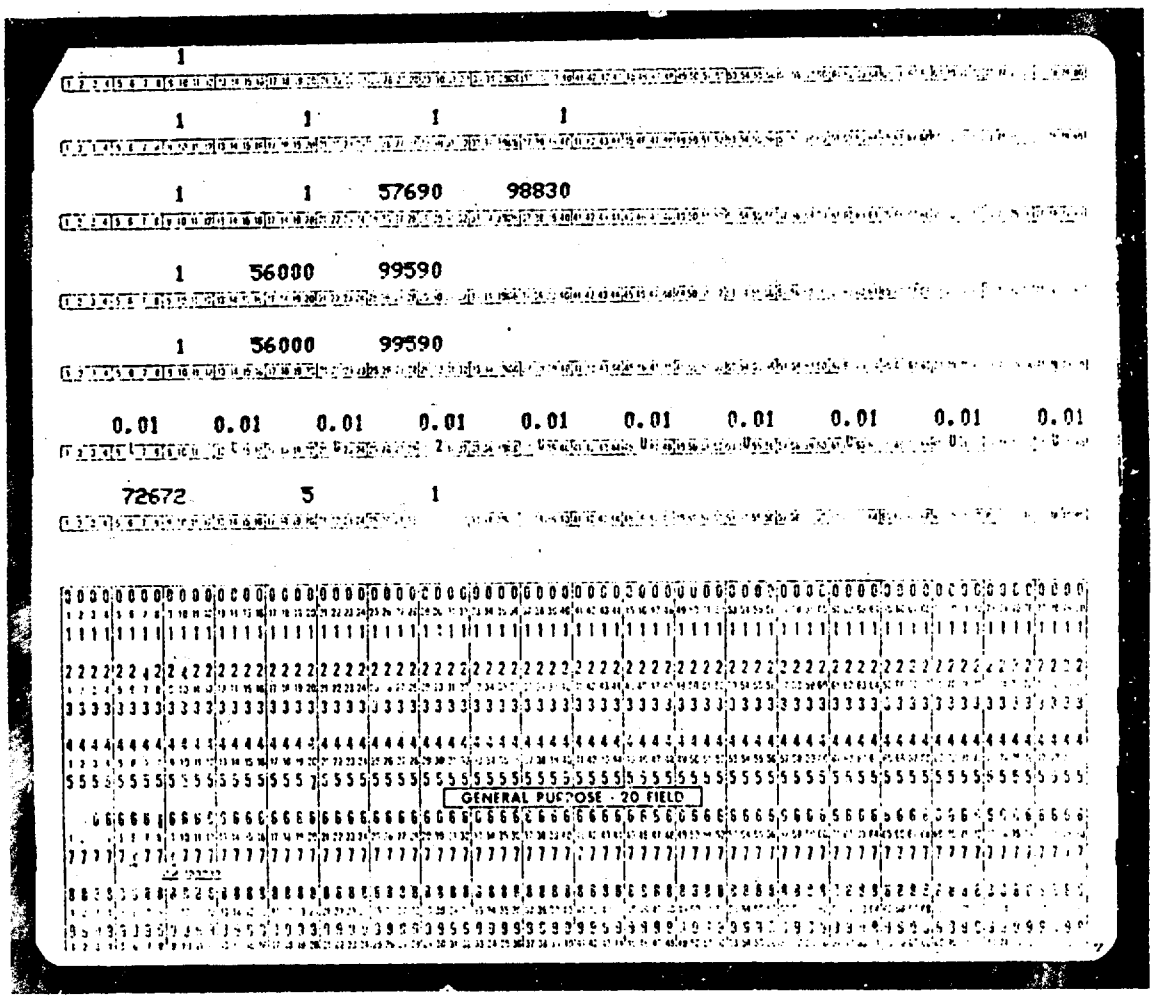
NOTE: For the current version of the programs the above DREFS may be left blank at the present time.

The following data is read according to format (8I10):

Cards 23, 24, 25, IT, JR, MR
etc.

AN EXAMPLE OF EACH CARD TYPE FOR

UNATTENDED SENSOR REPORT DATA PROCESSING MODEL



APPENDIX H

PLANNER INPUT FOR TACTICAL COMMUNICATIONS

DATA SET I

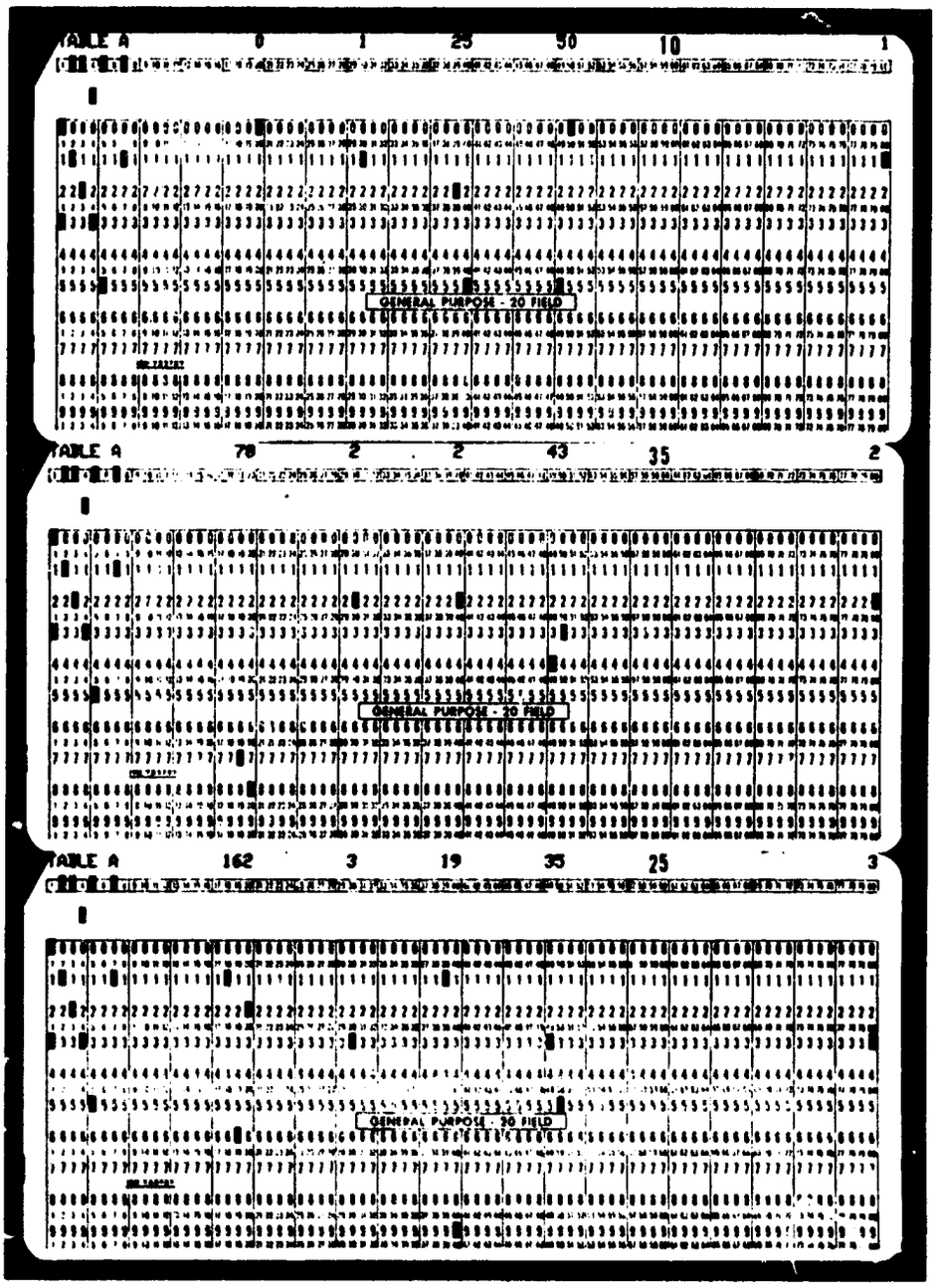
TABLE "A"

Item	Column	Description
Card 1-100		
1	1- 7	Prepunch TABLE A (user use only)
2	11-20	Time of message at monitor (ITIME) in seconds from beginning of game time
3	21-30	Message number should be a continuous (ordered) sequence when the messages are in chronological order (MSGNUM)
4	31-40	The monitor number for the monitor at the origin of the message (same number as used in Prerun and SM) - (IDMON)
5	41-50	Message type, a number from 1-100 that implies a specific message precedence, net preference, MONID, and other game variables. This number serves as a pointer for subroutines PRCDNT and ROUTE (MSGTYP).
6	51-60	The length of the message in seconds from time zero.

Format used: FORMAT (10X, 5I10)

A TYPICAL EXAMPLE OF THE FIRST THREE CARDS

FROM 'TABLE A' DATA SET I



DATA SET II

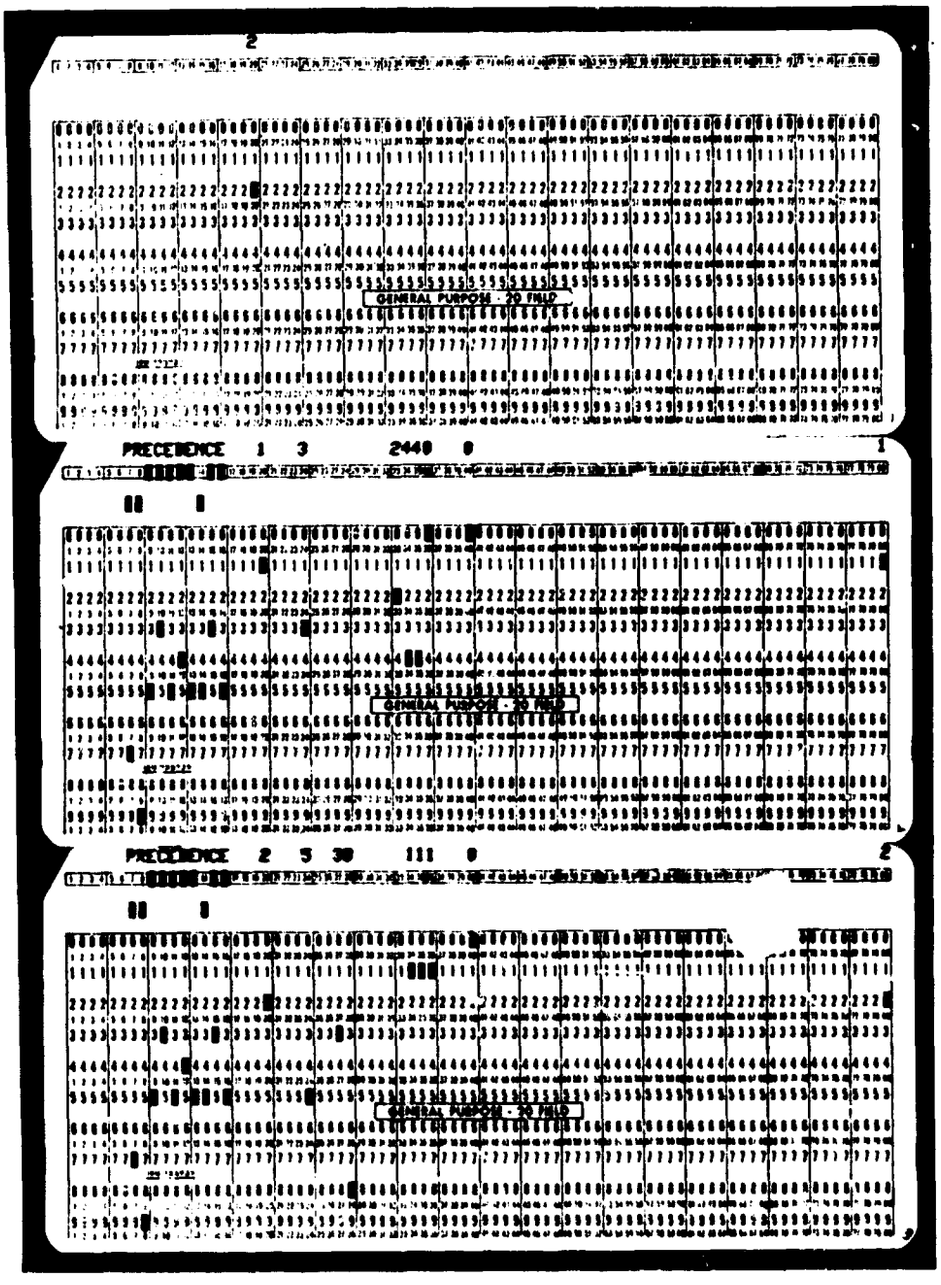
PRECEDENT

Item	Column	Description
Card 1		
1	11-20	Count on PRECEDENT Cards (IPREC)
Card (2 thru IPREC +1)		
1	7 -16	Prepunch PRECEDENCE for user use only
2	17-20	Message type, order cards in sequence 1, X (X ≤ 100)
3	21-24	Message precedent code.
4	25-28	Path Identification number of the route of this particular message must be ≤ 100.
5	33-36	NETPRF code (See note 1)
6	37-40	Not used at this time -- in expansion this will be a LTIME which indicates a time period over which this input is valid.
Card 1 format:		FORMAT (10X, I10)
Card (2 Thru IPREC +1) format:		FORMAT (16X, 3I4, 4X, 2I4)

Note 1: (Item 5) These nets are 1 = command operations net (radio and teletype), 2 = command operations net (FM), 3 = the intelligence net (FM), and 4 = fire support net (FM). Up to 4 digits may be inserted, to allow alternate choices of nets. See Volume I for further details.

A TYPICAL EXAMPLE OF THE CONTROL CARD AND

'PRECEDENT' DATA SET II



DATA SET III

COMMOROUTE

Item	Columns	Description
Card 1		
1	17-20	Count on route cards (NRTCNT)
Cards (2 through NRTCNT +1)		
1	7-16	Prepunch COMMOROUTE to identify this data to user (user use only)
2	17-20	The path number passed from the Precedence Data Set and is the path number or ID of this route. Must be $\leqslant$ 100.

NOTE 1: The data cards in this set should be ordered so that item 2 is a continuously increasing sequence.

3	21-24	The unit designation of the monitor location (MONLOC) (See Note 2).
4	27-30	A code describing the nodal connections for a specific STANO transmission (NODES). Four nodes must be indicated representing the four echelons; brigade, battalion, company, platoon. A skipped node may be left blank or a zero input. The code from left to right represents the message route, from origin to destination (See Note 3).
5	32	A code indicating direction of message flow. A blank or zero indicates the routing is in the normal vertical direction, either up or down. A one indicates other than the normal flow (IHORZ).
6	33-36	Unit designation of the lowest echelon involved in the transmission if IHORZ = 0; otherwise the destination unit if IHORZ = 1, (IROOT). The entry in this field will be the same as item 3 if the

monitor is located at the lowest echelon involved in the transmission and the flow is vertical. If item 3 is blank (implying brigade monitor) then the destination's unit designation appears in this item (See Note 2).

NOTE 2: Platoon's designation is a hundreds number, company's is tens number, battalion's is a units number and brigade is 1000. For example, 321 is the third platoon of the second company of the first battalion; and 300 is the third platoon attached to brigade. The capacity of the present design allows for up to 1 brigade, 9 battalions, 35 companies and 155 platoons for a total of 200 unit designations.

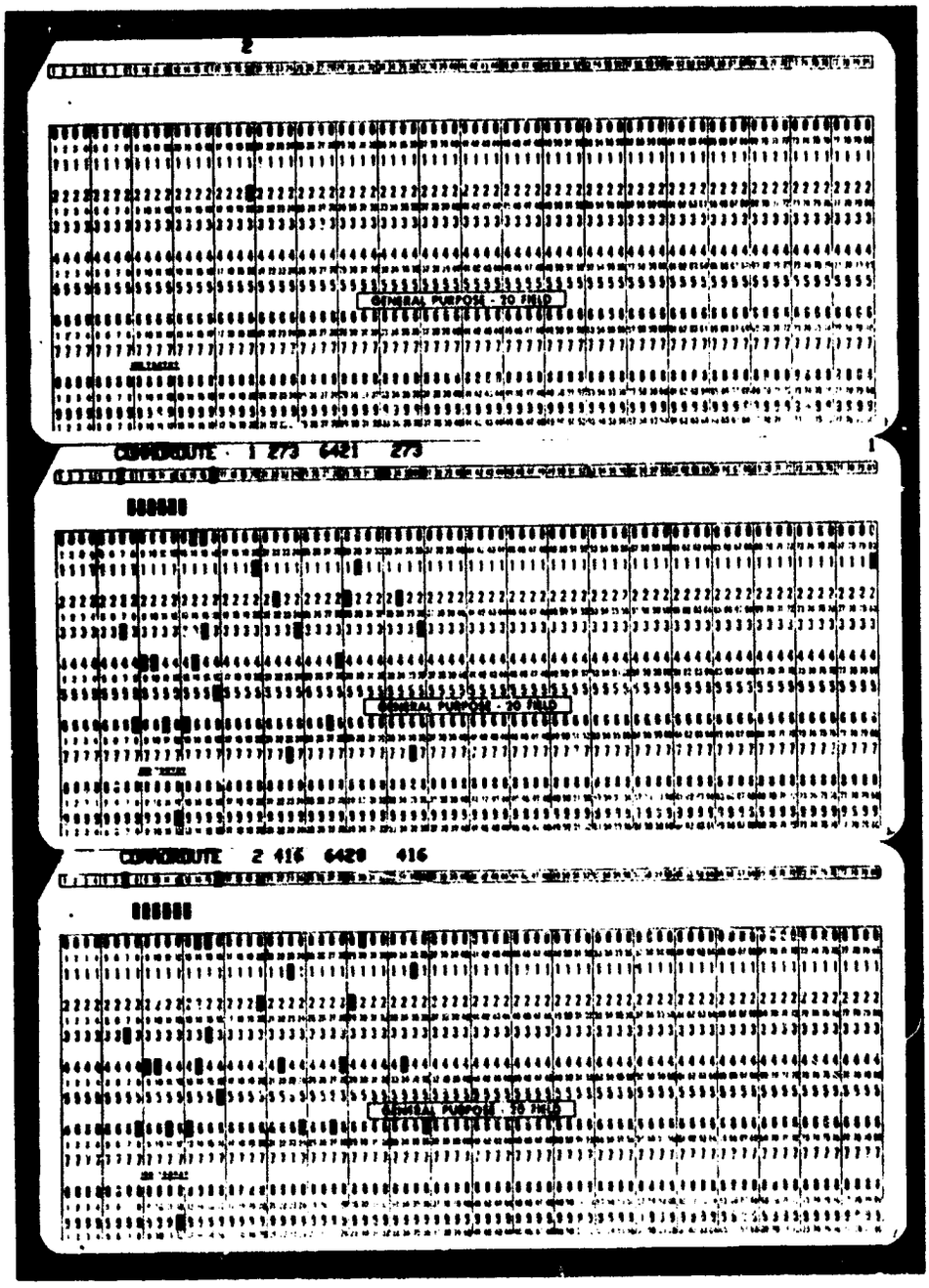
NOTE 3: The nodes code is:

1	brigade
2	battalion
4	company
6	platoon

Thus a 6421 in item 4 means platoon through company and battalion to brigade, while a 1246 means brigade through battalion and company to platoon. A 6021 input means platoon through battalion to brigade (skipping company) and an 0420 means company to battalion.

Format used: FORMAT (16X, 2I4, 2X, I4, 1X, I1, I4)

A TYPICAL EXAMPLE OF THE CONTROL CARD AND 'ROUTE DATA' DATA SET III



DATA SET IV

NET CYCLE TIMES FOR TACCOM

Item	Columns	Description
Card 1 (CONTROL CARD)		
1	1-5	NSIG - number of 'NETCYCLEDELAY' cards
2	6-10	IRATE - number of 'COMMOTRAFIK' cards divided by 2.
3	11-15	KTIME - number of periods in the day (there may be as many as 6x4 cards for each KTIME).
Card 2 - CARD NSIG+1		
1	1-14	Prepunch 'NETCYCLEDELAYS' to identify this data set to user (user use only).
2	16	Net code to indicate the commo-net for which this data set applies: 1 command/operations (RATT) 2 command/ operations (FM) 3 intelligence (FM) 4 fire support (FM)
3	18-21	Mean value of a normal density for a net cycling time for brigade transmitting down.
4	22-25	Standard deviation of the normal density in item 3.
5	26-29	Mean value of a normal density for a net cycling time for a battalion transmitting up.
6	30-33	Standard deviation of the normal density in item 5.
7	34-37	Mean value of a normal density for a net cycling time for a battalion transmitting down.
8	38-41	Standard deviation for a normal density in item 7.
9	42-45	Mean value of a normal density for a net cycling time for a company transmitting up.
10	46-49	Standard deviation for the normal density in item 9.
11	50-53	Mean value for a normal density for a net cycling time for a company transmitting down.

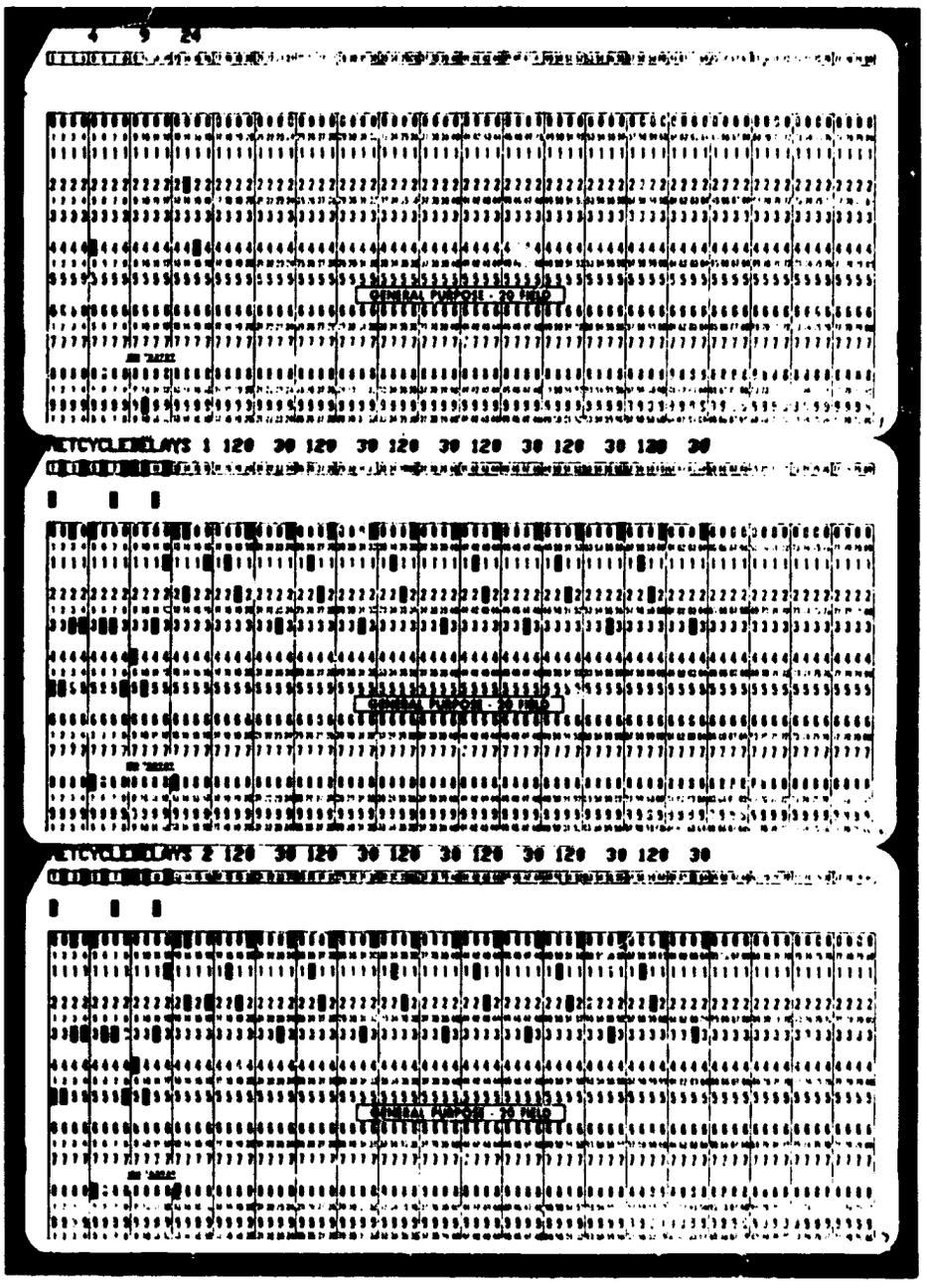
12	54-57	Standard deviation for the normal density in item 11.
13	58-61	Mean value for a normal density for a net cycling time for a platoon transmitting up.
14	62-65	Standard deviation for the normal density in item 13.

Format used: FORMAT (15X, I1, 1X, 12(I4)).

A TYPICAL EXAMPLE OF THE CONTROL CARD

CONTROLLING DATA SETS IV, V, VI and

THE FIRST TWO CARDS OF ' NET CYCLE TIMES' DATA SET IV



DATA SET V

COMMOTRAFIK FOR TACCOM

Item	Column	Description
Card 1		
1	1-11	Prepunch 'COMMOTRAFIK' to identify this data set to the user (user use only) as non-STANO communications traffic statistics
2	13	IFLOW code to indicate the echelon/link for which this data set applies: 1 brigade communicating down in the organizational structure; 2 battalion, up; 3 battalion, down; 4 company, up; 5 company, down; 6 platoon, up.
3	15	Net code to indicate the communication net for which this data set applies: 1 command/operations net (RATT) 2 command/operation net (FM) 3 intelligence net (FM) 4 fire support (FM)
4	16-18	Minimum (nominal) message rate (message per hour) for precedence FLASH.
5	19-21	Maximum (nominal) message rate (message per hour) for precedence FLASH.
6	22-25	Minimum (nominal) message length (seconds) for precedence FLASH.
7	26-29	Maximum (nominal) message length (seconds) for precedence FLASH.
8	30-32	
9	33-35	Items 8, 9, 10 and 11 are similar to items 4, 5, 6 and 7,
10	36-39	respectively, except that these inputs are for
11	40-43	precedence EMERGENCY.

12	44-46	Items 12, 13, 14 and 15 are similar to items 4, 5, 6 and 7, respectively, except that these inputs are for precedence OPERATIONAL IMMEDIATE.
13	47-49	
14	50-53	
15	54-57	

Card 2

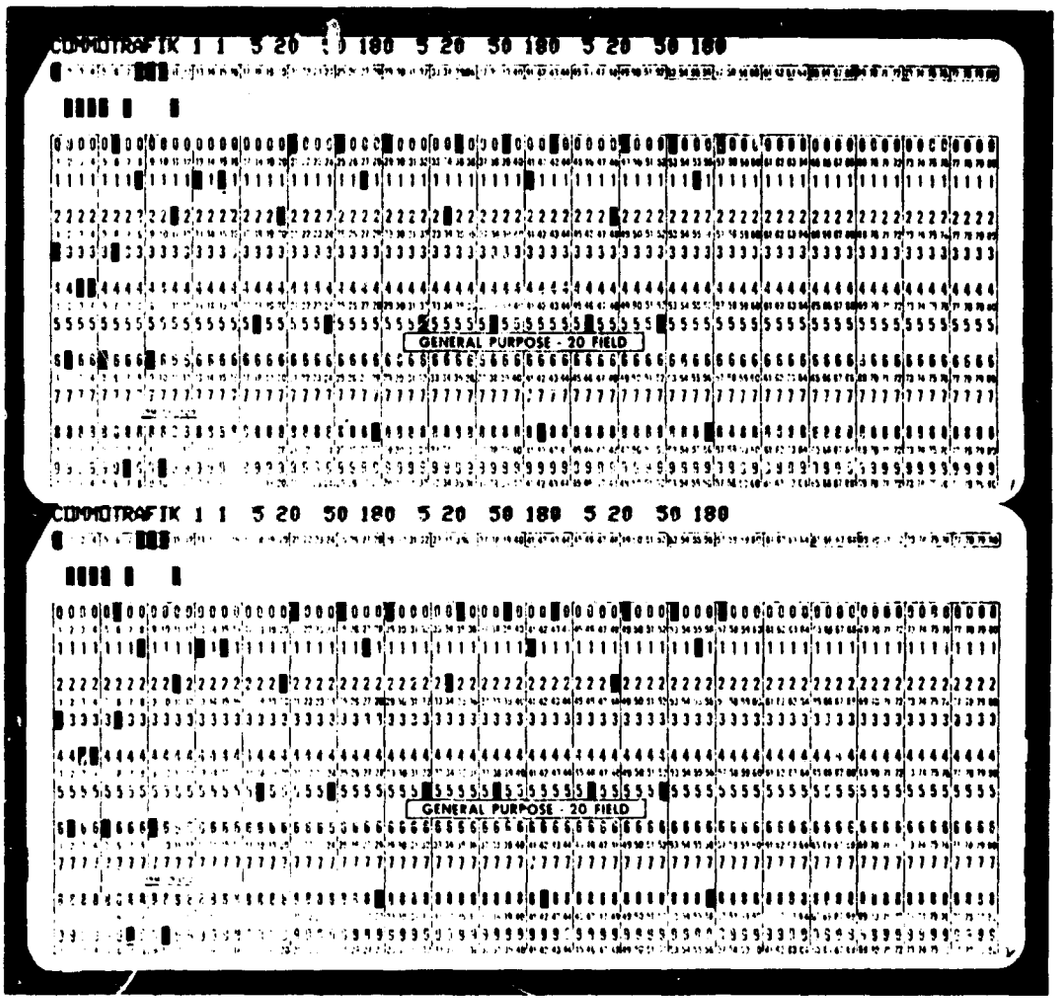
16	16-18	Items 16, 17, 18 and 19 are similar to items 4, 5, 6 and 7, respectively, except that these inputs are for precedence PRIORITY.
17	19-21	
18	22-25	
19	26-29	
20	30-32	Items 20, 21, 22 and 23 are similar to items 4, 5, 6 and 7, respectively, except that these inputs are for precedence ROUTINE.
21	33-35	
22	36-39	
23	40-43	
24	44-46	Items 24, 25, 26 and 27 are similar to items 4, 5, 6 and 7, respectively, except that these inputs are for precedence DEFERRED.
25	47-49	
26	50-53	
27	54-57	

Format used: FORMAT (12X, I1, 1X, I1, 3(2I3, 2I4)/15X, 3(2I3, 2I4))

NOTE: IRATE of these two card sets are read in.

A TYPICAL EXAMPLE OF FIRST TWO CARDS

FROM 'COMMOTRAFIK' DATA SET V



DATA SET VI

TRAFIKMODS FOR TACCOM

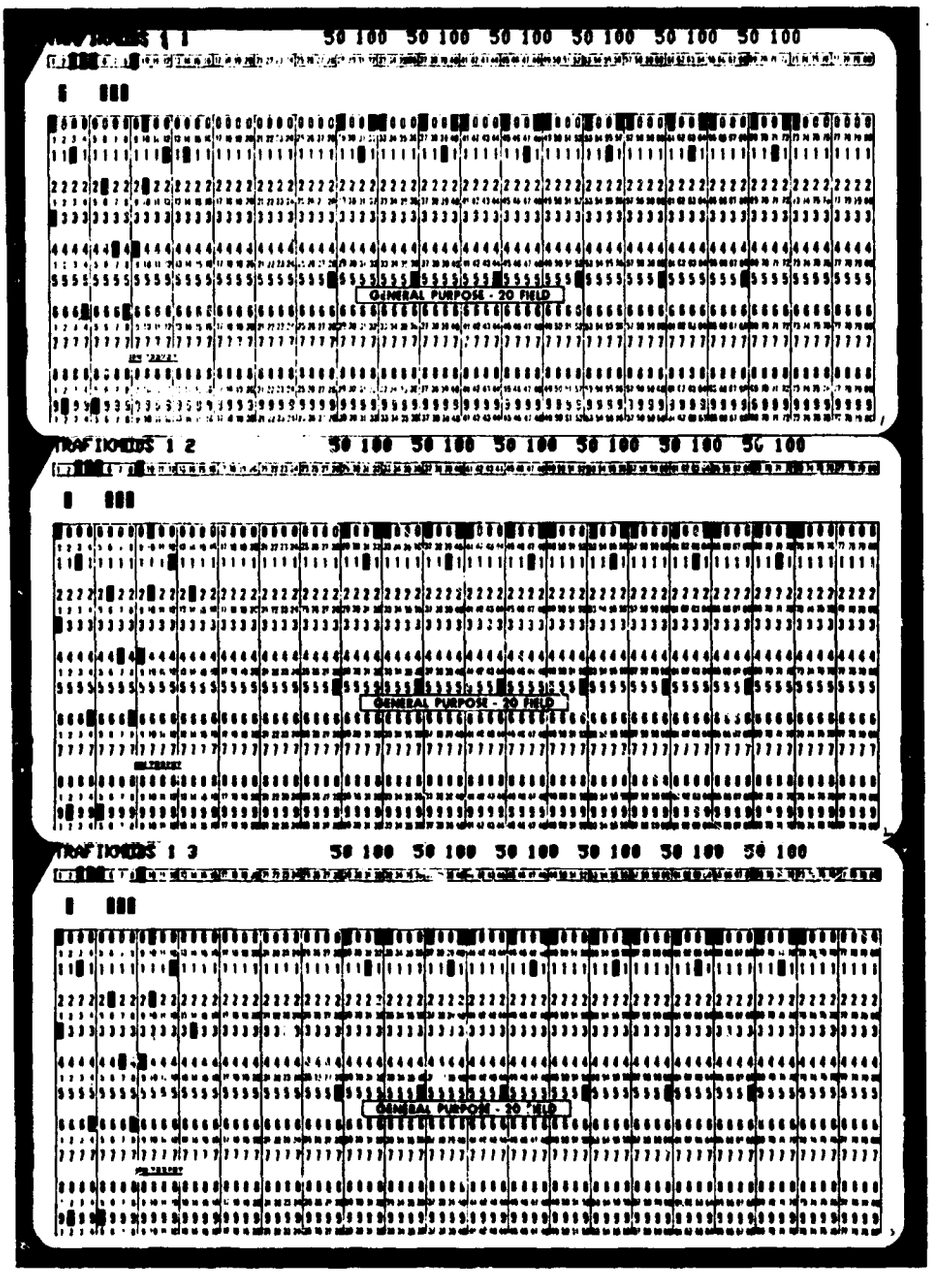
Item	Columns	Description
1	1-10	'TRAFIKMODS' is a prepunch to identify this data set to the user (user use only) as the time-dependent modifiers of the non-STANO message rates and message lengths.
2	12	IFLOW code indicating the echelon/link for which this data set applies: 1 brigade communicating down (to battalion, company or platoon); 2 battalion, up; 3 battalion, down; 4 company, up; 5 company, down; 6 platoon, up;
3	14	Net code to indicate the communications net for which this data set applies: 1 command/operations (RATT) 2 command/operations (FM) 3 intelligence (FM) 4 fire support (FM)
4	16-21	Day/time group when this data set becomes applicable. The first two digits are the day (00 = day of game start) and the next four are the time, in minutes, in the 24-hour clock.
5	27-29	A number 000 to 999 (percent) that is the percent of the nominal message rate inputs for precedence FLASH.
6	31-33	A number 000 to 999 that is the percent of the nominal message length inputs for precedence FLASH.
7 8	35-37 39-41	Items 7 and 8 are similar to items 5 and 6 except that 7 and 8 are for precedence EMERGENCY.
9 10	43-45 47-49	Items 9 and 10 are similar to items 5 and 6 except that 9 and 10 are for precedence OPERATIONAL IMMEDIATE.

11	51-53	Items 11 and 12 are similar to items 5 and 6 except
12	55-57	that 11 and 12 are for precedence PRIORITY.
13	59-61	Items 13 and 14 are similar to items 5 and 6 except
14	63-65	that 13 and 14 are for precedence ROUTINE.
15	67-69	Items 15 and 16 are similar to items 5 and 6 except
16	71-73	that 15 and 16 are for precedence DEFERRED.
17	74-80	IFLAG (Signals last of the cards for One KTYM).

Format used: FORMAT (11X, I1, 1X, I1, 1X, I6, 4X, 6(1X, I3, 1X, I3), I7)

A TYPICAL EXAMPLE OF THE FIRST THREE CARDS

FROM' TRAFIKMODS' DATA SET VI



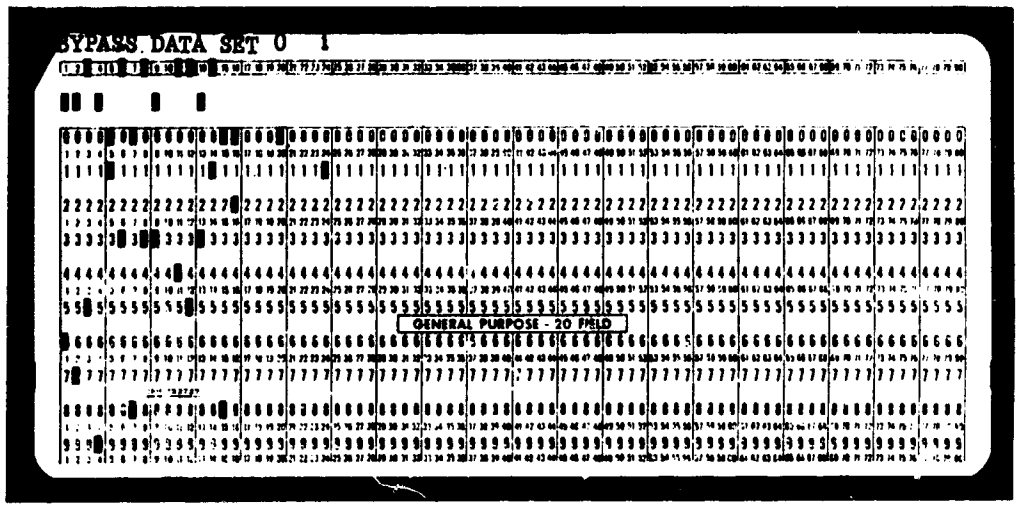
DATA SET VII

BYPASS DATA SET (OPERATOR AND CYCLE DELAYS)

Item	Column	Description
1	1-19	Prepunch ' 'BYPASS DATA SET' to identify this card; user use only.
2	20	Input for play or bypass of operator delay times: 0 bypass; i.e., operator delays = 0. 1 operator delay times are played for a) when message is introduced to tactical net from monitor and b) when taken from net for presentation (considers encoding, decoding, handling, etc.) The time played is determined by sampling from a normal density with mean 125 seconds and standard deviation 40 seconds for each message.
3	24	Input for play or bypass of net cycling (net change over) time delays: 0 bypass; i.e., no time lost in changing nets. 1 net cycling delay times are played by sampling from a normal distribution. An input of 1 here requires inputting data for cycle statistics in Data Set IV; i.e., data set with prepunch 'NETCYCLEDELAYS'.
Format used:		FORMAT (19X,I1,3X,I1)

A TYPICAL EXAMPLE OF 'BYPASS DATA SET'

DATA SET VII



Appendix I

TABLE OF CONTENTS

Page

Culture Tables

Appendix I

Designer Input Sets

Introduction

This appendix contains first three tables with information to the user on general design features of the model. The first(I-1)indicates the relation of equipment type to reliability subroutines in PRERUN. The second(I-2) shows the LOS dependence of sensor types used on design and the third (I-3) shows the design input of valid sensor-target combinations.

The next group of tables are designer input tables that are presently incorporated in the Phase I BAM model subroutines. Three tables are provided in subroutine SNPGT (PRERUN Step 3) with the error factors for emplacing artillery/mortar and air-dropped sensor UGS types. Four tables are provided for subroutine MVS (PRERUN Step 4) with sample values of error factors of navigation system types used in locating moving sensors. The systems parameters on these tables should be included as planner inputs but, if not so included, the program defaults to values contained in tables herein.

The next group of designer input tables are those used in the Battle and Culture environment program (PRERUN Step 6). Event descriptions are contained in Tables in Appendix F.

The final group of designer tables, Tables I-28 through I-35 are the designer data incorporated in the sensor performance routines. The rationale for these values are contained in Volume I, Section 3.

Provisions have been made for the user to incorporate additional data as desired up to the limits of the table dimensions. Of course changes in the values of the data presently incorporated can also be made if the user desires by recompilation of the appropriate subroutine and block data. Included with the tables are the block data listings for the two sets of data containing the designer input tables, JFBLK3 and JFBLK6.

TABLE I-1

DESIGN INPUT FOR SELECTION OF RELIABILITY SUBROUTINES

ARRAY	EQUIPMENT	RELIABILITY SUBROUTINE			
		RUSUP	READUP	MVS	COMMUP
ARRAYUGS	SEISMIC	X			
	ACOUSTIC	X			
	MAGNETIC	X			
	ARFBUOY	X			
	BREAKWIR	X			
	PASSIVIR	X			
STASCAN	RADAR (Stationary)	X			
	IMAGE (Stationary)	X			
	THERMVEW(Stationary)	X			
	IMAGE (Move/Ground)	X			
	THERMVEW(Move/Ground)	X			
MOVARRAY	RADAR (Moving/Air)			X	
	IMAGE(Moving/Air)			X	
	THERMVEW (Moving/Air)			X	
Other Groups	MONITORS		X		
	RELAYS				X

TABLE I-2

DESIGN INPUT FOR LOS DEPENDENCE

SEISMIC	NO
ACOUSTIC	NO
MAGNETIC	NO
ARFBOUY	NO
BREAKWIR	NO
PASSIVIR	ASSUMED
RADAR (Stationary)	YES
RADAR (Moving/Air)	YES
IMAGE (Stationary)	YES
IMAGE (Moving/Ground)	YES
IMAGE (Moving/Air)	YES
THERMVEW (Stationary)	YES
THERMVEW (Moving/Ground)	YES
THERMVEW (Moving/Air)	YES

TABLE I-3

DESIGN INPUT FOR VALID SENSOR TARGET COMBINATIONS

TARGET CATEGORY

GENERIC SENSOR TYPE	INDIV	SQD	PLAT	CO	SMVEH	HVYTRK	TANK	TRAIN	HELO	LTA/C	JETA/C	RAFT	OUTBRD	PTBOAT	LT AMMO	MD AMMO	HVY AMMO	SMANIM	LGANIM	CODE ***
SEISMIC	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X		X	1
ACOUSTIC	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X		X	2
MAGNETIC*	X	X	X	X	X	X	X	X											X	1
ARFBOUY	X	X	X	X	X	X	X												X	1
PASSIVIR	X	X	X	X	X	X	X	X				X	X	X					X	1
RADAR**	X	X	X	X	X	X	X	X				X	X	X					X	1
IMAGE	X	X	X	X	X	X	X	X				X	X	X					X	2
THERMVEW	X	X	X	X	X	X	X	X				X	X	X					X	2
BREAKWIR	X	X	X	X	X	X	X					X	X	X					X	1

****

* A valid target for a magnetic sensor must have ferrous metal present, indicated by A '1' in Item 2 in the Force Type Parameter Set Input (Appendix F - Data Set XIII).

** RADARS in SAM-1 are MTI-type thus targets with a nominal velocity less than half the MTI criterion are not valid targets. (A multiplier of two is used to account for forward and reverse speed factors that may be played.)

*** 0 - Detects only stationary targets

1 - Detects only moving targets

2 - Detects both stationary and moving targets

**** The entries in these target category are from CULTUR and BATTLE only; other target categories may be from either BLUE or RED Force inputs plus CULTUR or BATTLE as appropriate.

Table I-4

ATMOE DESIGNER INPUT DATA

BALLISTIC DISPERSION OF SENSOR EMPLACEMENT WEAPONS*

RANGE INTERVAL		155MM HOW		105MM HOW		8-IN. HOW		RANGE INTERVAL		81MM MORT		4.2-IN. MORT	
		σ RANGE	σ DEFL	σ RANGE	σ DEFL	σ RANGE	σ DEFL			σ RANGE	σ DEFL	σ RANGE	σ DEFL
0	500							0	200				
500	1000							200	400	10	27		
1000	1500							400	600	16	27		
1500	2000							600	800	23	43		
2000	2500			39	22			800	1000	31	41	38	14
2500	3000			48	22			1000	1200	42	61	43	14
3000	3500	74	15	54	44			1200	1400	49	61	54	20
3500	4000	86	15	59	60			1400	1600	56	54	60	20
4000	4500	86	15	68	60	92	37	1600	1800	64	74	68	20
4500	5000	101	15	71	82	104	37	1800	2000	73	68	76	27
5000	5500	98	22	86	67	116	37	2000	2200	78	68	84	34
5500	6000	107	22	68	74	118	44	2200	2400	87	61	69	34
6000	6500	101	30	74	74	131	37	2400	2600	89	54	97	34
6500	7000	110	30	83	74	128	44	2600	2800			106	41
7000	7500	119	30	77	37	140	44	2800	3000			114	41
7500	8000	119	37	83	37	134	52	3000	3200			119	47
8000	8500	128	37	89	30	142	52	3200	3400			125	47
8500	9000	134	37	85	44	151	44	3400	3600			136	47
9000	9500	143	37	89	44	140	52	3600	3800			141	47
9500	10000	128	44	95	44	148	52	3800	4000			146	54
10000	10500	137	44	108	37	157	52	4000	4200			154	54
10500	11000	143	44	92	37	166	44	4200	4400			160	54
11000	11500	148	44	128	37	146	52	4400	4600			165	61
11500	12000	157	60			154	52	4600	4800			171	61
12000	12500	131	60			160	52	4800	5000			176	67
12500	13000	137	52			169	52	5000	5200			184	68
13000	13500	145	52			178	52	5200	5400			190	68
13500	14000	151	52			156	60	5400	5600			195	68
14000	14500	160	44			152	60						
14500	15000	170	44			157	60						
15000	15500					164	60						
15500	16000					170	56						
16000	16500					178	52						
16500	17000					187	52						

*All data represent one standard deviation of a normal error distribution.

Table I-5

ADROP1 DESIGNER INPUT DATA
(Helicopter)

A/C ALTITUDE (ABOVE MSL, METERS)	VELOCITY (M/SEC)			
	0-25		25-50	
	σ ALONG TRACK	σ CROSS TRACK	σ ALONG TRACK	σ CROSS TRACK
0-150	60	20	80	25
150-300	60	20	80	25
300-450	70	20	90	25
450-600	70	20	90	30
600-750	80	20	100	30
750-900	95	25	115	30
900-1050	100	25	125	35
1050-1200	100	25	140	35
1200-1350	100	25	160	40
1350-1500	100	25	175	40

Table I-6

ADROP2 DESIGNER INPUT DATA
(Fixed Wing)

A/C ALTITUDE (ABOVE MSL, METERS)	A/C VELOCITY (M/SEC)					
	100-150		150-200		200-250	
	σ ALONG TRACK	σ CROSS TRACK	σ ALONG TRACK	σ CROSS TRACK	σ ALONG TRACK	σ CROSS TRACK
0-150	100	25	110	30	100	25
150-300	110	25	110	30	110	25
300-450	110	25	120	30	120	30
450-600	120	30	120	30	130	30
600-750	120	30	130	35	130	35
750-900	130	30	130	35	150	35
900-1050	130	35	140	40	150	40
1050-1200	140	35	140	40	160	40
1200-1350	140	35	150	40	180	45
1350-1500	140	35	150	40	180	45

Table I-7

DESIGNER INPUTS FOR HYPERBOLIC NAVIGATION SYSTEM (PRNV1)

SYSTEM PARAMETERS \ PARAMETER SET	1	2	3	4
STANDARD DEVIATION OF GROUND STATION LOCATION ERROR (METERS)	5			
STANDARD DEVIATION OF SYSTEM TIME DIFFERENCE MEASUREMENT ERROR (MICROSECONDS)	5			
X-COORDINATE, SLAVE STATION NUMBER 1 (METERS)	10,000			
Y-COORDINATE, SLAVE STATION NUMBER 1 (METERS)	5,000			
X-COORDINATE, SLAVE STATION NUMBER 2 (METERS)	17,000			
Y-COORDINATE, SLAVE STATION NUMBER 2 (METERS)	17,250			
X-COORDINATE, SLAVE STATION NUMBER 3 (METERS)	28,700			
Y-COORDINATE, SLAVE STATION NUMBER 3 (METERS)	5,400			
X-COORDINATE, MASTER STATION (METERS)	17,000			
Y-COORDINATE, MASTER STATION (METERS)	10,000			

NOTE:

1. CODE = (1, 2, 3, 4) TO INDICATE TO WHICH VERSION OF HYPERBOLIC NAVIGATION SYSTEM THIS PARAMETER SET APPLIES.
2. ADDITIONAL DATA CAN BE SUPPLIED FOR PARAMETER SETS 2, 3, 4 AS DESIRED.
3. SYSTEM PARAMETERS ARE SCENARIO DEPENDENT.
4. TABLE LOCATED IN BLOCK DATA (JFBLK3)

Table I-8

DESIGNER INPUTS FOR RHO THETA NAVIGATION SYSTEM
(PRNV2)

SYSTEM PARAMETERS \ PARAMETER SET	1	2	3	4
STANDARD DEVIATION OF GROUND STATION LOCATION ERROR (METERS)	3			
STANDARD DEVIATION OF SYSTEM DIRECTION RESOLUTION ERROR (MILS)	.035			
STANDARD DEVIATION OF SYSTEM RANGE-RESOLUTION ERROR (METERS)	30			
STANDARD DEVIATION OF ALTITUDE-RESOLUTION ERROR (METERS)	20			
X-COORDINATE OF GROUND STATION LOCATION (METERS)	25,000			
Y-COORDINATE OF GROUND STATION LOCATION (METERS)	10,000			
ELEVATION ABOVE MSL OF GROUND STATION LOCATION (METERS)	50			

NOTE:

1. CODE = (1, 2, 3, 4) TO INDICATE TO WHICH VERSION OF RHO THETA NAVIGATION SYSTEM THIS PARAMETER SET APPLIES.
2. ADDITIONAL DATA CAN BE PREPARED FOR SETS 2, 3, 4 AS DESIRED.
3. NAVIGATION SYSTEM PARAMETERS ARE SCENARIO DEPENDENT.
4. TABLE LOCATED IN BLOCK DATA (JFBLK3)

Table I-9

DESIGNER INPUTS FOR DOPPLER NAVIGATION SYSTEM (PRNV3)

SYSTEM PARAMETERS \ PARAMETER SET	1	2	3	4
STANDARD DEVIATION OF ERROR IN REGISTERING SYSTEM AT MOVEMENT INITIATION POINT (METERS)	5			
STANDARD DEVIATION OF FLIGHT UPDATING ERROR (PERCENT/100 THAT IS APPLIED TO ALTITUDE ABOVE GROUND.)	.05			
SYSTEM NOISE BANDWIDTH (1/MICROSECOND)	.0027			
STANDARD DEVIATION OF ALONG-TRACK SENSOR ERROR (METERS).	.00406			
STANDARD DEVIATION OF ALONG-TRACK COMPUTER ERROR (METERS)	.00225			
STANDARD DEVIATION OF CROSS-TRACK SENSOR ERROR (METERS)	.00445			
STANDARD DEVIATION OF CROSS-TRACK COMPUTER ERROR (METERS)	.00225			

NOTE:

1. CODE = (1, 2, 3, 4) TO INDICATE TO WHICH VERSION OF DOPPLER NAVIGATION SYSTEM THIS PARAMETER SET APPLIES.
2. ADDITIONAL DATA CAN BE SUPPLIED FOR PARAMETER SETS 2, 3, 4 AS DESIRED
3. SYSTEM PARAMETERS SCENARIO INDEPENDENT.
4. TABLE LOCATED IN BLOCK DATA (JFBLK3)

Table I-10

DESIGNER INPUTS FOR NORMER TYPE NAVIGATION SYSTEM (PRNV4)

SYSTEM PARAMETER \ PARAMETER SET	1	2	3	4
STANDARD DEVIATION OF THE PARAMETER SET (METERS)	200			

NOTE:

1. CODE = (1, 2, 3, 4) TO INDICATE ID OF PARAMETER SET.
2. ADDITIONAL DATA CAN BE PREPARED FOR SETS 2, 3, 4
3. SYSTEM PARAMETERS ARE SCENARIO INDEPENDENT.
4. TABLE LOCATED IN BLOCK DATA (JFBLK3)

TABLE 1-11

SAFETY MARGIN (SAFTY)

PSID EVENT TYPE / Code Class Digit Omitted / ID of Safety Margin	45-82mm Mortar Impacting	107-12[illegible]mm Morta. Impacting	155-160mm Mortar Impacting	240mm Mortar Impacting	[illegible]mm Mortar Impacting	76-94mm Artillery Impacting	100-122mm Artillery Impacting	152-155mm Artillery Impacting	175mm - 8in. Artillery Impacting	310mm Artillery Impacting	250-400mm Rockets & Missiles Impacting	600-850mm Rockets & Missiles Impacting	250 lb. Bomb	500-750 lb. Bomb	1000-2000 lb. Bomb
	031	032	033	034	035	051	052	053	054	055	096	095	131	132&133	134&135
1	20m	30m	50m	100m	150m	20m	30m	50m	70m	12[illegible]m	150m	250m	150m	300m	500m
2	700m	410m	450m	500m	550m	160m	180m	350m	400m	450m	500m	600m	500m	1000m	1500m
3	250m	[illegible]10m	550m	600m	650m	200m	220m	430m	500m	550m	650m	800m	700m	1500m	2000m

Notes: 1. These values of safety margin will be added to maximum x and y boundaries and subtracted from minimum x and y boundaries of planner chosen exclusion areas (planner input data set XXV).

2. Safety Margin Criteria

a. Lowest - No safety desired approximately equal to weapon cep.

b. Medium - 90% assurance damage radius + 1.83 cep's.

c. Greatest - 99% assurance damage radius + 2.5 cep's.

3. Data Located in Block Data (JFBLK 6).

TABLE I-12

FIRING CHARACTERISTICS OF WEAPONS (FCWPN)

EVENT TYPE		Small Arms Mortars	Artillery	Direct Fire, Recoilless Rifles, Bombs	Rockets & Missiles	Mines
Characteristic	Occurrence \ EVID (Last 2 Digits Omitted)	01 03	05	07 11 13	09	12
Number of Volleys	60%	3	3	4	1	1
	30%	5	1	6	2	1
	10%	10	6	8	3	3
Time Between Volleys, if No. of Volleys ≤ 3	60%	20 sec.	30 sec.	10 sec.	10 sec.	10 sec.
	30%	45 sec.	60 sec.	20 sec.	10 sec.	30 sec.
	10%	10 sec.	15 sec.	30 sec.	40 sec.	60 sec.
Time Between Volleys, if No. of Volleys >3	60%	10 sec.	40 sec.	5 sec.	10 sec.	5 sec.
	30%	5 sec.	30 sec.	20 sec.	15 sec.	20 sec.
	10%	20 sec.	90 sec.	30 sec.	30 sec.	40 sec.
Rounds per Volley	60%	1	1	1	1	1
	30%	2	2	2	1	1
	10%	4	6	3	2	2
Fuze Type (0-Ground Burst) (1-Air Burst)	60%	0	0	0	0	0
	30%	0	1	0	0	0
	10%	0	0	0	1	1

Notes: 1. For use in selecting weapon firing characteristics when these are not input by planner.

2. Table located in Block Data (JFBLK6)

Table I-13

FIREBASE WEAPONS [FBWPN(M,N)]

EVID TYPE DESCRIPTION	100-122mm ARTILLERY IMPACT	152-155mm ARTILLERY IMPACT
EVIL TYPE IMPACT / Range Bin ID (See Table I-14)	052	053
1 (200m)	041	042
2 (500m)	041	042
3 (1000m)	042	042
4 (2000m)	042	042
5 (4000m)	042	042
6 (7000m)	042	042
7 (10,000m)	043	043
8 (14,000m)	043*	044
9 (18,000m)	043	044*
10 (24,000m	043	044
11 (30,000m)	043	044
12 (50,000m)	043	044

*THIS IS MAXIMUM RANGE WEAPON CAN FIRE BUT IF TARGET IS FARTHER FROM FIRE BASE PROGRAM SHOULD NOT BE HELD UP, MUTUAL EFFECT OF FIRING AND IMPACT CONSIDERED NEGLIBLE AT THESE RANGES.

1. THIS TABLE PRESENTS A FIRING WEAPON EVID THAT CAUSES IMPACT EVENT, AT OR LESS THAN RANGE INDICATED BY RANGE BIN ID (SEE TABLE I-14), but greater than range at previous ID SHOWN. THUS FOR EVID 052 AT RANGE ID 5 THE FIRING WEAPON EVID IS 042 (100-105 MM CHARGE 5 OR 122 MM MEDIUM CHARGE)
2. RANGE ID VS RANGE LOCATED IN TABLE I-14(RNGBN)
3. DATA LOCATED IN BLOCK DATA (JFBLK6)

Table I-14

RANGE BIN LIMITS (RNGBN)

RADAR BIN ID	1	2	3	4	5	6	7	8	9	10	11	12
UPPER LIMIT OF RANGE (M) BOUNDARY	200	500	1000	2000	4000	7000	10000	14000	18000	24000	30000	50000

1. THIS TABLE PROVIDES RANGE ID'S FOR USE IN TABLES I-13(FBWPN) and I-15 (WPFLT)
2. ENTER TABLE WITH RANGE BETWEEN FIRING AND IMPACT LOCATION AND SELECT ID FOR RANGE ≤ ENTERING RANGE AND > NEXT LOWEST RANGE SHOWN. THUS A RANGE > 4000 M BUT ≤ 7000 M, INDICATOR RANGE BIN ID = 6
3. DATA LOCATED IN BLOCK DATA (JFBLK6)

TABLE I-15

WEAPON PROJECTILE FLIGHT TIMES (WPFLT)

EVENT TYPE		45-160mm Mortar	240-420mm Mortar	76-155mm Artillery	175mm/8 in. Artillery	37-100mm Direct Fire 57-107mm Recoilless Rifle	115-152mm Direct Fire Guns	Direct Fire Rockets and Missiles	250-850mm Rockets and Missiles
Range Bin ID	EVID(last Digit Omitted)	021,022, 023	024,025	041,042, 043	044,045	061,062,063 101,102,103	064, 065	081, 082, 083	084, 085
1	(200m)	13 sec	16 sec	1 sec	1 sec	1 sec	1 sec	1 sec	1 sec
2	(500m)	17 sec	20 sec	2 sec	1 sec	1 sec	1 sec	1 sec	1 sec
3	(1000m)	19 sec	24 sec	3 sec	2 sec	1 sec	2 sec	1 sec	2 sec
4	(2000m)	25 sec	30 sec	6 sec	4 sec	2 sec	3 sec	2 sec	3 sec
5	(4000m)	30 sec	35 sec	12 sec	8 sec	4 sec	6 sec	3 sec	4 sec
6	(7000m)	37 sec	40 sec	22 sec	14 sec	7 sec	10 sec	5 sec	5 sec
7	(10,000m)	37 sec	45 sec	26 sec	20 sec	10 sec	15 sec	5 sec	8 sec
8	(14,000m)	37 sec	45 sec	30 sec	26 sec	10 sec	20 sec	5 sec	10 sec
9	(18,000m)	37 sec	45 sec	30 sec	32 sec	10 sec	20 sec	5 sec	14 sec
10	(24,000m)	37 sec	45 sec	30 sec	40 sec	10 sec	20 sec	5 sec	18 sec
11	(30,000m)	37 sec	45 sec	30 sec	48 sec	10 sec	20 sec	5 sec	22 sec
12	(50,000m)	37 sec	45 sec	30 sec	50 sec	10 sec	20 sec	5 sec	22 sec

1. Data Located in Block Data (JFBLK6)

TABLE I-16

WEAPON RANGE LIMITATIONS (WRLIM)

Limit Type	EVENT TYPE / Range Limit ID / EVID (Last Digit Omitted)	MORTAR IMPACTING	DIRECT FIRE IMPACTING	ROCKETS, MISSILES AND RECOILLESS RIFLES IMPACTING
Minimum Range	1	200m	0m	0m
Maximum Range	2	8,000m	21,000m	7,000m
		031-035	061-065	081-083 & 101-103

1. Designed to apply to mortars, direct fire weapons, small rockets and missiles, and recoilless rifles.
2. EVID's are for impact types only.
3. Table located in block data (JFBLK 6).

TABLE I-17

AIRCRAFT SPEED SET(ACSPD)

Speed Dist	EVENT TYPE / A/C Speed ID / EVID (Last Digit Omitted)	LT & MED HELI	LARGE HELI	LOW-PWD FIXED WNG PROP A/C	HI-PWD FIXED WNG PROP A/C	JET FGTS
		171	172	173	174	175
60% of Time	1	25mps	25mps	30mps	45mps	175mps
30% of Time	2	20mps	25mps	40mps	35mps	250mps
10% of Time	3	50mps	90mps	70mps	100mps	130mps

Note: Table located in Block Data (JFBLK6)

TABLE I-18

AIRCRAFT ALTITUDE (ACALT)

	EVENT TYPE	LT & MED HELI	LARGE HELI	LOW-PWD FIXED WNG PROP A/C	HIGH-PWD FIXED WNG PROP A/C	JET FGTS
Altitude Dist	A/C Alt ID \ EVID (Last Digit Omitted)	171	172	173	174	175
60% of Time	1	100m	150m	300m	400m	1500m
30% of Time	2	700m	800m	500m	600m	700m
10% of Time	3	15m	25m	30m	50m	25m

1. Table located in block data (JFBLK 6)
2. Event type columns must correspond to those in Table I-17 (ACSPD).

TABLE I-19

VEHICLE SPEED(VSPED)

EVENT TYPE	LT WHL VEH < 1 TON	MED WHL VEH 1-5 TONS	HVY WHL VEH > 5 TONS	LT TRK VEH < 20 TONS	HVY TRK VEH ≥ 20 TONS
Vehicle Speed ID \ EVID (Last Digit Omitted)	181	182	183	184	185
1	3mps	3mps	3mps	3mps	3mps
2	10mps	8mps	6mps	7mps	4mps
3	20mps	16mps	12mps	14mps	8mps

1. Randomly select speed from choices shown with equal probability.
2. Table located in block data (JFBLK 6).

TABLE I-20

CONVOY SIZE (CNVOY)

EVENT TYPE	LT WHL VEH < 1 TON	MED WHL VEH 1-5 TONS	HVY WHL VEH > 5 TONS	LT TRK VEH < 20 TONS	HVY TRK VEH ≥ 20 TONS
Convoy Size ID \ EVID (Last Digit Omitted)	181	182	183	184	185
1	1	1	1	1	1
2	1	1	1	1	1
3	1	1	2	1	2
4	1	1	2	2	2
5	1	2	3	2	3
6	2	2	3	2	4
7	2	3	4	3	4
8	4	6	4	3	5

1. Randomly select number of vehicles in convoy from Table values with equal probability.
2. Table located in block data (JFBLK6).

TABLE I-21

SPACING BETWEEN VEHICLES (SPACE)

EVENT TYPE	LT WHL VEH < 1 TON	MED WHL VEH 1-5 TONS	HVY WHL VEH > 5 TONS	LT TRK VEH < 20 TONS	HVY TRK VEH ≥ 20 TONS
Vehicle Spacing ID \ EVID (Last Digit Omitted)	181	182	183	184	185
1	20m	25m	25m	20m	30m
2	30m	40m	35m	30m	50m
3	50m	75m	45m	40m	70m
4	100m	150m	75m	80m	90m

1. Randomly select intervals between vehicles in convoy from table values with equal probability.

2. Table located in block data (JFBLK 6).

TABLE I-22
NOMINAL EFFECT ON SENSOR OF PARTICULAR BATTLE EVENT
IN PERIOD OF CONSIDERATION (ZMOMAS)
VALUES ARE AVERAGE ENERGY DISSIPATION BY EVENT(VOLTS)

Event Description	EVID's (Last Digit Omitted)	SENSORS 1 Seismic	2 Acoustic
7.62mm Small Arms Firing	011	0.02V	0.05V
12.7-14.5mm Small Arms Firing	012	0.05V	0.10V
20-23mm Small Arms Firing	013	0.08V	0.15V
30mm Small Arms Firing	014	0.10V	0.20V
Class 1 Fire Support Weapons	(Note 1)	0.12V	0.25V
Class 2 Fire Support Weapons	(Note 2)	0.15V	0.30V
Class 3 Fire Support Weapons	(Note 3)	0.18V	0.35V
Classes 4 and 5 Fire Support Weapons	(Note 4)	0.20V	0.40V
250 lb. Bomb	131	0.22V	0.45V
500 lb. Bomb	132	0.25V	0.50V
750 lb. Bomb	133	0.28V	0.55V
1000-2000 lb Bomb	134 & 135	0.30V	0.60V
Light and Medium Helicopters	171	0.32V	0.65V
Heavy Helicopters	172	0.35V	0.70V
Light Propeller Fixed Wing Aircraft	173	0.38V	0.75V
Heavy Propeller & Jet Fixed Wing Aircraft	174 & 175	0.40V	0.80V
Under 1 Ton Light Wheeled Vehicle	181	0.42V	0.85V
1-5 Tons Medium Wheeled Vehicle	182	0.45V	0.90V
Over 5 Tons Heavy Wheeled Vehicle	183	0.48V	0.95V
Light and Heavy Tracked Vehicle	184 & 185	0.50V	1.00V

NOTES: 1. EVID's included in Class 1, Fire Support Weapons are 021, 031, 041, 051, 061, 071, 081, 091, 101, 111, and 121.

2. EVID's included in Class 2, Fire Support Weapons are 022, 032, 042, 052, 062, 072, 082, 092, 102, 112, and 122.

3. EVID's included in Class 3, Fire Support Weapons are 023, 033, 043, 053, 063, 073, 083, 093, 103, 113, and 123.

4. EVID's included in Class 4, Fire Support Weapons are 024, 034, 044, 054, 064, 074, 084, 094, and 124. EVID's included in Class 5, Fire Support Weapons are 025, 035, 045, 055, 065, 075, 085, 095, and 125.

5. Table located in Block Data C1B5LK6.

TABLE I-23

SIGNAL CHARACTERISTICS FROM BACKGROUND NOISE SOURCES (SCHAR)

EVENT TYPE / Signal Strength Level	Rural Village <50 Per	Small Village 50-500 Per	Large Village 500-2000 Per	Town/City >2000 Per	Small Pump	Water Wheel	Small Gen	Large Gen Pile Driver	Small Air-Strip	Med Air-strip Lt Traffic	Med Air-strip Mod Traffic	Airport Heavy Traffic	Light Surf	Moderate Surf	Heavy Stormy Surf	Unpvd Vehicle Traffic	Pvd Cart & Scooter Traffic	Car & Light Truck Traffic	Med.& Heavy Truck Traffic	Birds & Insects
	0113	0123	0133	0143 & 0153	0213	0223	0233	0243 & 0253	0313	0323	0333	0343 0353	0413	0423	0433 0443 0453	0513	0523	0533	0543 & 0553	1013
INDIVIDUAL ELEMENT RELATIVE STRENGTH FACTOR WITHIN EVENT CLASS:																				
Occurrence Strength																				
01 Low	0.2	0.2	0.2	0.2	0.4	0.4	0.4	0.4	0.2	0.2	0.2	0.2	0.1	0.2	0.3	0.2	0	0.2	0.2	0.1
05 Medium	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.4	0.5	0.6	0.6	0.5	0.6	0.6	0.5
10 High	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
TIME DEPENDENT NUMERICAL STRENGTH/ACTIVITY LEVEL VARIATION FACTOR OF EVENT:																				
Curfew Time of Day																				
Yes 2400-0600 hrs	0.1	0.1	0.1	0.1	0.2	1.0	0.1	0.1	0.1	0.1	0.1	0.1	1.0	1.0	1.0	0.1	0.1	0.1	0.1	1.0
0600-1200 hrs	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.7	0.7	0.7	1.0	1.0	1.0	1.0	0.5
1200-1800 hrs	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.4	0.4	0.4	1.0	1.0	1.0	1.0	0.3
1800-2400 hrs	0.3	0.3	0.3	0.3	0.1	1.0	0.5	0.3	0.2	0.2	0.2	0.2	0.7	0.7	0.7	0.2	0.2	0.2	0.2	0.8
No 2400-0600 hrs	0.1	0.2	0.3	0.3	0.4	1.0	0.3	0.1	0.2	0.3	0.3	0.5	1.0	1.0	1.0	0.2	0.2	0.2	0.2	1.0
0600-1200 hrs	0.8	0.8	0.8	0.8	0.7	1.0	0.9	1.0	1.0	0.8	0.8	0.9	0.7	0.7	0.7	0.8	0.8	0.9	1.0	0.5
1200-1800 hrs	0.8	0.8	0.8	0.8	0.7	1.0	0.9	1.0	1.0	0.8	0.8	0.9	0.4	0.4	0.4	0.7	0.8	0.9	1.0	0.3
1800-2400 hrs	0.4	0.4	0.5	0.5	0.3	1.0	0.7	0.3	0.2	0.3	0.3	0.5	0.7	0.7	0.7	0.4	0.4	0.4	0.4	0.8

NOTES:

1. These are multipliers that degrade the signal or disturbance from its maximum obtainable sustained level due to the Event individual element relative source strength and variation of number of elements or activity level of event over a daily time cycle.

2. As indicated in Block Data (JFBLK6).

TABLE I-24
PATH SPEED (PSPED)

EVENT TYPE / CEVID	Unpowered Vehicles	Powered Light Vehicles	Cars and Light Trucks	Medium Trucks	Heavy Trucks	Unpowered Boats	Low and Medium Powered Boats	High Powered Boats	Hand Pump Car	Passenger Train	Large Freight Train	Light Single Engine Plane	Lt/Med Twin Engine Propeller Plane	Heavy Four Engine Propeller Plane	Heavy Jet Airliner
Occurrence Distribution / Path Speed ID	0613	0623	0633	0643	0653	0713	0723, 0733, 0743	0753	0813	0823, 0833	0843, 0853	0913	0923 0933	0943	0953
60% 1	3mps	8mps	18mps	16mps	12mps	2mps	14 mps	20mps	6mps	25mps	25mps	50mps	90mps	150mps	250mps
30% 2	6mps	15mps	9mps	8mps	6mps	1mps	9mps	12mps	4mps	20mps	15mps	50mps	90mps	150mps	250mps
10% 3	9mps	mps	25mps	20mps	15mps	3mps	20mps	25mps	12mps	10mps	5mps	35mps	65mps	110mps	180mps

NOTES:

1. Designed to apply to Culture events moving along identified paths as potential false targets.
2. Table located in Block Data (JFBLK6).

TABLE I-25
CULTURAL AIRCRAFT ALTITUDE (CACAL)

EVENT TYPE / CEVID	Light Single Engine Plane	Light Twin Engine Plane	Medium Twin Engine Propeller Plane	Heavy Four Engine Propeller Plane	Heavy Jet Airliner
Occurrence Distribution / A/C Altitude ID	0913	0923	0933	0943	0953
60% 1	300m	300m	450m	2500m	7500m
30% 2	200m	800m	600m	2500m	6000m
10% 3	300m	200m	1000m	1500m	9999m

NOTES:

1. For use in varying aircraft altitudes.
2. Table located in Block Data (JFBLK6).

TABLE I-26

MAXIMUM SUSTAINED SIGNAL STRENGTH FROM BACKGROUND NOISE SOURCES (CEVDBA)

Sensor Type	Rural Village <500 Per	Small Village (500-2000 Per	Large Village 500-20000 Per	Town/City >20000 Per	Small Pump	Water Wheel	Small Gen	Large Gen/ Pile Driver	Small Air-strip	Med Air-strip, Light Traffic	Med Air-strip, Moderate Traffic	Airport, Heavy Traffic	Light Surf	Med Surf	Heavy/ Stormy Surf	Unpvd Veh Traffic	Pvd Cart & Sctr Traffic	Car & Lt Trk Traffic	Med & Hvy Trk Traffic	Birds & Insects
Seismic	5V	10V	20V	40V	10V	15V	40V	150V	25V	50V	75V	100V	10V	15V	35V	5V	20V	30V	40V	0V
Acoustic	10V	20V	40V	80V	20V	30V	80V	200V	50V	100V	150V	200V	20V	40V	70V	10V	40V	60V	80V	0V

0116 0123 0133 0143 & 0153 0213 0223 0233 0243 & 0253 0313 0323 0333 0343 & 0353 0613 0623 0433 0443 & 0453 0513 0523 0533 0543 & 0553 1613

NOTE:

1. Maximum sustained signal strength effect (in volts) upon sensor at minimum range from event source.
2. Table located in Block Data (IFBLK6).

TABLE I-27

ANIMAL SPEED (ANSPD)

EVENT TYPE	Small Dog, Cat, Rabbit	Large Dog, Wild Boar, Deer	Lion, Tiger, Bear	Horse, Cow, Water Buffalo
CEVID: Occurrence Distribution / Animal Speed ID	1023	1033	1043	1053
60%	1	2mps	2mps	1mps	1mps
90%	2	4mps	4mps	2mps	1mps
100%	3	10mps	10mps	5mps	2mps

NOTES:

1. Applies to animal moving along unidentified paths as potential false targets.
2. Table located in Block Data (IFBLK6).

```
C********************************* JFBLK3 ***********************************
C*                                                                          *
C*        BLOCK DATA USED TO SET  DESIGNER INPUT VALUES FOR THE             *
C*        DETERMINATION OF GROUND TRUTH POSITIONS                           *
C*                                                                          *
C*                                                                          *
      BLOCK DATA
       COMMON/MVSNP/ADRP1(10,2,2),ADRP2(10,3,2),PRNV1(4,10),PRNV2(4,7)
     X             ,PRNV3(4,7),PRNV4(4),ATMDE(34,5,2)
       DATA ADRP1/2*60.,2*70.,80.,95.,4*100.,2*80.,2*90.,100.,115.,125.,
     1 140.,160.,175.,5*20.,8*25.,3*30.,2*35.,2*40./
       DATA ADRP2/100.,2*110.,2*120.,2*130.,3*140.,2*110.,2*120.,2*130.,
     1 2*140.,2*150.,100.,110.,120.,130.,140.,150.,150.,160.,2*180.,
     2 3*25., 3*30., 4*35., 4*30., 2*35.,4*40., 2*25., 2*30., 2*35.,
     3 2*40., 2*45./
       DATA PRNV1/5.,3*0.,.5,3*0.,10000.,3*0.,5000.,3*0.,17000.,3*0.,
     1 17250.,3*0.,28700.,3*0.,5400.,3*0.,17000.,3*0., 10000.,3*0./
       DATA PRNV2/0.,3.,0.,0.,0.,0.035,3*0.,30.,3*0.,20.,3*0.,25000.,
     1           3*0.,10000.,3*0.,50.,0.,0./
       DATA PRNV3/5.,3*0.,0.05,3*0.,0.0027,3*0.,0.00408,3*0.,0.00225,
     1           3*0.,0.00445,3*0.,0.00225,3*0./
       DATA PRNV4/200.,3*0./
       DATA ATMDE/6*0.,74.,2*86.,101.,98.,107.,101.,110.,2*119.,128.,
     1 134.,143.,128.,137.,143.,148.,157.,131.,137.,145.,151.,160.,170.,
     2 4*0., 4*0.,39.,48.,54.,59.,68.,71.,86.,68.,74.,83.,77.,83.,89.,
     3 85.,89.,95.,108.,92.,128.,19*0.,92.,104.,116.,118.,131.,128.,140.
     4,134.,142.,151.,140.,148.,157.,166.,146.,154.,160.,169.,178.,156.,
     5 152.,157.,164.,170.,178.,187.,0.,10.,16.,23.,31., 42.,49.,56.,
     6 64., 73.,78.,87.,89.,25*0.,38.,43.,54.,60.,68.,76.,84.,69.,97.,
     7106.,114.,119.,125.,136.,141.,146.,154.,160.,165.,171.,176.,184.,
     8190.,195.,6*0.,6*0.,4*15.,2*22.,3*30.,4*37.,4*44.,2*60.,3*52.,
     92*44.,8*0.,2*22.,44.,2*60.,82.,67.,3*74.,2*37.,30.,3*44.,3*37.,
     A19*0.,3*37.,44.,37.,2*44.,2*52.,44.,3*52.,44.,5*52.,4*60.,56.,
     B2*52.,0.,2*27.,43.,41.,2*61.,54.,74.,2*68.,61.,54.,25*0.,2*14.,
     C3*20.,27.,3*34.,2*41.,4*47.,3*54.,2*61.,67.,3*68.,6*0./
       END
```

```
C******************************** JFBLK6 ************************************
C*                                                                          *
C*        BLOCK DATA USED TO SET DESIGNER INPUT VALUES USED TO              *
C*        COMPLETE BATTLE AND CULTURAL SCHEDULE TABLES                      *
C*                                                                          *
C*                                                                          *
      BLOCK DATA
C      ANY CHANGES IN TABLES SHOULD BE CHECKED SO DIMENSION OF TABLE IS
C      NOT EXCEEDED.  TABLES HAVE STANDARD FORTRAN INDEX NOTATION,
C      I.E.  XX(I,J).
C      EXAMPLE:  XCLUA(I,J)  WHERE  1<=I<=IXCLUA
C                                   1<=J<=JXCLUA
      COMMON/BATTEL/ SCHDL(14), SAFTY(15,4), ZNOMAS(20,4),
     1          FBWPN(4,13),  RNGBN(12,1),  WPFLT(8,13),
     2   WRLIM(3,3),   ACSPD(5,4),   ACALT(5,3),   VSPED(5,4),
     3 CNVOY(5,9), SPACE(5,5), FCWPN(5,6,3), TMAX
      COMMON/BB/ ISAFTY, IPIEVT, IWPFLT, JWRLIM, IWRLIM,
     1          IACSPD,JACSPD,IACALT,JACALT,IVSPED,JVSPED,ICNVOY,ISPACE,
     2          IFCWPN,IRSEVT,INMSS,NDAYS
      COMMON/EXCLUD/IXCLUA, JXCLUA, XCLUA(20,15)
      COMMON/SUBCUL/PSPED(15,4), CACAL(5,4), SCHAR(20,12),
     X           CEVDBA(20,4), ANSPD(4,4)
      COMMON/PAR/ IRCEVT, IPCEVT, ISCHAR, IPSPED, ICACAL,
     X           ICEVD, ISNFDX, ISNFDY, IANSPD, NLMX
      DATA ISAFTY/5/,IWPFLT/6/,JWRLIM/3/,IWRLIM/2/,
     1IACSPD/2/,JACSPD/4/,IACALT/2/,JACALT/3/,IVSPED/2/,JVSPED/4/,
     2ICNVOY/2/,ISPACE/2/,IFCWPN/5/,INMSS/16/
      DATA FCWPN/ 31.,  32.,  52.,  53., 121.,
     1            2.,   1.,   1.,   1.,   1.,
     2           60.,  60.,  60.,  60.,   0.,
     3          120., 120., 120., 120.,   0.,
     4            1.,   3.,   2.,   2.,   1.,
     5            0.,   0.,   1.,   1.,   0.,
     6            0.,   0.,   0.,   0.,   0.,
     7            4.,   3.,   3.,   3.,   1.,
     8           30.,  30.,  30.,  30.,   0.,
     9           60.,  60.,  60.,  60.,   0.,
     A            2.,   3.,   6.,   6.,   1.,
     B            0.,   0.,   0.,   0.,   0.,
     C            0.,   0.,   0.,   0.,   0.,
     D            8.,   5.,   5.,   5.,   1.,
     E           15.,  15.,  15.,  15.,   0.,
     F           15.,  15.,  15.,  15.,   0.,
     G            3.,   1.,   6.,   2.,   1.,
     H            0.,   0.,   0.,   0.,   0.0/
      DATA FBWPN/52.,53.,0.,0.,
     1          41.,42.,0.,0.,
     2          41.,42.,0.,0.,
     3          42.,42.,0.,0.,
     4          42.,42.,0.,0.,
```

```
5            42.,42.,0.,0.,
6            42.,42.,0.,0.,
7            43.,43.,0.,0.,
8            43.,44.,0.,0.,
9            43.,44.,0.,0.,
A            43.,44.,0.,0.,
B            43.,44.,0.,0.,
C            43.,44.,0.,0./
 DATA RNGBN/200.,500.,1000.,2000.,4000.,7000.,10000.,14000.,18000.,
1           24000.,30000.,50000./
 DATA WRLIM/ 31.,32.,0.,100.,800.,0.,2600.,5600.,0./
 DATA ACSPD/ 1711., 1721.,   0.,   0.,   0.,
1              25.,   25.,   0.,   0.,   0.,
2              20.,   25.,   0.,   0.,   0.,
3              50.,   90.,   0.,   0.,   0./
 DATA ACALT/100.,100., 0., 0., 0.,
1           700.,700., 0., 0., 0.,
2            15., 25., 0., 0., 0./
 DATA SAFTY/ 311.,321.,521.,531.,1211.,10*0.,
1            20., 30., 30., 50.,  10.,10*0.,
2           200.,410.,180.,350.,  50.,10*0.,
3           250.,510.,220.,430.,  50.,10*0./
 DATA VSPED/181.,182.,3*0.,
1            3.,  3.,3*0.,
2           10., 10.,3*0.,
3           20., 20.,3*0./
 DATA CNVOY/181.,182., 3*0.,
1            1.,  1., 3*0.,
2            2.,  2., 3*0.,
3            4.,  3., 3*0.,
4            1.,  1., 3*0.,
5            2.,  2., 3*0.,
6            4.,  4., 3*0.,
7            1.,  1., 3*0.,
8            2.,  2., 3*0./
 DATA SPACE/181.,182.,3*0.,
1           20., 30.,3*0.,
2           30., 40.,3*0.,
3           50., 50.,3*0.,
4          100.,100.,3*0./
 DATA ZNOMAS/21.,22.,31.,32.,41.,42.,43.,44.,52.,53.,121.,132.,
1           171.,172.,181.,182.,4*0.,
2         3*.'0,.20,2*.10,3*.20,.30,.10,.30,.20,2*.30,.40,4*0.,
3         3*.30,.40,2*.30,3*.40, .50,.30,.50,.40,2*.50,.60,4*0.,
4         20*0./
 DATA ISCHAR/ 2/,IPSPED/2/,ICACAL/2/,ICEVD/2/,IANSPD/1/
 DATA SCHAR/12.,42.,18*0.,.5,.5,18*0.,.75,.75,18*0.,1.,1.,18*0.
1,0.10,1.0,18*0.,0.9,1.0,18*0.,0.8,1.0,18*0.,0.1,1.0,18*0.,0.3,1.0,
2 18*0.,0.8,1.0,18*0.,0.8,1.0,18*0.,0.4,1.0,18*0./
 DATA PSPED/61.,72.,13*0.,3.,2.,13*0.,6.,5.,13*0.,9.,10.,13*0./
```

```
      [illegible]92 ,3*[illegible]200.,200.,3*0.,400.,400.,3*0.,800.,800.,
     1 3*0./
      DATA CEVOBA/12.,42.,18*0.,30.,30.,18*0.,2*60.,18*0.,20*0./
      DATA ANSPD/105.,3*0.,1.0,3*0.,5.0,3*0.,10.,3*0./
      DATA WPFLT/21.,22.,41.,42.,43.,44.,0.,0.,
     3 18.,00.,00.,00.,00.,00.,0.,0.,
     4 17.,00.,02.,01.,01.,01.,0.,0.,
     5 19.,00.,03.,03.,02.,01.,0.,0.,
     6 25.,22.,07.,06.,04.,03.,0.,0.,
     7 25.,30.,14.,12.,08.,06.,0.,0.,
     8 25.,37.,14.,19.,16.,13.,0.,0.,
     9 25.,37.,14.,19.,28.,23.,0.,0.,
     A 25.,37.,14.,19.,28.,37.,0.,0.,
     B 25.,37.,14.,19.,28.,53.,0.,0.,
     C 25.,37.,14.,19.,28.,53.,0.,0.,
     D 25.,37.,14.,19.,28.,53.,0.,0.,
     E 25.,37.,14.,19.,28.,53.,0.,0./
      END
```

TABLE I-28
TARGET CHARACTERISTICS
(Cont'd)

ITGTTP	4 = MUNITION			5 = BOAT		
KSTRNG	1 Lt Ammo	2 Med Ammo	3 Hvy Ammo	1 Sampan	2 Outboard	3 PT
SEISTG	ARTAR			DB BOAT		
	-18.	-12.	-6.	-54	-51	-48
ACOUTG	TBLMUN			WTRTBL		
	100	130	150	82	88	94
PIRTG				AREABO		
				1.	5.	10.
ARFTG						
RADAR				XSCBOT		
				.5	10.	50.
THERML				TSIZBT		
				.4	2.	5.
				TLENBT		
				2.	6.	30.
IMAGE				TSIZBT		
				.4	2.	5.

TABLE I-28

TARGET CHARACTERISTICS

ITGTTP	1 = MAN			2 = VEHICLE				3 = AIRCRAFT		
KSTRNG	1 Small	2 Large	3 Animal	1 Sm Trk	2 Hvy Trk	3 Tank	4 Train	1 Helo	2 Lt A/C	3 Jet
SEISTG	DB MAN			DB VEH				ACTAR		
	-66	-60.	-57.	-48	-45	-42	-39	105	115	125
ACOUTG	TBLMAN			VEHTBL				ALPAIR		
	20	50	65	85	105	115	125	105	115	125
PIRTG	AREAMN			AREAVH						
	.4	.7	2.0	3.	10.	20.	50.			
ARFTG	AREAM			AREAV						
	.1	.1	.2	.4	.7	2.	2.			
	AREAMM			AREAVM						
	.15	.15	0.0	1.	4.	10.	10.			
RADAR	XSCMAN			XSCVEH						
	.4	.4	1.0	2.5	5.0	10.0	20.0			
THERML	TSIZMN			TSIZVH						
	0.25	0.25	1.5	2.0	3.0	2.0	5.0			
	TLENMN			TLENVH						
	1.5	1.5	2.0	3.0	6.0	5.0	25.0			
IMAGE	TSIZMN			TSIZVH						
	0.25	0.25	1.5	2.0	3.0	2.0	5.0			

TABLE I-19

TARGET MAGNETIC DESCRIPTION

	ITGTTP = 1, KSTRNG = 1 or 2						ITGTTP = 2, KSTRNG = 1,2,3,4			
	KNIFE ISIZE = 1	SIDEARM ISIZE = 2	LIGHT RIFLE ISIZE = 3	MACHETE ISIZE = 4	MORTAR ISIZE = 5	HEAVY RIFLE ISIZE = 6	KSTRNG = 1	KSTRNG = 2	KSTRNG = 3	KSTRNG = 4
POLRES	5.0	5.0	7.0	7.0	30.0	10.0	70.	150.	300.	300.
POLIND	20.0	20.0	25.0	25.0	240.0	40.0	300.	1000.	3000.	3000.
TARLEW	40.	15.	30.	60.	75.	40.	500.	800.	1000.	1000.
ZOTABL	1.5	1.5	1.5	1.5	1.5	1.5	2.0	2.0	2.0	2.0

TABLE I-30
DESIGNER INPUT BASED ON WAVELENGTH INTERVAL

WAVELENGTH INTERVAL (MICRONS)

	.35-.4	.4-.45	.45-.5	.5-.55	.55-.6	.6-.65	.65-.7	.7-.75	.75-.8	.8-.85	.85-.9	.9-.95	
SENSPH	.02	.031	.042	.036	.03	.0225	.015	.01	.0053	.003	.0008	.0008	
FOTOPT	0.	.038	.323	.995	.631	.107	.004	0.	0.	0.	0.	0.	
SCOPT	.009	.455	.982	.481	.033	.001	0.	0.	0.	0.	0.	0.	
SEARCH	.1	.3	.45	.4	.35	.33	.3	.32	.64	.4	.85	.6	
SEARCH (Pink)	0.	0.	0.	0.	0.	0.	0.	0.	.16	.32	.3	.67	
RBACK1	.08	.12	.14	.15	.09	.05	.08	.45	.63	.68	.73	.76	Trees Grass(S.
RBACK2	.04	.04	.04	.06	.08	.11	.14	.21	.28	.3	.32	.34	Conifer-ous
RBACK3	.05	.07	.08	.14	.2	.26	.32	.43	.54	.55	.56	.57	Trs,Grs, (AUTMN)
RBACK4	.03	.04	.05	.07	.12	.15	.18	.19	.2	.2	.19	.18	Leaves
RBACK5	.05	.05	.05	.05	.05	.08	.12	.25	.38	.40	.41	.41	Ele Grass
RTGTM1	.05	.05	.05	.05	.05	.06	.08	.11	.15	.16	.16	.16	Fatigues
RTGTM2	.02	.04	.06	.08	.11	.14	.25	.47	.57	.63	.67	.68	Viet Hat
RTGTM3	.05	.05	.07	.1	.13	.18	.22	.25	.27	.27	.29	.3	Viet Blk Wear
RTGTVH	.1	.1	.11	.12	.13	.13	.13	.13	.13	.13	.13	.13	OD Paint
RTGTBT	.1	.1	.15	.18	.20	.18	.1	.2	.4	.45	.5	.52	OD Paint

TABLE I-31

SEISMIC DESIGNER DATA

SEISTG

FOLATN (db/meter)	
Dense	.15
Medium	.2
Open	.05
TARORG	(db)
Sgl File	0.
Dbl File	6.
Open	-6.
TMM	(db)
Normal	0.0
Hard	3.0
Gravel	6.0
DB SURF	(db)
Normal	0.0
Hard	2.0
Gravel	4.0
ALPHA	1.1
ALPHB	1.1
CUPCOF	140.

SEISBK

SOILM	
Dry	0.0
Moist	3.0
Very Moist	6.0
Saturated	6.0
VEGCVR	
Multi Cnpy	0.0
Sgl Cnpy	3.0
Brush Wd	3.0
Rice Paddy	9.0
Open	6.0
SENSEX	
Buried	0.0
Exposed	6.0
VEGCVW	
Multi Cnpy	0.0
Sgl Cnpy	6.0
Brush Wd	6.0
Rice Paddy	3.0
Open	3.0

F WIND	
km/hr	
0 - 9.1	.5
9.1 - 19.1	.4
19.1 - 29.1	.3
29.1 - 39.1	.2
> 39.1	.2
F RAIN	
mm/hr	
0 - 9.0 (lt)	.5
9. - 99.(med)	.3
> 99.(hvy)	.2
F CULT	
db	
0 - 20(remote)	.25
20 - 40(rural)	.15
40 - 60(urban)	.1
F BATL	
db	
0 - 20(low intensity)	1.5
20 - 40(med intensity)	.7
40 - 60(hi intensity)	.4
SET (Gain)	
1	6.31×10^4
2	3.1×10^4
3	1.577×10^4
4	$.788 \times 10^4$
5	$.394 \times 10^4$

TABLE I-32
ACOUSTIC DESIGNER DATA

ACOUTG

DBSURF	(db)
Soft	-3.0
Hard	0.0
Gravel	6.0
TMM	(db)
Soft	-3.0
Hard	0.0
Gravel	3.0
FOLTBL	(db/meter)
Dense	.05
Medium	.1
Open	.15
TROORG	(db)
Sgl Fl	-3.0
Dbl Fl	0.0
Opn	3.0
BOTORG	(db)
Sgl Fl	1.0
Dbl Fl	2.0
Opn	.2

ACOUBK

FANTBL	(db)	FFAON
Time		
3am-9am	40	.2
9am-3pm	27	.4
3pm-9pm	22	.5
9pm-3am	15	.7

FCULT	
Remote	.5
Rural	.3
Urban	.2
FBATL	
Low	.7
Medium	.5
High	.2

TABLE I-33
RADAR DESIGNER DATA

Wavelength (meters)	WAVELENGTH INTERVAL											
	0.0	0.004	0.01	0.02	0.03	0.05	0.10	0.3	0.6	1.0	2.0	
FPREC1	.93	1.09	1.24	.94	.92	NA						
FPREC2	.44	1.58	9.0	16.	89.5	NA						
ATATEN	1.2	.25	.1	.036	.025	NA						
BSECTN	0.05	0.03	0.01	0.0025	0.0025	0.0005	0.0002	0.0002	0.0002	0.0002		

TABLE I-34

SUBROUTINE ENVIR DESIGNER DATA

Wind Speed	WINDF	WINDV
km/hr		
0 - 4	1.	1.0
4 - 9	0.8	1.0
9 - 14	0.8	1.0
14 - 19	0.8	0.9
19 - 24	0.6	0.9
24 - 29	0.5	0.9
29 - 34	0.4	0.8
34 - 39	0.3	0.8
39 - 44	0.2	0.7
> 44	0.1	0.7

Precip. Rate mm/hr	RAINF	RAINV
0 - .9	1.0	0.6
.9 - 9.9	0.8	0.7
9.9 - 99.9	0.4	0.8
> 99.9	0.0	1.0

	VEEF	VEGV
Open Terrain	1.0	0.6
Medium Cover	0.5	0.8
Dense Jungle	0.1	1.0

	TYPEF	TYPEV
Barren	1.0	0.8
Grass	0.6	0.5
Woods	0.4	0.7
Water	0.2	0.9
Sky	0.1	1.0

	Cloud Transmission %	CLOUDF	CLOUDV
Dense Cloud	0 - 12.5	0.0	1.0
Heavy Cloud	12.5 - 25.	0.05	.9
Medium Cloud	25.- 37.5	0.1	.7
Light Cloud	37.5 - 50	0.2	.7
Heavy Haze	50 - 62.5	0.3	.8
Medium Haze	62.5 - 75.	0.5	.9
Light Haze	75.- 87.5	0.7	1.0
Clear	87.5 - 100	1.0	1.0

TABLE I-35

ADDITIONAL DESIGNER DATA

ARFTG: SAMPTM = 2 Seconds

BRKWIR:

IUT =	1	2	3	4	5	6	7	8	9
DISCOM =	0.5	0.2	0.2	0.2	0.1	0.1	0.1	0.7	0.0

COMMON SENVAR	DATA	USED BY
CONSTA	1.0 volt	ACOUTG
TDEL2A	40 seconds	ACOUTG
BIASAC	.2 volts	ACOUTG
BWACOU	500. hertz	ACOUTG
CONSTS	1.0 volt	SEISTG
TDEL2S	40 seconds	SEISTG
BIASSE	.2 volts	SEISTG
BWSEIS	100. hertz	SEISTG
PHIAZ	.01745 radians	PIRTG
PHIEL	.05236 radians	PIRTG
DIAM	10 millimeters	PIRTG
BWPIR	100. hertz	PIRTG
DEVXMN	.9	PIRTG
XMNDEV	.9	THERML
BANDTH	2600. hertz	THERML
ANEP	10^{-10} watts	THERML
OPTXMN	.8	IMAGE
THRESH	$.5 \times 10^{-7}$	PIRTG
DELAZ	.0349 radians	PIRTG
TIMMAX	3.0 seconds	PIRTG

VOLUME II INDEX

UNCLASSIFIED

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) US Army Combat Developments Command Systems Analysis Group Fort Belvoir, Virginia 22060	2a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED 2b. GROUP N/A

3. REPORT TITLE

Surveillance, Target Acquisition and Night Observation (STANO) Phase I System Assessment Model (SAM) (Short Title: STANO Phase I SAM)

4. DESCRIPTIVE NOTES (Type of report and inclusive dates)

Final Report

5. AUTHOR(S) (First name, middle initial, last name)

No personal author.

6. REPORT DATE 30 April 1971	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO. DAAB07-69-C-0069 Amendment P00002 b. PROJECT NO. ACN 16782 c. d.	9a. ORIGINATOR'S REPORT NUMBER(S) ACN 16782 9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	

10. DISTRIBUTION STATEMENT

None

11. SUPPLEMENTARY NOTES None	12. SPONSORING MILITARY ACTIVITY US Army Combat Developments Command Systems Analysis Group Fort Belvoir, Virginia 22060

13. ABSTRACT

The STANO Phase I SAM is designed to simulate a brigade or smaller STANO System in a low-intensity conflict. The model will permit the establishment and evaluation of numerous effectiveness criteria for individual STANO sensors and subsystems. It will facilitate the formation of improved candidate STANO Systems, through better understanding of shortcomings in organization, materiel and concepts of employment. It has the capability of producing information permitting scientifically supportable evaluations and judgments of interface requirements and trade-off options of STANO subsystems The model can be used for parametric analysis, trade-off analysis, and system performance sensitivity tests. (U)

DD FORM 1 NOV 68 1473 REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

UNCLASSIFIED

Security Classification

ASDIRS No:

Study Subcategory: Intelligence, Target Acquisition, System Assessment

Study Category: 300 - Development Studies

Starting Date: 23 March 1970

Initiated by: ACSFOR-DC, DA

Completion Date: 30 April 1971

Study Sponsor: USACDC

Availability Date: 30 April 1971

Study Agency: USACDCSAG/ISS

Reference Number: ACN 16782

Title: Surveillance, Target Acquisition and Night Observation (STANO) Phase I System Assessment Model (SAM) (Short Title: STANO Phase I SAM)

Abstract: The STANO Phase I SAM is designed to simulate a brigade or smaller STANO System in a low-intensity conflict. The model will permit the establishment and evaluation of numerous effectiveness criteria for individual STANO sensors and subsystems. It will facilitate the formation of improved candidate STANO Systems, through better understanding of shortcomings in organization, materiel and concepts of employment. It has the capability of producing information permitting scientifically supportable evaluations and judgments of interface requirements and trade-off options of STANO subsystems. The model can be used for parametric analysis, trade-off analysis, and system performance sensitivity tests.

Time Frame: Army 75 (1970-1975)

Study Descriptors: Nightvision, Surveillance, Target acquisition, Sensors, Detection, Systems; Simulation, System analysis; Sensitivity tests, Performance

Classification: UNCLASSIFIED

Contributes to: Concepts of employment, Organization, Materiel, and Doctrine

---

ASDIRS No:

Study Subcategory: Intelligence, Target Acquisition, System Assessment

Study Category: 300 - Development Studies

Starting Date: 23 March 1970

Initiated by: ACSFOR-DC, DA

Completion Date: 30 April 1971

Study Sponsor: USACDC

Availability Date: 30 April 1971

Study Agency: USACDCSAG/ISS

Reference Number: ACN 16782

Title: Surveillance, Target Acquisition and Night Observation (STANO) Phase I System Assessment Model (SAM) (Short Title: STANO Phase I SAM)

Abstract: The STANO Phase I SAM is designed to simulate a brigade or smaller STANO System in a low-intensity conflict. The model will permit the establishment and evaluation of numerous effectiveness criteria for individual STANO sensors and subsystems. It will facilitate the formation of improved candidate STANO Systems, through better understanding of shortcomings in organization, materiel and concepts of employment. It has the capability of producing information permitting scientifically supportable evaluations and judgments of interface requirements and trade-off options of STANO subsystems. The model can be used for parametric analysis, trade-off analysis, and system performance sensitivity tests.

Time Frame: Army 75 (1970-1975)

Study Descriptors: Nightvision, Surveillance, Target acquisition, Sensors, Detection, Systems; Simulation, System Analysis; Sensitivity tests, Performance

Classification: UNCLASSIFIED

Contributes to: Concepts of employment, Organization, Materiel, and Doctrine