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SKYLAB FILM USAGE ANALYSIS PROGRAM

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16. ABSTRACT

A computer model for a film usage analysis of the Skylab missions is described. The major objectives of the program are to predict the total time that each film canister will be out of the radiation vault and to verify the compatibility between the principal investigators' film requirements and the amount of time allocated for filming during the mission. The program is written in GASP IIA simulation language. The description and format for the input data are given. An example problem, as well as a sample output, is explained. The program description includes an execution flow chart, subprogram definitions, variable definitions, array limitations, and a FORTRAN listing of both the user written routines and the GASP routines.

EDITOR'S NOTE

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SKYLAB FILM USAGE ANALYSIS PROGRAM

SUMMARY

A computer model for a film usage analysis (FUA) of the Skylab (SL) mission has been developed, and its operation and use are described in this report. The program traces the use of the film cassettes throughout the complete mission and tabulates the total amount of time that each canister is out of the radiation vault, along with a summary of unused film.

This program is written in General Activity Simulation Program (GASP)-IIA language. The use of GASP was best suited for this program because of its adaptability to the accounting processes and event logic that were considered. The input to the program consists of the film requirements data and the filming activity timeline. A complete description of the user-written routines is given so that the changes to the existing model may be made when needed.

INTRODUCTION

Many of the activities to be performed on the SL missions require various amounts of filming, with some activities using different types of film. For example, the amount of filming planned for the SL-1/2 mission consumes 60 to 70 canisters for 30 different experiments and activities. A model was developed to provide the mission planner with an easy method of keeping track of the 150 filming events that will take place during the 28-day mission. The prime objectives of the SL FUA model are to predict the time that each canister will be out of the protective film vault and to verify compatibility between the film requirements and the mission timeline. The calculated out-of-vault time is used to predict the approximate amount of radiation dosage that each film canister will receive. A canister usage timeline tape can be generated by this program and serves as input to a detailed radiation analysis model.

The program is written in GASP IIA simulation language. This is a Fortran-based, next-event simulation language consisting of a set of Fortran routines that can be used by the analyst subprograms. No attempt will be made to explain the fundamental operations

of GASP since adequate references[1] are available, and an understanding of it is not needed for those who want to use the program as it is. However, modifications can easily be made to the existing program if the analyst wants to change the model to fit his particular needs.

This report is divided into three major sections. The first section contains all the instructions required by the user to operate and execute the program. A description of the UNIVAC 1108 control cards and of the input data format is presented. The second section illustrates an example project. A variety of different program options is shown, along with a listing of the input data and output results. The third section is a program description and should be referred to if modifications to the existing program are necessary. It includes a description of program execution, subprograms, variables, and GASP file definitions; project limitations, and a Fortran listing of all routines.

PROGRAM OPERATING INSTRUCTIONS

Control Card Description

Execution of the FUA program may be accomplished by means of the following control deck designed for operation on the Marshall Space Flight Center's (MSFC) UNIVAC 1108 EXEC VIII system. This method uses two tapes that are stored in the central site tape library. The first is the program tape that contains a compiled set of subroutines ready for execution. The second tape is the activity timeline data that is used as dynamic input to the program.

An additional tape may be needed when the user wishes to produce an output data tape that contains a canister usage timeline trace. All control cards containing the word OPTIONAL should be deleted from the following list if the output tape is not required.

1. A. A. Pritsker and P. J. Kiviat: Simulation with GASP II. Prentice Hall, Inc., Englewood Cliffs, N. J., 1969.

```
@RUN
@ASG,T TAPE1,T,12123
@ASG,T TAPE2,T,23491
@ASG,T TAPE3,T                    .OPTIONAL
@ASG,T 3,F2
@ASG,T 4,F2                       .OPTIONAL
@REWIND TAPE1.
@REWIND TAPE2.
@REWIND TAPE3.                    .OPTIONAL
@COPTN TAPE1,TPF4.
@COPY,G TAPE2,3
@FREE TAPE1.
@FREE TAPE2.
@XQT FILM
 DATA CARD TYPE 1
 DATA CARD TYPE 2
 DATA CARD TYPE 3
 -
 -
 BLANK CARD
@COPY,GM 4,TAPE3                  .OPTIONAL
@FIN
```

Similar control card deck setups may be generated for other computers or remote site operation.

Input Data Description

The input data required for the FUA program consist of three different types of data cards and one data tape. The format and description of the cards and tape are as follows.

1. Data Card Type 1 (2A6, 2A4, 5F10.0, I5)

Fields 1 and 2 (T1, T2)	A 12-letter alphanumeric title that describes the mission being analyzed. (Example, Skylab 1/2).
Fields 3 and 4 (D1, D2)	The reference date assigned by the analyst.
Field 5 (PRTIME)	The time the film canisters have been in the vault up to the start of the current mission (minutes).
Field 6 (VATIME)	The maximum time the film canisters have been in the vault during the current mission (minutes).

Field 7 (OTTIME)	The amount of time that the film canisters were out of the vault other than for filming operations (minutes).
Field 8 (XDAY)	The number of minutes per orbital day.
Field 9 (XTIME)	The initial starting time for the first orbital day (MISSION TIME = GROUND ELAPSED TIME + X TIME).
Field 10 (JTEST)	If a canister usage timeline output tape is required, a (1) should be placed in this field; otherwise, it can be left blank.

2. Data Card Type 2 (4F5.1)

Fields 1 through 4 (TRANS(I),I=1, 4)	The transfer time for moving the canister between the film vault and the area of filming. The four defined areas are the CM, MDA, AM, and OWS, respectively. Time is in minutes.

3. Data Card Type 3 (I3, 5X, 2A6, 6I5, 3F10.1)

a. This data card contains all the attributes associated with the experiment/film requirements. The user must define one card per individual filming requirement.

b. For activities requiring multiple film types, one card entry per type should be assigned.

Field 1 (JQ)	Activity identification code. This variable matches those codes contained on the activity timeline tape. (The code value of 1 is not permitted.)
Fields 2 and 3 (NAME 1, NAME 2)	A 12-letter alphanumeric descriptor used for identification of the event being filmed.
Field 4 (JTRIB(1))	Numeric representation of the film type assigned to the activity.
Field 5 (JTRIB(2))	Numeric code for the type of camera to be used. Present program designates camera 1 as a Maurer, 2 as a Hasselblad, 3 as undefined, and 4 as TBD.

Field 6 (JTRIB(4))	The footage or number of exposures per canister for the particular film type being used.
Field 7 (JTRIB(3))	Special canister code used by activities that share film off the same canister. Any integer may be assigned to this field; however, the same value must be assigned for all filming events that use a common canister. This field may be left blank.
Field 8 (JTRIB(5))	Code to indicate that the film is to be returned to the vault immediately after filming occurs versus waiting until the completion of activity performance. A 1 in this field represents immediate return; otherwise, it can be left blank.
Field 9 (JTRIB(7))	Integer code representing the location of filming. This field may be left blank if the location code is specified on the activity timeline tape.
Field 10 (ATRIB(1))	Total footage or exposures to be shot.
Field 11 (ATRIB(2))	Film time per activity performance in minutes.
Field 12 (ATRIB(3))	Camera shooting rate. For movie cameras it is in feet per minute and for single exposure cameras, shots per minute.

c. A blank card must be inserted as the last card in the data deck.

d. In cases where the filming requirements dictate variable shooting times and camera rates, this information can be read from the activity tape, thus overriding any constant input values defined on this card type.

4. Activity Timeline Tape Description

a. Present program operation requires the mission timeline of filming activities to be read from a magnetic tape. This tape is a condensed version of a generalized flight plan timeline tape containing only those events that require film. Input to the program is accomplished by a binary tape read statement containing the following variables.

Variables	Function
ICODE	This integer variable represents the code for an event requiring film. These codes must be compatible with the identification used in Field 1 of data card type 3.

Variables	Function
ASTART	The starting time at the beginning of the activity (hours).
ASTOP	The ending time at the completion of the activity (hours).
LOC	An integer variable indicating the location of filming. Used for determining the cumulative transfer time per canister. Present timeline includes the four major locations in the Skylab workshop (1-CM, 2-MDA, 3-AM, and 4-OWS).

b. Other formats for the activity timeline tape can be used by the program; however, subroutine EPICK must be changed accordingly.

EXAMPLE PROJECT

The example project chosen is based on preliminary film requirements and other information selected from the SL-3 mission. These data illustrate typical results produced by the FUA model. As explained in the preceding section of this report, the input film requirements consist of nine different attributes associated with each requirement entry. A listing of the punched input data is shown in Table 1, and the program printout of this information is shown in Table 2. Notice should be taken of the canister assignment for experiments M074, M092, and M093. These experiments permit the sharing of film among canisters assigned to the three activities. An identical canister code (10) was assigned to field 7 for each card entry. Experiments M171B and M171C also share common canisters.

A special requirement was placed on all film for experiment S190. This type of film is very sensitive to the radiation environment; therefore, the analyst specified that these canisters are to be returned to the vault immediately after filming takes place. A "1" placed in field 8 permitted this option to be executed.

The activity timeline used represents a reference flight plan that was defined during the planning stages of the Skylab program. An example listing of the first 50 records contained on the timeline tape is shown in Table 3.

The output of the program generates four tables and one optional canister usage trace tape. Table 4 is an hour-by-hour timeline of the status of each canister. Identification of each canister is made by a number code assigned internally within the program and

TABLE 1. LISTING OF INPUT DATA FOR EXAMPLE PROJECT

```
SKYLAB-3     4/15/70    0.0          77960.          0.0        1410.        -60.        1
   1.    3.    3.    2.
  6       M487 -FMA-          1     2   400                          400.        15.       8.66
  6       M487 -FMA-          1     1   600                           50.         5.        4.0
  7       M074&M151           1     2   400     10                   810.        15.       8.66
 25       M092&M151           1     2   400     10                  1620.        20.       8.66
 29       M093&M151           1     2   400     10                  675.0        15.       8.66
 23       M171A&M151          1     2   400                          945.        15.       8.66
 32       M171B&M151          1     2   400     12                   945.        15.       8.66
 37       M171C&M151          1     2   400     12                   945.        15.       8.66
 51       M5U8 SUITED         1     2   400                         1000.        45.       8.66
 56       M5U8UNSUITED        1     2   400                         1000.        45.       8.66
 35       S190                3     3   500           1             1500.         8.        7.5
 35       S190                3     3   500           1             1500.         8.        7.5
 35       S190                5     3   500           1             1500.         8.        7.5
 35       S190                7     3   500           1             1500.         8.        7.5
 35       S190                7     3   500           1             1500.         8.        7.5
 35       S190                8     3   500           1             1500.         8.        7.5
 77       T020                1     2   400                          1600.        69.       8.66
 77       T020                1     1   600                            10.        2.5       4.0
```

TABLE 2. INITIAL FILM REQUIREMENTS DATA FOR SKYLAB MISSION

```
************************************************
*                                              *
*                                              *
*FILM USAGE ANALYSIS FOR THE SKYLAB-3      MISSION*
*                                              *
*                                              *
*            REFERENCE DATE- 4/15/70           *
*                                              *
************************************************
```

-AN OUTPUT TAPE HAS BEEN GENERATED DURING THIS RUN-

CODE	EXPERIMENT	TYPE	CAMERA	SPECIAL CAN.	FOOT/CAN.	FOOTAGE	SHOOT-TIME	CAMERA-RATE	IMMEDIATE RETURN
6	M487 -FMA-	1	2	11	400	400.	15.0	8.66	NO
6	M487 -FMA-	1	1	0	600	* 50.	5.0	4.00	NO
7	M074&M151	1	2	10	400	810.	15.0	8.66	NO
25	M092&M151	1	2	10	400	1620.	20.0	8.66	NO
29	M093&M151	1	2	10	400	675.	15.0	8.66	NO
23	M171A&M151	1	2	0	400	945.	15.0	8.66	NO
32	M171B&M151	1	2	12	400	945.	15.0	8.66	NO
37	M171C&M151	1	2	12	400	945.	15.0	8.66	NO
51	M508 SUITED	1	2	0	400	1000.	45.0	8.66	NO
56	M508UNSUITED	1	2	0	400	1000.	45.0	8.66	NO
35	S190	3	3	0	500	* 1500.	8.0	7.50	YES
35	S190	3	3	0	500	* 1500.	8.0	7.50	YES
35	S190	5	3	0	500	* 1500.	8.0	7.50	YES
35	S190	7	3	0	500	* 1500.	8.0	7.50	YES
35	S190	7	3	0	500	* 1500.	8.0	7.50	YES
35	S190	8	3	0	500	* 1500.	8.0	7.50	YES
77	T020	1	2	0	400	1600.	69.0	8.66	NO
77	T020	1	1	0	600	* 10.	2.5	4.00	NO

*-INDICATES NUMBER OF EXPOSURES RATHER THAN FOOTAGE

TABLE 3. LISTING FROM ACTIVITY TIMELINE TAPE

6	24.50	25.50	1
6	29.75	30.75	4
23	33.23	34.73	4
25	34.23	35.50	4
6	35.50	36.50	4
7	36.50	36.75	4
7	39.75	40.00	4
29	51.92	52.47	4
29	52.35	53.00	4
6	53.00	54.00	4
6	60.50	61.50	4
7	61.50	61.75	4
7	63.25	63.50	4
25	75.48	76.75	4
6	76.75	77.75	4
35	79.00	80.55	2
29	80.70	81.35	4
25	81.23	82.50	4
6	82.50	83.50	4
7	83.50	83.75	4
7	86.75	87.00	4
32	98.08	99.50	4
23	98.75	100.25	4
6	100.25	101.25	4
35	102.25	103.80	2
23	104.50	106.00	4
6	106.00	107.00	4
7	107.00	107.25	4
7	110.25	110.50	4
37	121.07	123.07	4
25	122.48	123.75	4
6	123.75	124.75	4
32	125.25	126.67	4
32	126.42	127.94	4
29	128.32	128.97	4
29	128.85	129.50	4
6	129.50	130.50	4
7	130.50	130.75	4
7	133.75	134.00	4
25	145.98	147.25	4
6	147.25	148.25	4
35	148.88	150.43	2
29	151.20	151.85	4
25	151.73	153.00	4
6	153.00	154.00	4
7	154.00	154.25	4
7	157.25	157.50	4
6	170.75	171.75	4
37	172.75	174.75	4
37	174.50	176.50	4
6	176.50	177.50	4

TABLE 4. INTERMEDIATE FILM USAGE RESULTS

DAY	HR	MIN	EXPERIMENT	LOCATION	CAMERA	FILM TYPE	CAN NO.	CURRENT REMAIN. FILM	CUMULATIVE TRANS TIME	CUMULATIVE SHOOT TIME	CUMULATIVE WAIT TIME	CUMULATIVE TIME OUT OF REPOS
2	0	59	M487 -FMA-	1	M	1	1	270.10	2.00	15.00	43.00	60.00
2	0	59	M487 -FMA-	1	H	1	2	580.00	2.00	5.00	53.00	60.00
2	6	14	M487 -FMA-	4	M	1	1	140.20	2.00	30.00	88.00	120.00
2	6	14	M487 -FMA-	4	H	1	2	560.00	6.00	10.00	104.00	120.00
2	10	13	M171A&M151	4	M	1	6	270.10	4.00	15.00	71.00	90.00
2	10	59	M092&M151	4	M	1	9	226.80	4.00	20.00	52.20	76.20
2	11	59	M487 -FMA-	4	M	1	1	10.30	6.00	45.00	129.00	180.00
2	11	59	M487 -FMA-	4	H	1	2	550.00	10.00	12.50	157.50	180.00
	ALL TYPE 1 S.E. FILM ASSIGNED TO : M487 -FMA- HAS BEEN USED UP											
	****NOTE: THE FILMING TIME FOR THE NEXT ACTIVITY EXCEEDS THE ALLOCATED FLIGHT PLAN TIME											
2	12	18	M074&M151	4	M	1	3	270.10	4.00	15.00	.00	19.00
	****NOTE: THE FILMING TIME FOR THE NEXT ACTIVITY EXCEEDS THE ALLOCATED FLIGHT PLAN TIME											
2	15	33	M074&M151	4	M	1	3	140.20	4.00	30.00	4.00	38.00
3	4	28	M093&M151	4	M	1	13	270.10	4.00	15.00	20.00	39.00
3	5	59	M487 -FMA-	4	M	1	1	.00	10.00	46.19	183.81	240.00
	ALL TYPE 1 MOVIE FILM ASSIGNED TO : M487 -FMA- HAS BEEN USED UP											
	****NOTE: THE FILMING TIME FOR THE NEXT ACTIVITY EXCEEDS THE ALLOCATED FLIGHT PLAN TIME											
3	13	48	M074&M151	4	M	1	3	10.30	8.00	45.00	4.00	57.00
	****NOTE: THE FILMING TIME FOR THE NEXT ACTIVITY EXCEEDS THE ALLOCATED FLIGHT PLAN TIME											
3	15	33	M074&M151	4	M	1	3	.00	8.00	46.19	21.81	76.00
3	15	33	M074&M151	4	M	1	4	280.40	4.00	13.81	1.19	19.00
4	5	14	M092&M151	4	M	1	9	53.60	8.00	40.00	104.40	152.40
4	7	43	S190	2	U	3	1	440.00	6.00	8.00	.00	14.00
4	7	43	S190	2	U	3	4	440.00	6.00	8.00	.00	14.00
4	7	43	S190	2	U	5	1	440.00	6.00	8.00	.00	14.00
4	7	43	S190	2	U	7	1	440.00	6.00	8.00	.00	14.00
4	7	43	S190	2	U	7	4	440.00	6.00	8.00	.00	14.00
4	7	43	S190	2	U	8	1	440.00	6.00	8.00	.00	14.00
4	9	50	M093&M151	4	M	1	13	140.20	8.00	30.00	40.00	78.00
4	10	59	M092&M151	4	M	1	9	.00	12.00	46.19	170.41	228.60
4	10	59	M092&M151	4	M	1	10	280.40	4.00	13.81	58.39	76.20
	****NOTE: THE FILMING TIME FOR THE NEXT ACTIVITY EXCEEDS THE ALLOCATED FLIGHT PLAN TIME											
4	12	18	M074&M151	4	M	1	4	150.50	8.00	28.81	1.19	38.00
	****NOTE: THE FILMING TIME FOR THE NEXT ACTIVITY EXCEEDS THE ALLOCATED FLIGHT PLAN TIME											
4	15	33	M074&M151	4	M	1	4	20.60	8.00	43.81	5.19	57.00
5	4	29	M171B&M151	4	M	1	14	270.10	4.00	15.00	66.20	85.20
5	5	14	M171A&M151	4	M	1	6	140.20	8.00	30.00	142.00	180.00
5	7	28	S190	2	U	3	1	380.00	12.00	16.00	.00	28.00
5	7	28	S190	2	U	3	4	380.00	12.00	16.00	.00	28.00

serves as a means of tracing canister handling. Associated attributes are given for each filming performance, including experiment title, film type, camera type, and location. Statistics on the remaining unexposed film and the cumulative out-of-repository time are shown. Logic within the program generates a message when all requirements for a particular experiment have been completed. Incompatibilities between the activity performance time and the assigned shoot time are also noted in this output.

Table 5 gives the final summary per film type for each canister. These results permit the mission planner to reassign unused film to other experiments that require the same film type, thus optimizing the number of canisters.

A histogram of cumulative out-of-vault times for each film type is given in Table 6. The average, minimum, and maximum, times out permit a rough estimate that any film type will receive a given amount of radiation damage. A large distribution of canisters per film type represents a typical variety for out-of-vault times and gives a good indication of what the final mission statistics will probably be like.

Table 7 includes the percentage of filming requirements that are completed during the mission. Incomplete requirements indicate that not enough performances of the activity are scheduled or that an excessive amount of film is assigned. This information permits the analyst to recommend that the Principal Investigator reduce his desired footage or use longer shoot times. In some cases the longer shoot times will not give any more photographic information. One additional solution to this problem is to schedule more performances of the desired filming event.

Table 8 includes a portion of the printout from canister usage trace tapes. Each record contains four words of information. The first word is the canister code (XXYY - XX is the film type, YY is the canister number) and is used for identification purposes. The second and third words are floating point variables giving the absolute mission times (hours) that each canister is removed and returned to the film vault. The fourth word is an integer code reflecting the location of the canister during filming operations. The tape is generated by a formatted write statement, and therefore must be read according to the following format (I4, 2F10.3, I4). The data contained on this tape serve as input to a radiation analysis program that determines the probable dosages received by each canister during the duration of the mission.

PROGRAM DESCRIPTION

Program Execution

A flow chart showing the major events for normal operation of the program is given in Figure 1. Execution begins by reading in all user-defined variables. The mission

TABLE 5. FILM USAGE SUMMARY

FILM TYPE	CAN NO.	TOTAL TRANS TIME	TOTAL SHOOT TIME	TOTAL WAIT TIME	OTHER TIME OUT OF REPOS	TOTAL TIME OUT OF REPOS	TOTAL TIME IN REPOS	REMAIN FILM	FOOTAGE/ CANISTER
1	1	10.0	46.2	183.8	.0	240.0	77720.0	.0	400
1	2	10.0	12.5	157.5	.0	180.0	77780.0	550.0	600
1	3	8.0	46.2	21.8	.0	76.0	77884.0	.0	400
1	4	12.0	46.2	13.8	.0	72.0	77888.0	.0	400
1	5	20.0	35.2	153.0	.0	208.2	77751.8	95.0	400
1	6	16.0	46.2	297.8	.0	360.0	77600.0	.0	400
1	7	12.0	46.2	301.8	.0	360.0	77600.0	.0	400
1	8	8.0	16.7	155.3	.0	180.0	77780.0	255.0	400
1	9	12.0	46.2	170.4	.0	228.6	77731.4	.0	400
1	10	12.0	46.2	170.4	.0	228.6	77731.4	.0	400
1	11	12.0	46.2	170.4	.0	228.6	77731.4	.0	400
1	12	12.0	46.2	246.6	.0	304.8	77655.2	.0	400
1	13	16.0	46.2	93.8	.0	156.0	77804.0	.0	400
1	14	16.0	46.2	278.6	.0	340.8	77619.2	.0	400
1	15	16.0	46.2	278.6	.0	340.8	77619.2	.0	400
1	16	8.0	33.5	368.9	.0	410.4	77549.6	110.0	400
1	17	12.0	46.2	301.8	.0	360.0	77600.0	.0	400
1	18	12.0	46.2	421.8	.0	480.0	77480.0	.0	400
1	19	8.0	46.2	275.8	.0	330.0	77630.0	.0	400
1	20	8.0	46.2	275.8	.0	330.0	77630.0	.0	400
1	21	4.0	23.1	137.9	.0	165.0	77795.0	200.0	400
1	22	8.0	46.2	335.8	.0	390.0	77570.0	.0	400
1	23	8.0	46.2	335.8	.0	390.0	77570.0	.0	400
1	24	4.0	23.1	167.9	.0	195.0	77765.0	200.0	400
3	1	48.0	66.7	11.3	.0	126.0	77834.0	.0	500
3	2	6.0	66.7	53.3	.0	126.0	77834.0	.0	500
3	3	6.0	10.7	11.3	.0	28.0	77932.0	420.0	500
3	4	54.0	66.7	5.3	.0	126.0	77834.0	.0	500
3	5	54.0	66.7	5.3	.0	126.0	77834.0	.0	500
3	6	12.0	10.7	5.3	.0	28.0	77932.0	420.0	500
5	1	54.0	66.7	5.3	.0	126.0	77834.0	.0	500
5	2	54.0	66.7	5.3	.0	126.0	77834.0	.0	500
5	3	12.0	10.7	5.3	.0	28.0	77932.0	420.0	500
7	1	54.0	66.7	5.3	.0	126.0	77834.0	.0	500
7	2	54.0	66.7	5.3	.0	126.0	77834.0	.0	500

TABLE 6. FREQUENCY RESULTS FOR TIME OUT OF VAULT

TIME OUT	NUMBER CANISTERS OF FILM TYPE				
	1	3	5	7	8
0. TO 50.	0	2	1	2	1
50. TO 100.	2	0	0	0	0
100. TO 150.	0	4	2	4	2
150. TO 200.	5	0	0	0	0
200. TO 250.	5	0	0	0	0
250. TO 300.	0	0	0	0	0
300. TO 350.	5	0	0	0	0
350. TO 400.	5	0	0	0	0
400. TO 450.	1	0	0	0	0
450. TO 500.	1	0	0	0	0
NUMBER CAN. USED	24.	6.	3.	6.	3.
AVERAGE TIME OUT	273.	93.	93.	93.	93.
MINIMUM TIME OUT	72.	28.	28.	28.	28.
MAXIMUM TIME OUT	480.	126.	126.	126.	126.

TABLE 7. SUMMARY RESULTS FOR COMPLETED FILM REQUIREMENTS

ACTIVITY	FILM TYPE		FOOTAGE REQUIRED	FOOTAGE SHOT	PERCENT OF REQUIREMENTS COMPLETED
M487 -FMA-	1		400.	400.	100.
M487 -FMA-	1	*	50.	50.	100.
M0748M151	1		810.	810.	100.
M0928M151	1		1620.	1520.	100.
M0938M151	1		675.	675.	100.
M171A8M151	1		945.	945.	100.
M1718M151	1		945.	945.	100.
M171C8M151	1		945.	945.	100.
M508 SUITED	1		1000.	1000.	100.
M508UNSUITED	1		1000.	1000.	100.
S190	3	*	1500.	1080.	72.
S190	3	*	1500.	1080.	72.
S190	5	*	1500.	1090.	72.
S190	7	*	1500.	1080.	72.
S190	7	*	1500.	1080.	72.
S190	8	*	1500.	1080.	72.
T020	1		1600.	0.	0.
T020	1	*	10.	0.	0.

TABLE 8. PRINTOUT OF CANISTER TIMELINE TAPE

101	24.500	25.500	1
102	24.500	25.500	1
101	29.750	30.750	4
102	29.750	30.750	4
106	33.230	34.730	4
109	34.230	35.500	4
101	35.500	36.500	4
102	35.500	36.500	4
103	36.500	36.817	4
103	39.750	40.067	4
113	51.820	52.470	4
101	53.000	54.000	4
103	61.500	61.817	4
103	63.250	63.567	4
104	63.250	63.567	4
109	75.480	76.750	4
301	79.000	79.233	2
304	79.000	79.233	2
501	79.000	79.233	2
701	79.000	79.233	2
704	79.000	79.233	2
801	79.000	79.233	2
113	80.700	81.350	4
109	81.230	82.500	4
110	91.230	82.500	4
104	83.500	83.817	4
104	86.750	87.067	4
114	98.080	99.500	4
106	98.750	100.250	4
301	102.250	102.483	2
304	102.250	102.483	2
501	102.250	102.483	2
701	102.250	102.483	2
704	102.250	102.483	2
801	102.250	102.483	2
106	104.500	106.000	4
104	107.000	107.250	4
105	107.000	107.250	4
117	121.070	123.070	4
110	122.480	123.750	4
114	123.250	126.670	4
113	128.320	128.970	4
110	145.980	147.250	4
111	145.980	147.250	4
301	148.880	149.113	2
304	148.880	149.113	2
501	148.880	149.113	2
701	148.880	149.113	2
704	148.880	149.113	2
801	148.880	149.113	2
113	151.200	151.950	4

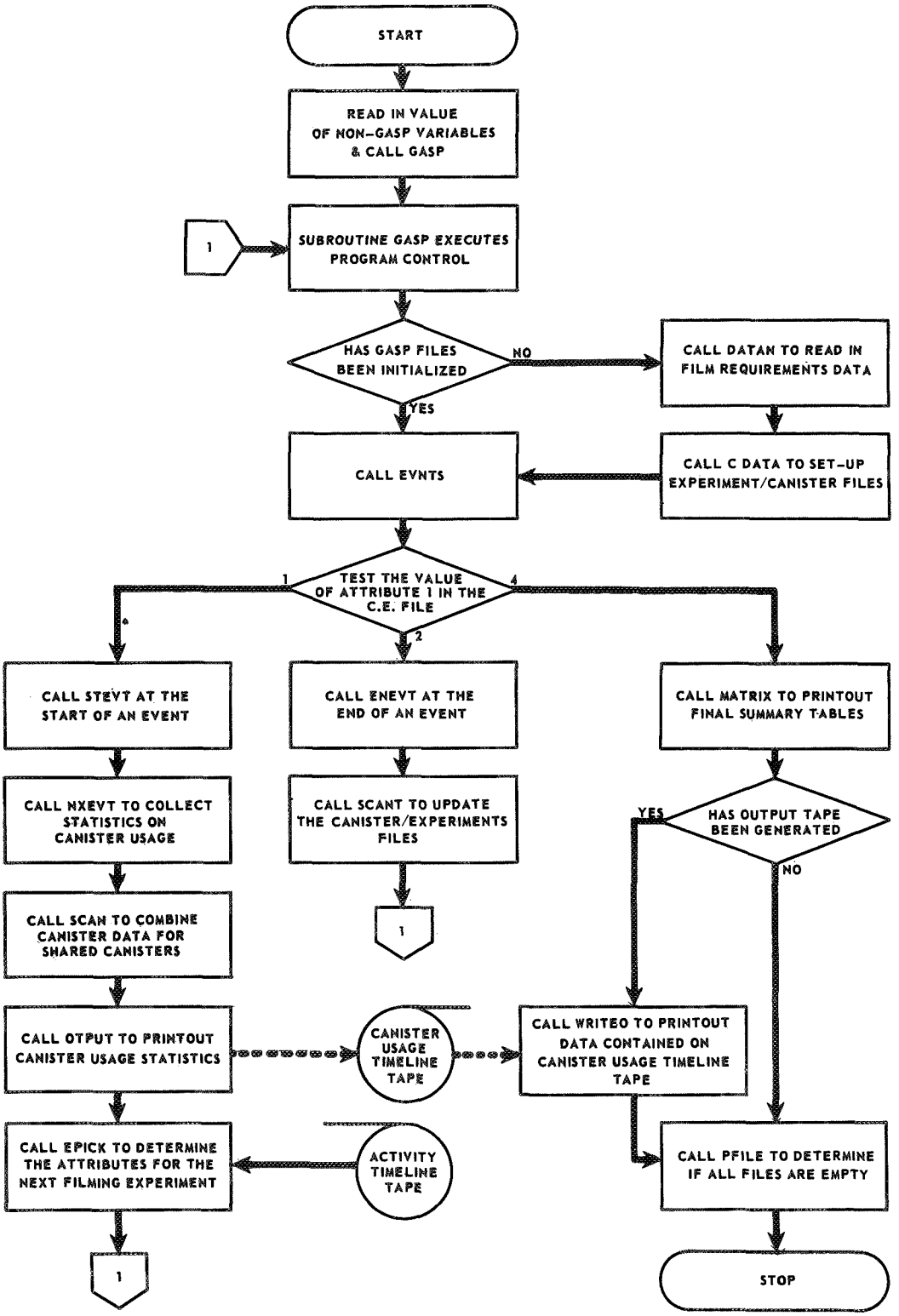

Figure 1. Film usage analysis program flow chart.

title and reference date are then printed out. If an output tape is to be generated, a message to this effect is noted on the title page. Subroutine GASP is then called to handle program control. The initialization of the GASP files are established by subroutines DATAN and CDATA. Subroutine CDATA allocates and assigns the number of canisters needed to complete each filming requirement. The EVNTS routine determines the state of the next event simulation by testing the value of attribute 1 in the current events file. The program is then transferred to one of three different legs. Leg one is executed at the start of each filming event. Cumulative statistics on canister usage and time out of the vault are collected and stored in the canister/experiment files. The intermediate film usage results are printed out. Generation of a canister usage timeline trace is recorded on tape. The last operation in this leg is accomplished by EPICK. This includes the updating of the current events file with the requirements for the next filming activity. The activity timeline tape is required as input to this routine. Execution sends control back to routine GASP.

Leg two is executed at the end of each filming event. The status of the canister usage is recorded and stored in the canister/experiment files. Program operation is then returned to GASP.

The last major leg is called only at the end of the mission. Subroutine MATRIX prints out the summary Tables 5 through 7. If an output tape has been generated, subprogram WRITEO is called. Subprogram WRITEO rewinds the output tape and prints the data contained on this file. Routine PFILE checks the status of the GASP files to determine if all information has been retrieved. Variable MSTOP is set to the value of (-1); thus, program execution is completed.

User-Written Routines

User Subprogram Descriptions. Table A-1, Appendix A, gives a description of the user-written subroutines that are contained in the FUA program. Each routine has been well explained; therefore, only a brief statement of its purpose was given.

User Variables and Arrays. An alphabetical list of the variables contained in the user-written program is given in Table A-2 of Appendix A. All variables are defined in COMMON. All dimensioned variables that limit the size of the problem are discussed in the following subsection.

Program Limitations. The size of the analysis is limited by the dimensions of the user-defined arrays. Current program limitations are shown in the following table.

Arrays Affected	Limitation	Characteristics
NAME 1 (200) NAME 2 (200)	200	Number of different filming activities.
ICAN (40)	40	Number of canisters per activity for each film type.
KFILM (25)	25	Number of different film types.
TRANS (4)	4	Number of different areas in which filming occurs.
CAMERA (4)	4	Number of camera types.

The complete compiled program uses 20 500 words of core storage.

Error Messages. Normal operation of the program will not terminate execution because of changes in input data. However, the development of the program included various tests within the user-written and GASP subroutines that determine if the program is operating in a nominal manner. These tests will terminate execution by calling subroutine ERROR upon the generation of any irregular conditions. At this time a complete dump of the status of all GASP files will be made. The following list of error codes and the corresponding routines is included as a troubleshooting tool for those wishing to modify the program.

Error Code	Routine
11	EPICK
12	NXEVT
87	FILEM
88	SET
89	FIND
93	GASP
97	RMOVE
90	COLCT

Fortran Listing. A Fortran listing of the user-written subprograms is contained in Tables A-3 through A-15 of Appendix A.

GASP Routines

GASP File Definitions. The GASP written program requires the manipulation of three user-defined files. The information contained in each file is retrieved and filed through the use of the GASP-IIA routines that are called within the analyst-written subroutines.

File 1 is always the current events file, and the user's event subprograms must be written so that the attributes of the next event to occur are stored in file 1. Two additional sets of files are defined.

The first set, referred to as the experiment/film requirements files, consists of a file for each experiment that requires film. Each entry in a file corresponds to a different filming requirement. The file number corresponds to a code assigned to each experiment and varied from 3 to 200. The second set of files, referred to as the experiment/canister files, is generated within a user subroutine using the film requirements specified in the first set. As for the first set, a file was defined for each experiment that required film with the file number corresponding to 200 plus the experiment code. An entry was made for each film canister that was allocated to each film requirement. The fixed- and floating-point attributes associated with each of the files are given in Tables B-1, B-2, and B-3 of Appendix B.

GASP Subprogram Descriptions. The GASP routines used in the FUA program consist of the set of standard subprograms that make up the simulation language. However, the operation of the program utilizes only 10 out of the 22 available subroutines. Subroutines GASP and DATAN were modified to reduce unnecessary logic and input to the program. The other eight routines are used for information storage and retrieval, error reporting, and data collection. The function of each subprogram is described in Table B-4 of Appendix B.

Variables and Arrays. The variables contained in the FUA program that are peculiar to the GASP subroutines are included in Table B-5 of Appendix B. It should be noted that not all of these variables are used by the program but are listed in the COMMON statements of the standard GASP routines.

GASP Listing. A Fortran listing of the GASP subprograms is contained in Tables B-6 through B-16 of Appendix B.

APPENDIX A
USER-WRITTEN PROGRAM INFORMATION

TABLE A-1. USER-WRITTEN SUBPROGRAM DESCRIPTION

Subprogram	Function
MAIN	Serves as master control FUA program. All initialization of user variables is read in from this routine. (Subroutine called GASP.)
CDATA	Initializes the experiment/canister files from the data available in the experiment/film requirements files. (User-written subroutine called NONE.)
ENEVT	Stores the attributes of ending an event in the experiment/canister files. (User-written subroutine called SCANT.)
EPICK	Sets up data for the current events file. Film activity timeline tape provides input to this routine. (User-written subroutine called NONE.)
EVNTS	Controls the sequencing of starting or ending an event and end of mission. (User-written subroutines called STEVT, ENEVT, and MATRIX.)
MATRIX	Generates the summary tables for the FUA program. Output includes Tables 5 through 7. (User-written subroutines called PFILE and WRITEO.)
NXEVT	Collects statistics and determines the time usage data on each canister of film. Generates the attributes for the next experiment requiring film. Prints out message indicating that an activity has completed all filming requirements. (User-written subroutines called SCANT, SCAN, OTPUT, and EPICK.)
PFILE	Prints out the current values of the attributes stored in the GASP files. This routine is called when abnormal operation of the program occurs.

TABLE A-1. (Concluded)

Subprogram	Function
OTPUT	Prints out the film canister usage timeline (Table 4) and generates an output tape if required. (User-written subroutine called NONE.)
SCAN	Updates the attributes of the experiment/canister files for those activities that share film off a common canister. (User-written subroutine called NONE.)
SCANT	Determines the status of the canister usage such as canister on standby or in vault and partially used or new canister. (User-written subroutine called NONE.)
STEVT	Checks to see if the event is the first event. Computes the time for ending an event and determines the total footage used during the filming activity. (User-written subroutines called EPICK and NXEVT.)
WRITEO	Produces a printout of the data contained on the canister usage timeline tape. This routine is executed after the output tape has been generated and serves as a check on parity errors. (User-written subroutine called NONE.)

TABLE A-2. USER-DEFINED VARIABLES AND ARRAYS

Variable	Definition
A(I)	A buffer array used to store the floating-point attributes of the current events file.
BTIME	The beginning time for the start of filming events.
ETIME	The time in which a canister is returned to the vault.
IA(I)	A buffer array used to store the fixed-point attributes of the current events file.
ICAN(I)	The number of canisters per film type per activity.
JCOUNT	Counter used to keep track of the number of printed lines per page of output.
JTEST	Indicator value that permits an output tape to be generated. (Value = 1 if output tape is required.)
KFILE	Unit number for the input tape (flight plan data tape).
KOUT	Unit number for the output tape (canister usage timeline trace).
KFILM(I)	Stores the different types of film to be used during the mission.
NAME 1 (I), NAME 2 (I)	Used to store the alphanumeric identification name of the ith filming activity (12-letter description).
NCODE(I)	The array used to store the values of the filming activity codes.
NFILM	The number of different film types used during the mission.
NOEXP	The number of activities or experiments requiring film.
NRECYC	Test variable used to determine if additional filming is to be completed during present filming activity.
NWRITE	Indicator value used to print out a message when all film requirements of an activity have been completed.

TABLE A-2. (Concluded)

Variable	Definition
OTIME	The amount of time the film canisters were out of the vault other than for filming operations (minutes).
PFOOT	The tolerance on the amount of film shot per performance (feet or exposures).
PRTIME	The amount of time the canisters have spent in the vault other than during the current mission (minutes).
RFOOT	The minimum amount of film remaining on a canister in order that the canister can be used again (feet or exposures).
TRANS(I)	The translation times for moving the canisters between the vault and the area in which filming occurs.
VATIME	The maximum time that the film canister has been in the vault during the current mission (minutes).
XDAY	The number of minutes in an orbital day.
XTIME	The initial time for the start of the first mission day (minutes).

TABLE A-3. FORTRAN LISTING OF USER-WRITTEN PROGRAM MAIN

```
400550*TPFS.MAIN
     1            DIMENSION NSET(6000),QSET(3333)                                    MAIN  10
     2            COMMON ID,IM,INIT,JEVNT,JMNIT,MFA,MSTOP,MX,MXC,NCLCT,NHIST,        MAIN  20
     3           1NQQ,NQRPT,NQT,NPRMS,NRUN,NRUNS,NSTAT,OUT,SCALE,ISEED,TNOW,         MAIN  30
     4           2TBEG,TFIN,MXX,NPRNT,NCRDR,NEP,VNQ(400),IMM,MAXQS,MAXNS             MAIN  40
     5            COMMON ATRI(15),ENQ(400),INN(400),JCELS(20,22),KRANK(401),         MAIN  50
     6           1MAXNQ(400),MFE(400),MLC(400),MLE(400),NCELS(20),NQ(400),          MAIN  60
     7           2PARAM(9,4),QTIME(400),SSUMA(20,5),SUMA(20,5),NAME(6),NPROJ,MON,   MAIN  70
     8           3NDAY,NYR,JCLR,JTRIB(17)                                           MAIN  80
     9            COMMON A(1),BTIME,ETIME,IA(10),ICAN(40),JCOUNT,JTEST,KFILE,KOUT,  MAIN  90
    10           1 KFILM(25),NAME1(200),NAME2(200),NCODE(40),NFILM,NOEXP,NRECYC,    MAIN 100
    11           2 NWRITE,OTTIME,PFOOT,PRTIME,RFOOT,TRANS(4),VATIME,XDAY,XTIME      MAIN 110
    12      C                                                                       MAIN 120
    13      C*****NCRDR IS THE UNIT NUMBER OF THE CARD READER                       MAIN 130
    14      C                                                                       MAIN 140
    15            NCRDR = 5                                                         MAIN 150
    16      C                                                                       MAIN 160
    17      C*****NPRNT IS THE UNIT NUMBER OF THE PRINTER                           MAIN 170
    18      C                                                                       MAIN 180
    19            NPRNT = 6                                                         MAIN 190
    20      C                                                                       MAIN 200
    21      C*****PAUSE TO MOUNT TAPE ON DRIVE UNIT                                 MAIN 210
    22      C                                                                       MAIN 220
    23      C                                                                       MAIN 230
    24      C*****KFILE IS THE UNIT NUMBER OF THE FOR THE FLIGHT PLAN FILE          MAIN 240
    25      C                                                                       MAIN 250
    26            KFILE =3                                                          MAIN 260
    27      C                                                                       MAIN 270
    28      C*****KOUT IS THE UNIT NUMBER FOR THE OUTPUT FILE                       MAIN 280
    29      C                                                                       MAIN 290
    30            KOUT=4                                                            MAIN 300
    31      C                                                                       MAIN 310
    32      C*****VARIABLE OTTIME IS THE AMOUNT OF TIME THAT THE FILM WAS OUT OF    MAIN 320
    33      C     THE VAULT OTHER THAN FOR FILMING OPERATION                        MAIN 330
    34      C*****VARIABLE XTIME IS THE INITIAL TIME FOR THE START OF THE ORBITAL   MAIN 340
    35      C*****VARIABLE XDAY IS THE NUMBER OF MINUTES PER ORBITAL DAY.           MAIN 350
    36      C*****VARIABLE PRTIME IS THE NUMBER OF MINUTES THE FILM HAS BEEN IN     MAIN 360
    37      C     THE VAULT SINCE THE LAST MISSION                                  MAIN 370
    38      C*****VARIABLE VATIME IS THE MAXIMUM TIME THE FILM HAS BEEN IN THE VAULTMAIN 380
    39      C     DURING THE CURRENT MISSION                                        MAIN 390
    40      C     DAY                                                               MAIN 400
    41      C*****VARIABLE JTEST = 1 IF OUTPUT TAPE IS REQUIRED                     MAIN 410
    42      C                                                                       MAIN 420
    43      C*****READ IN THE MISSION TITLE, REFERENCE DATE, AND OTHER DATA         MAIN 430
    44      C                                                                       MAIN 440
    45            READ(NCRDR,103)T1,T2,D1,D2,PRTIME,VATIME,OTTIME,XDAY,XTIME,JTEST  MAIN 450
    46          103 FORMAT(2A6,2A4,5F10.0,I5)                                       MAIN 460
    47              ATIME=XTIME                                                     MAIN 470
    48              WRITE(NPRNT,104)T1,T2,D1,D2                                     MAIN 480
    49          104 FORMAT(1H1////////45X,50(1H*)//45X,1H*,48X,1H*//45X,1H*,48X,1H*,MAIN 490
    50             3 /45X,28H*FILM USAGE ANALYSIS FOR THE,1X,2A6,9H MISSION*,       MAIN 500
    51             4        /45X,1H*,48X,1H*//45X,1H*,48X,1H*                       MAIN 510
    52             6/45X,1H*,11X,16HREFERENCE DATE- ,2A4,13X,1H*                    MAIN 520
    53             7        /45X,1H*,48X,1H*//45X,50(1H*))                          MAIN 530
    54              IF(JTEST .EQ. 1)WRITE(NPRNT,105)                                MAIN 540
    55              IF(JTEST.EQ.1)REWIND KOUT                                       MAIN 550
    56          105 FORMAT(3O(/)20X,51H-AN OUTPUT TAPE HAS BEEN GENERATED DURING THIS MAIN 560
```

TABLE A-3. (Concluded)

```
57            1RUN-)                                                                MAIN 570
58          C                                                                       MAIN 580
59          C*****READ IN THE TRANSLATION TIMES FOR TRANSFER BETWEEN VAULT AND CM,  MAIN 590
60          C     MDA,AM,AND OWS                                                    MAIN 600
61          C                                                                       MAIN 610
62                READ(NCRDR,100)       (TRANS(I),I=1,4)                          MAIN 620
63              100 FORMAT(4F5.1)                                                   MAIN 630
64                CALL GASP(NSET,QSET)                                              MAIN 640
65                CALL EXIT                                                         MAIN 650
66                END                                                               MAIN 660
```

TABLE A-4. FORTRAN LISTING OF USER-WRITTEN SUBPROGRAM CDATA

```
403550*IPFS.CDATA
     1            SUBROUTINE CDATA(NSET,QSET)                                        CDAT  10
     2            DIMENSION NSET(1),QSET(1)                                          CDAT  20
     3            COMMON ID,IM,INIT,JEVNT,JMNTT,MFA,MSTOP,MX,MXC,NCLCT,NHIST,        CDAT  30
     4           1NOQ,NORPT,NOT,NPRMS,NRUN,NRUNS,NSTAT,OUT,SCALE,ISEED,TNOW,         CDAT  40
     5           2TBEG,TFIN,MXX,NPRNT,NCRDR,NEP,VNQ(400),IMM,MAXQS,MAXNS             CDAT  50
     6            COMMON ATRIB(15),ENQ(400),VN(400),JCELS(20,22),KRANK(400),         CDAT  60
     7           1MAXNQ(400),MFE(400),MLC(400),MLE(400),NCELS(20),NQ(400),          CDAT  70
     8           2PARAM(4),4),QTIME(400),SSUMA(20,5),SUMA(20,5),NAME(6),NPROJ,MON,   CDAT  80
     9           3NDAY,NYR,JCLR,JTRIB(17)                                           CDAT  90
    10            COMMON A(1),BTIME,ETIME,IA(1),ICAN(40),JCOUNT,JTEST,KFILE,KOUT,   CDAT 100
    11           1 KFILM(25),NAME1(200),NAME2(200),NCODE(40),NFILM,NOEXP,NRECYC,    CDAT 110
    12           2 NWRITE,QTTIME,PFOOT,PRTIME,RFOOT,TRANS(4),VATIME,XDAY,XTIME      CDAT 120
    13      C                                                                       CDAT 130
    14      C*****SETS UP CANISTER/EXPERIMENT FILES FROM DATA AVAILABLE IN THE       CDAT 140
    15      C     EXPERIMENT/FILM REQUIREMENTS FILES                                CDAT 150
    16            DO 20 I=1,4                                                       CDAT 160
    17         20 ICAN(I)=0                                                         CDAT 170
    18            DO 1 I=201,NOQ                                                    CDAT 180
    19            IF(NQ(I))1,1,2                                                    CDAT 190
    20          2 CONTINUE                                                          CDAT 200
    21      C                                                                       CDAT 210
    22      C*****REMOVE ALL ENTRIES FROM THE FILE AND STORE THEM IN FILE 2         CDAT 220
    23      C                                                                       CDAT 230
    24            KK=NQ(I)                                                          CDAT 240
    25            DO 3 J=1,KK                                                       CDAT 250
    26            CALL RMOVE(MFE(I),I,NSET,QSET)                                    CDAT 260
    27          3 CALL FILEM(2,NSET,QSET)                                           CDAT 270
    28      C                                                                       CDAT 280
    29      C*****REMOVE THE ENTRIES FROM FILE 2, SET UP THE CANISTER FILE          CDAT 290
    30      C*****AND RESTORE THE ENTRY IN FILE I.                                  CDAT 300
    31      C                                                                       CDAT 310
    32            DO 4 J=1,KK                                                       CDAT 320
    33            CALL RMOVE(MFE(2),2,NSET,QSET)                                    CDAT 330
    34            DO 11 I4=1,IM                                                     CDAT 340
    35         11 IA(I4)=JTRIB(I4)                                                  CDAT 350
    36            DO 12 I4=1,IMM                                                    CDAT 360
    37         12 A(I4)=ATRIB(I4)                                                   CDAT 370
    38            I3=JTRIB(1)                                                       CDAT 380
    39            X=ATRIB(I)/FLOAT(JTRIB(4))                                        CDAT 390
    40            I1=X                                                              CDAT 400
    41            IF(ABS(FLOAT(I1)-X)-1.E-4)5,5,6                                   CDAT 410
    42          6 I1=I1+1                                                           CDAT 420
    43      C                                                                       CDAT 430
    44      C*****STORE ENTRY FOR EACH CANISTER IN THE EXPERIMENT/CANISTER FILE.     CDAT 440
    45      C                                                                       CDAT 450
    46          5 CONTINUE                                                          CDAT 460
    47            ISP=0                                                             CDAT 470
    48            DO 10 I2=1,I1                                                     CDAT 480
    49            IF(I2.NE.I)GO TO 40                                               CDAT 490
    50      C                                                                       CDAT 500
    51      C*****CHECK IF CANISTER HAS A SPECIAL CANISTER CODE.                    CDAT 510
    52      C                                                                       CDAT 520
    53            IF(IA(3).EQ.0)GO TO 40                                            CDAT 530
    54            ISP=IA(3)                                                         CDAT 540
    55      C                                                                       CDAT 550
    56      C*****CHECK IF A CANISTER HAS ALREADY BEEN ASSIGNED WITH THIS CODE.     CDAT 560
```

TABLE A-4. (Concluded)

```
      C                                                                 CDAT 570
           DO 41 I4=3,I99                                               CDAT 580
           IF(NQ(I41,EQ,0)GO TO 41                                      CDAT 590
           CALL FINDN(IA(3),5,I4,5,KCOL,NSET,QSET)                      CDAT 600
           IF(KCOL,EQ,0)GO TO 41                                        CDAT 610
           CALL RMOVE(KCOL,I4,NSET,QSET)                                CDAT 620
           I5=JTRIB(1)                                                  CDAT 630
           CALL FILEM(I4,NSET,QSET)                                     CDAT 640
           JTRIB(1)=I5                                                  CDAT 650
           GO TO 42                                                     CDAT 660
        41 CONTINUE                                                     CDAT 670
        40 ICAN(I3)=ICAN(I3)+1                                          CDAT 680
           JTRIB(1)=ICAN(I3)                                            CDAT 690
        42 JTRIB(2)=1                                                   CDAT 700
           JTRIB(3)=IA(4)                                               CDAT 710
           JTRIB(4)=IA(1)                                               CDAT 720
           JTRIB(5)=ISP                                                 CDAT 730
           JTRIB(6)=IA(6)                                               CDAT 740
           JTRIB(7)=0                                                   CDAT 750
           JTRIB(8)=0                                                   CDAT 760
           ATRIB(1)=0.                                                  CDAT 770
           ATRIB(2)=0.                                                  CDAT 780
           ATRIB(3)=0.                                                  CDAT 790
           ATRIB(4)=FLOAT(IA(4))                                        CDAT 800
           CALL FILEM(I-200,NSET,QSET)                                  CDAT 810
        10 CONTINUE                                                     CDAT 820
           DO 25 I4=1,IM                                                CDAT 830
        25 JTRIB(I4)=IA(I4)                                             CDAT 840
           DO 26 I4=1,IMM                                               CDAT 850
        26 ATRIB(I4)=A(I4)                                              CDAT 860
           CALL FILEM(I,NSET,QSET)                                      CDAT 870
         4 CONTINUE                                                     CDAT 880
         1 CONTINUE                                                     CDAT 890
           WRITE (NPRNT,300)                                            CDAT 900
       300 FORMAT (1H1,///40X,35H**INTERMEDIATE FILM USAGE RESULTS**///) CDAT 910
           WRITE (NPRNT,301)                                            CDAT 920
       301 FORMAT (50X,44HFILM,3X,3HCAN,4X,7HCURRENT,2X,4(10HCUMULATIVE,2X)) CDAT 930
           WRITE (NPRNT,302)                                            CDAT 940
       302 FORMAT (3X,3HDAY,3X,2HHR,2X,3HMIN,2X,10HEXPERIMENT,4X,8HLOCATION, CDAT 950
          12X,6HCAMERA,2X,4HTYPE,3X,3HNO.,4X,7HREMAIN.,5X,5HTRANS,7X,       CDAT 960
          2548HOOT,8X,4HWAIT,5X,8HTIME OUT)                             CDAT 970
           WRITE (NPRNT,303)                                            CDAT 980
       303 FORMAT (65X,44HFILM,3(8X,4HTIME),5X,8HOF REPOS/)             CDAT 990
           JCOUNT=0                                                     CDAT1000
           RETURN                                                       CDAT1010
           END                                                          CDAT1020
```

TABLE A-5. FORTRAN LISTING OF USER-WRITTEN SUBPROGRAM ENEVT

```
*00550*TPFS.ENEVT
      1            SUBROUTINE ENEVT(NSET,QSET)                                    ENEV  10
      2            DIMENSION NSET(1),QSET(1)                                      ENEV  20
      3            COMMON ID,IM,INIT,JEVNT,JMNIT,MFA,MSTOP,MX,MXC,NCLCT,NHIST,    ENEV  30
     4            1NOQ,NORPT,NOT,NPRMS,NRUN,NRUNS,NSTAT,OUT,SCALE,ISEED,TNOW,    ENEV  40
     5            2TBES,TFIN,MXX,NPRNT,NCROR,NEP,VNQ(400),IMM,MAXQS,MAXNS        ENEV  50
      6            COMMON ATRIB(15),ENQ(400),INN(400),JCELS(20,22),KRANK(400),    ENEV  60
      7           1MAXNQ(400),MFE(400),MLC(400),MLE(400),NCELS(20),NQ(400),       ENEV  70
      8           2PARAM(40,4),QTIME(400),SSUMA(20,5),SUMA(20,5),NAME(6),NPROJ,MON,ENEV  80
      9           3NDAY,NYR,JCLR,JTRIB(17)                                        ENEV  90
     10            COMMON A(10),BTIME,ETIME,IA(10),ICAN(40),JCOUNT,JTEST,KFILE,KOUT,ENEV 100
     11           1 KFILM(25),NAME1(200),NAME2(200),NCODE(40),NFILM,NOEXP,NRECYC,  ENEV 110
     12           2 NWRITE,OTTIME,PFOOT,PRTIME,RFOOT,TRANS(4),VATIME,XDAY,XTIME    ENEV 120
     13      C                                                                     ENEV 130
     14      C*****VARIABLE RFOOT IS MINIMUM AMOUNT OF FILM REMAINING ON A CANISTER ENEV 140
     15      C*****IN ORDER FOR THE CANISTER TO BE USED AGAIN.                      ENEV 150
     16      C                                                                     ENEV 160
     17            RFOOT=10.                                                       ENEV 170
     18      C                                                                     ENEV 180
     19      C*****STORE ATTRIBUTES OF ENDING EXPERIMENT IN IA AND A ARRAYS.       ENEV 190
     20      C                                                                     ENEV 200
     21            DO 10 I=1,IM                                                    ENEV 210
     22         10 IA(I)=JTRIB(I)                                                  ENEV 220
     23            DO 11 I=1,IMM                                                   ENEV 230
     24         11 A(I)=ATRIB(I)                                                   ENEV 240
     25            J=JTRIB(7)                                                      ENEV 250
     26      C                                                                     ENEV 260
     27      C*****CHECK IF AN EXPERIMENT IN THE NEXT EVENT FILE REQUIRES THE SAME  ENEV 270
     28      C*****FILM.                                                           ENEV 280
     29      C                                                                     ENEV 290
     30            CALL SCANT(1,2,IA(2),1,1     ,4,IA(4),KCOL,NSET,QSET)         ENEV 300
     31            I=KCOL                                                          ENEV 310
     32      C                                                                     ENEV 320
     33      C*****IF THE NEXT EXPERIMENT DOES NOT REQUIRE THE SAME FILM, STORE THE ENEV 330
     34      C*****REMAINING FILM IN THE PARTIALLY USED CANISTER FILE.              ENEV 340
     35      C                                                                     ENEV 350
     36            CALL SCANT (IA(2),2,4,6,IA(4),4,IA(3),KCOL,NSET,QSET)          ENEV 360
     37            IF(KCOL)5,5,6                                                   ENEV 370
     38         6  CALL RMOVE (KCOL,IA(2),NSET,QSET)                              ENEV 380
     39            IF(ATRIB(4)-RFOOT)30,30,31                                      ENEV 390
     40         31 IF(I)20,20,21                                                   ENEV 400
     41         20 JTRIB(2)=2                                                      ENEV 410
     42            GO TO 23                                                        ENEV 420
     43         21 JTRIB(2)=3                                                      ENEV 430
     44            GO TO 23                                                        ENEV 440
     45         30 JTRIB(2)=5                                                      ENEV 450
     46         23 CONTINUE                                                        ENEV 460
     47            JTRIB(9)=0                                                      ENEV 470
     48            CALL FILEM (IA(2),NSET,QSET)                                    ENEV 480
     49          5 CONTINUE                                                        ENEV 490
     50            RETURN                                                          ENEV 500
     51            END                                                             ENEV 510
```

TABLE A-6. FORTRAN LISTING OF USER-WRITTEN SUBPROGRAM EPICK

```
403550*IPFS.EPICK
      1            SUBROUTINE EPICK(NSET,QSET)                                    EPIK  10
      2            DIMENSION NSET(1),QSET(1)                                      EPIK  20
      3            COMMON ID,IM,INIT,JEVNT,JMNIT,MFA,MSTOP,MX,MXC,NCLCT,NHIST,    EPIK  30
      4           1NOQ,NORPT,NOT,NPRMS,NRUN,NRUNS,NSTAT,OUT,SCALE,ISEED,TNOW,     EPIK  40
      5           2TBEG,TFIN,MXX,NPRNT,NCRDR,NEP,VNQ(400),IMM,MAXQS,MAXNS         EPIK  50
      6            COMMON ATRIB(15),ENQ(400),INV(400),JCELS(20,22),KRANK(400),    EPIK  60
      7           1MAXNQ(400),MFE(400),MLC(400),MLE(400),NCELS(20),NQ(400),       EPIK  70
      8           2PARAM(40,4),QTIME(400),SSUMA(20,5),SUMA(20,5),NAME(6),NPROJ,MON,EPIK  80
      9           3NDAY,NYR,JCLR,JTRIB(17)                                       EPIK  90
     10            COMMON A(10),BTIME,ETIME,IA(10),ICAN(40),JCOUNT,JTEST,KFILE,KOUT,EPIK 100
     11           1 KFILM(25),NAME1(200),NAME2(200),NCODE(40),NFILM,NOEXP,NRECYC,  EPIK 110
     12           2 NWRITE,QTTIME,PFOOT,PRTIME,RFOOT,TRANS(4),VATIME,XDAY,XTIME    EPIK 120
     13      C*****CHECK TO SEE IF TNOW = BTIME                                     EPIK 150
     14            IF(ABS(TNOW-BTIME)-1.E-04)2,2,1                                EPIK 160
     15           1 WRITE(NPRNT,101)                                              EPIK 170
     16         101 FORMAT (28H ERROR IN MODEL TIME OR TNOW)                      EPIK 180
     17           2 IF(NCYCLE)3,3,60                                              EPIK 190
     18      C*****READ FLIGHT PLAN DATA                                         EPIK 200
     19           3 READ(KFILE)ICODE,ASTART,ASTOP,LOC                            EPIK 210
     20             IF(ICODE.EQ.0)GO TO 99                                       EPIK 220
     21          10 CONTINUE                                                     EPIK 230
     22             STTIME=ASTART*60.+XTIME                                      EPIK 240
     23      C*****BEGIN TIME FOR START OF FILMING PERFORMANCE                   EPIK 250
     24             BTIME = STTIME                                               EPIK 260
     25             GO TO 25                                                     EPIK 270
     26          99 CONTINUE                                                     EPIK 280
     27      C*****END OF FILE COMMAND SETS JTRIB(1)=4 IN THE CURRENT EVENTS FILE EPIK 290
     28             JTRIB(1)=4                                                   EPIK 300
     29             ATRIB(1)=BTIME                                               EPIK 310
     30             CALL FILEM(1,NSET,QSET)                                      EPIK 320
     31             GO TO 59                                                     EPIK 330
     32          25 CONTINUE                                                     EPIK 340
     33             GO TO 20                                                     EPIK 350
     34          90 WRITE(NPRNT,100)                                             EPIK 360
     35         100 FORMAT (26H ERROR IN SUBROUTINE EPICK)                       EPIK 370
     36             CALL ERROR(1,NSET,QSET)                                      EPIK 380
     37          20 CONTINUE                                                     EPIK 390
     38      C*****IS FILMING OF THE SAME EXPERIMENT IN PROGRESS?                EPIK 400
     39             CALL FINDN(ICODE,5,1,2,KCOL,NSET,QSET)                       EPIK 410
     40             IF(KCOL)90,43,30                                             EPIK 420
     41          30 CONTINUE                                                     EPIK 430
     42             CALL  RMOVE(KCOL,1,NSET,QSET)                                EPIK 440
     43             CKTIME = ATRIB(1) + 60.                                      EPIK 450
     44             CALL FILEM(1,NSET,QSET)                                      EPIK 460
     45             IF(STTIME.LE.CKTIME)GO TO 3                                  EPIK 470
     46          43 CONTINUE                                                     EPIK 480
     47      C                                                                   EPIK 490
     48      C*****SET UP DATA FOR CURRENT EVENTS FILE                           EPIK 500
     49      C                                                                   EPIK 510
     50      C      JQ IS THE FILE NUMBER OF THE EXP. FILM DATA                  EPIK 520
     51             KCONST = 200                                                 EPIK 530
     52             JQ=KCONST + ICODE                                            EPIK 540
     53      C*****IS ANY FUTHER FILMING OF THIS EXP. REQUIRED?                  EPIK 550
     54             NMORE=1                                                      EPIK 560
     55             CALL FINDN(NMORE,5,JQ,6,KCOL,NSET,QSET)                      EPIK 570
     56             IF(KCOL.NE.1)GO TO 40                                        EPIK 580
```

TABLE A-6. (Continued)

```
57            CALL FINDN(NMORE,2,JQ,6,KCOL,NSET,QSET)                          EPIK 590
58            IF(KCOL)90,3,40                                                  EPIK 600
59         40 CALL RMOVE(KCOL,JQ,NSET,QSET)                                    EPIK 610
60         41 CONTINUE                                                         EPIK 620
61      C*****CHECK TO SEE IF OTHER FILM TYPES ARE TO BE SHOT DURING THIS ACTIVIEPIK 680
62            IF(JTRIB(6).GE.1)NCYCLE=1                                        EPIK 690
63         51 CONTINUE                                                         EPIK 700
64      C                                                                      EPIK 710
65      C*****UPDATE FOOTAGE USED.                                             EPIK 720
66      C                                                                      EPIK 730
67            X2=ATRIB(2)*ATRIB(3)                                             EPIK 740
68            IF(ATRIB(5)*X2.LE.ATRIB(1))GO TO 80                              EPIK 750
69            X2=ATRIB(1)-ATRIB(5)                                             EPIK 760
70            ATRIB(2)=X2/ATRIB(3)                                             EPIK 770
71         80 ATRIB(5)=ATRIB(5)+X2                                             EPIK 780
72            NTYPE = JTRIB(1)                                                 EPIK 790
73            NCAM =  JTRIB(2)                                                 EPIK 800
74            SPCNUM = JTRIB(3)                                                EPIK 810
75            NFTPC = JTRIB(4)                                                 EPIK 820
76            NRETUN=JTRIB(5)                                                  EPIK 830
77            NMORE = JTRIB(6)                                                 EPIK 840
78            LOC=JTRIB(7)                                                     EPIK 841
79            STPFT = ATRIB(2)                                                 EPIK 850
80            CAMRAT = ATRIB(3)                                                EPIK 860
81            SHTIME = ATRIB(4)                                                EPIK 870
82            TEST=ATRIB(5)-ATRIB(1)+1.                                        EPIK 880
83            IF(TEST)71,72,72                                                 EPIK 890
84         71 CALL FILEM(JQ,NSET,QSET)                                         EPIK 900
85            JTRIB(8)=0                                                       EPIK 910
86            GO TO 73                                                         EPIK 920
87         72 JTRIB(8)=2                                                       EPIK 930
88            JTRIB(3)=ICODE                                                   EPIK 940
89            CALL FILEM(20),NSET,QSET)                                        EPIK 950
90         73 JTRIB(1) = 1                                                     EPIK 960
91            JTRIB(2) = ICODE                                                 EPIK 970
92            JTRIB(3) = NTYPE                                                 EPIK 980
93            JTRIB(4) = NMORE                                                 EPIK 990
94            JTRIB(5) = NCAM                                                  EPIK1000
95            JTRIB(6) = NFTPC                                                 EPIK1010
96            JTRIB(7) = LOC                                                   EPIK1020
97            ATRIB(1) = BTIME                                                 EPIK1030
98            ATRIB(2) = STPFT                                                 EPIK1040
99            ATRIB(3) = CAMRAT                                                EPIK1050
100           TTIME=STPFT*STTIME+2.*TRANS(LOC)                                 EPIK1060
101           ATRIB(4) = ASTOP*60.* XTIME                                      EPIK1070
102     C                                                                      EPIK1080
103     C*****TEST TO SEE IF ACTIVITY PERFORMANCE TIME IS SHORTER THAN SHOOTING EPIK1090
104     C     PLUS TRANSFER TIME                                               EPIK1100
105     C                                                                      EPIK1110
106           IF(TTIME.GT.ATRIB(4))WRITE(NPRNT,103)                            EPIK1120
107       103 FORMAT(/15X,90H****NOTE: THE FILMING TIME FOR THE NEXT ACTIVITY EXEPIK1130
108          .1CEEDS THE ALLOCATED FLIGHT PLAN TIME       )                   EPIK1140
109           IF(TTIME.GT.ATRIB(4))JCOUNT=JCOUNT+1                             EPIK1150
110           IF(NRETUN.EQ.1.OR.TTIME.GT.ATRIB(4))ATRIB(4)=TTIME               EPIK1160
111           ATRIB(5) = STTIME                                                EPIK1170
112           ETIME=ATRIB(4)                                                   EPIK1180
113           CALL FILEM(1,NSET,QSET)                                          EPIK1190
```

TABLE A-6. (Concluded)

```
      59 RETURN                                                          EPIK1200
C*****FILE OTHER FILM DATA FOR THIS PERFORMANCE                          EPIK1210
      60 JQ = KCONST + ICODE                                            EPIK1220
         CALL FINDN(NMORE,2,JQ,6,KCOL,NSET,QSET)                        EPIK1230
         IF(KCOL.EQ.0)GO TO 3                                           EPIK1240
      74 CALL RMOVE(KCOL,JQ,NSET,QSET)                                  EPIK1250
         GO TO 41                                                       EPIK1260
         END                                                            EPIK1270
```

TABLE A-7. FORTRAN LISTING OF USER-WRITTEN SUBPROGRAM EVNTS

```
400550*TPF$.EVNTS
      1            SUBROUTINE EVNTS(K,NSET,QSET)                                    EVNT  10
      2            DIMENSION NSET(1),QSET(1)                                        EVNT  20
      3            COMMON ID,IM,INIT,JEVNT,JMNIT,MFA,MSTOP,MX,MXC,NCLCT,NHIST,      EVNT  30
      4           1NOQ,NORPT,NOT,NPRMS,NRUN,NRUNS,NSTAT,OUT,SCALE,ISEED,TNOW,       EVNT  40
      5           2TBEG,TFIN,MXX,NPRNT,NCRDR,NEP,VNQ(400),IMM,MAXQS,MAXNS           EVNT  50
      6            COMMON ATRIB(15),ENQ(400),INN(400),JCELS(20,22),KRANK(400),      EVNT  60
      7           1MAXNQ(400),MFE(400),MLC(400),MLE(400),NCELS(20),NQ(400),         EVNT  70
      8           2PARAM(40,4),QTIME(400),SSUMA(20,5),SUMA(20,5),NAME(6),NPROJ,MON, EVNT  80
      9           3NDAY,NYR,JCLR,JTRIB(17)                                         EVNT  90
     10            COMMON A(10),BTIME,ETIME,IA(10),ICAN(40),JCOUNT,JTEST,KFILE,KOUT, EVNT 100
     11           1 KFILM(25),NAME1(200),NAME2(200),NCODE(40),NFIL4,NOEXP,NRECYC,   EVNT 110
     12           2 NWRITE,OTTIME,PFOOT,PRTIME,RFOOT,TRANS(4),VATIME,XDAY,XTIME     EVNT 120
     13            GO TO (1,2,6,7),K                                                EVNT 130
     14           1 CALL STEVT(NSET,QSET)                                           EVNT 140
     15            GO TO 4                                                          EVNT 150
     16           2 CALL ENEVT(NSET,QSET)                                           EVNT 160
     17            GO TO 4                                                          EVNT 170
     18           6 CONTINUE                                                        EVNT 180
     19            GO TO 4                                                          EVNT 190
     20           7 MSTOP=-1                                                        EVNT 200
     21            CALL MATRIX(NSET,QSET)                                           EVNT 210
     22           4 RETURN                                                          EVNT 220
     23            END                                                              EVNT 230
```

TABLE A-8. FORTRAN LISTING OF USER-WRITTEN SUBPROGRAM MATRIX

```
400550*TPFS.MATRIX
     1            SUBROUTINE MATRIX(NSET,QSET)                                          MATX  10
     2            DIMENSION NSET(1),QSET(1)                                             MATX  20
     3            COMMON ID,IM,INIT,JEVNT,JMNIT,MFA,MSTOP,MX,MXC,NCLCT,NHIST,           MATX  30
    4            1NOQ,NORPT,NOT,NPRMS,NRUN,NRUNS,NSTAT,OUT,SCALE,ISEED,TNOW,           MATX  40
    5            2TBEG,TFIN,MXX,NPRNT,NCRDR,VEP,VNQ(400),IMM,MAXQS,MAXNS               MATX  50
    6            COMMON ATRIB(15),ENQ(400),INN(400),JCELS(20,22),KRANK(400),           MATX  60
    7            1MAXNQ(400),MFE(400),MLC(400),MLE(400),NCELS(20),NQ(400),             MATX  70
    8            2PARAM(40,4),QTIME(400),SSUMA(20,5),SUMA(20,5),NAME(6),NPROJ,MON,     MATX  80
    9            3NDAY,NYR,JCLR,JTRIB(17)                                              MATX  90
   10            COMMON A(10),BTIME,ETIME,IA(10),ICAN(40),JCOUNT,JTEST,KFILE,KOUT,     MATX 100
   11            1 KFILM(25),NAME1(200),NAME2(200),NCODE(40),NFILM,NDEX2,NRECYC,       MATX 110
   12            2 NWRITE,OTTIME,PFOOT,PRTIME,RFOOT,TRANS(4),WATIME,XDAY,XTIME         MATX 120
   13            DIMENSION AVG(25)                                                     MATX 130
   14            DIMENSION NEXP(2)                                                     MATX 140
   15            DATA NEXP/1H*,1H /                                                    MATX 150
   16            XLEFLOAT(INT(OTTIME/100.))*100.                                       MATX 160
   17            WRITE (NPRNT,105)                                                     MATX 170
   18        105 FORMAT (1H1,//48X,22H**FILM USAGE SUMMARY**)                          MATX 180
   19            WRITE (NPRNT,101)                                                     MATX 190
   20        101 FORMAT (    ///7X,4HFILM,6X,3HCAN,3(8X,5HTOTAL),8X,5HOTHER,8X,        MATX 200
   21           1 5HTOTAL,7X,5HTOTAL)                                                  MATX 210
   22            WRITE (NPRNT,102)                                                     MATX 220
   23        102 FORMAT (7X,4HTYPE,7X,3HNO.,7X,5HTRANS,8X,5HSHOOT,9X,4HWAIT,         MATX 230
   24           12(6X,8HTIME OUT),5X,7HTIME IN,7X,6HREMAIN,3X,8HFOOTAGE/)              MATX 240
   25            WRITE (NPRNT,103)                                                     MATX 250
   26        103 FORMAT (20X,3(9X,4HTIME),2(6X,8HOF REPOS),6X,5HREPOS, 9X,4HFILM,     MATX 260
   27           14X,9HCANISTER)                                                        MATX 270
   28            JCOUNT=0                                                              MATX 280
   29            DO 1 N=1,NFILM                                                        MATX 290
   30            WRITE (NPRNT,111)                                                     MATX 300
   31        111 FORMAT (/)                                                            MATX 310
   32            JCOUNT=JCOUNT+1                                                       MATX 320
   33            J=KFILM(N)                                                            MATX 330
   34        C                                                                         MATX 340
   35        C*****REMOVE CANISTERS OF TYPE J AND PUT IN FILE 2                        MATX 350
   36        C                                                                         MATX 360
   37              DO 10 I=3,199                                                       MATX 370
   38              IF(NQ(I))10,10,2                                                    MATX 380
   39            2 CALL FINDN (J,5,I,4,KCOL,NSET,QSET)                                 MATX 390
   40              IF(KCOL)10,10,3                                                     MATX 400
   41            3 CALL RMOVE (KCOL,I,NSET,QSET)                                       MATX 410
   42              CALL FILEM (2,NSET,QSET)                                            MATX 420
   43              GO TO 2                                                             MATX 430
   44           10 CONTINUE                                                            MATX 440
   45        C                                                                         MATX 450
   46        C*****INITIALIZE JCELS AND SUMA ARRAYS.                                   MATX 460
   47        C                                                                         MATX 470
   48              DO 380 L=1,22                                                       MATX 480
   49          380 JCELS(N,L)=0                                                        MATX 490
   50              DO 17 I=1,3                                                         MATX 500
   51           17 SUMA(N,I)=0.                                                        MATX 510
   52              SUMA(N,4)=1.E20                                                     MATX 520
   53              SUMA(N,5)=-1.E20                                                    MATX 530
   54        C                                                                         MATX 540
   55        C*****PRINT RESULTS FOR EACH CANISTER                                     MATX 550
   56        C                                                                         MATX 560
```

TABLE A-8. (Continued)

```
      I1=NQ(2)                                                          MATX 570
      DO 11 I=1,T1                                                      MATX 580
      IF(NQ(2).EQ.0)GO TO 11                                            MATX 590
      CALL RMOVE (MFE(2),2,NSET,QSET)                                   MATX 600
      IF(JTRIB(2).EQ.1)GO TO 11                                         MATX 610
      IF(JTRIB(5).EQ.0)GO TO 200                                        MATX 620
      JCAN=JTRIB(5)                                                     MATX 630
      IA(1)=JTRIB(1)                                                    MATX 640
      IA(3)=JTRIB(3)                                                    MATX 650
  201 CALL FINDN(JCAN,5,2,5,KCOL,NSET,QSET)                             MATX 660
      IF(KCOL)200,200,203                                               MATX 670
  203 CALL RMOVE (KCOL,2,NSET,QSET)                                     MATX 680
      GO TO 201                                                         MATX 690
  200 Y=ATRIB(1)+ATRIB(2)+ATRIB(3)+OTTIME                               MATX 700
      CALL COLCT(Y,N,NSET,QSET)                                         MATX 710
      CALL HISTO(Y,XL,50.,N)                                            MATX 720
      X=VATIME+PRTIME-Y                                                 MATX 730
      JCOUNT=JCOUNT+1                                                   MATX 740
      IF(JCOUNT.LT.40)GO TO 112                                         MATX 750
      WRITE(NPRNT,106)                                                  MATX 760
  106 FORMAT(//60X,12H-TABLE  III-)                                     MATX 770
      JCOUNT=0                                                          MATX 780
      WRITE (NPRNT,113)                                                 MATX 790
  113 FORMAT (1H1)                                                      MATX 800
      WRITE (NPRNT,101)                                                 MATX 810
      WRITE (NPRNT,102)                                                 MATX 820
      WRITE (NPRNT,103)                                                 MATX 830
      WRITE (NPRNT,111)                                                 MATX 840
  112 WRITE (NPRNT,100) J,JTRIB(1),(ATRIB(K),K=1,3) ,OTTIME,Y,X,ATRIB(4)MATX 850
     1,JTRIB(3)                                                         MATX 860
  100 FORMAT (2I10,7F13.1,I9)                                           MATX 870
   11 CONTINUE                                                          MATX 880
      IF(SUMA(N,3).LE.0.0)GO TO 150                                     MATX 890
      GO TO 1                                                           MATX 900
  150 CONTINUE                                                          MATX 910
    1 CONTINUE                                                          MATX 920
      WRITE(NPRNT,106)                                                  MATX 930
      DO 140 N=1,NFILM                                                  MATX 940
  140 AVG(N)=SUMA(N,1)/SUMA(N,3)                                        MATX 950
C                                                                       MATX 960
C*****PRINT STATISTICAL RESULTS FOR FILM TYPE J.                        MATX 970
C                                                                       MATX 980
      WRITE (NPRNT,120)                                                 MATX 990
  120 FORMAT (1H1,//35X,43H**FREQUENCY RESULTS FOR TIME OUT OF VAULT**/)MATX1000
      WRITE (NPRNT,122) (KFILM(N),N=1,NFILM)                            MATX1010
  122 FORMAT (5X,9HTIME OUT,20X,29HNUMBER CANISTERS OF FILM TYPE,       MATX1020
     1/18X,16I7)                                                        MATX1030
      WRITE (NPRNT,111)                                                 MATX1040
      NCUM=0                                                            MATX1050
      DO 141 I1=1,21                                                    MATX1060
      I2=I1+1                                                           MATX1070
      DO 142 N=1,NFILM                                                  MATX1080
      DO 142 I3=I2,22                                                   MATX1090
      IF(JCELS(N,I3).GT.0)GO TO 143                                     MATX1100
  142 CONTINUE                                                          MATX1110
      GO TO 144                                                         MATX1120
  143 NCUM=NCUM+1                                                       MATX1130
```

TABLE A-8. (Continued)

```
      141 CONTINUE                                                          MATX1140
      144 CONTINUE                                                          MATX1150
          X1=XL-50.                                                         MATX1160
          DO 250 I=1,NCUM                                                   MATX1170
          X1=X1+50.                                                         MATX1180
          X2=X1+50.                                                         MATX1190
          IF(I.EQ.21)GO TO 130                                              MATX1200
          WRITE(NPRNT,125) X1,X2,(JCELS(N,I+1),N=1,NFILM)                   MATX1210
      125 FORMAT (1X,F6.0,2X,2HTO,1X,F6.0,16I7)                             MATX1220
          GO TO 250                                                         MATX1230
      130 WRITE (NPRNT,126) X2,(JCELS(N,22),N=1,NFILM)                      MATX1240
      126 FORMAT (1X,12HGREATER THAN,F6.0,16I7)                             MATX1250
      250 CONTINUE                                                          MATX1260
          WRITE (NPRNT,121) (SUMA(L,3),L=1,NFILM)                           MATX1270
      121 FORMAT (/1X,16HNUMBER CAN, USED,1X,16F7.0)                        MATX1280
          WRITE (NPRNT,145) (AVG(I),I=1,NFILM)                              MATX1290
      145 FORMAT (1X,16HAVERAGE TIME OUT,1X,16F7.0)                         MATX1300
          WRITE (NPRNT,146) (SUMA(J,4),J=1,NFILM)                           MATX1310
      146 FORMAT (1X,16HMINIMUM TIME OUT,1X,16F7.0)                         MATX1320
          WRITE (NPRNT,147) (SUMA(K,5),K=1,NFILM)                           MATX1330
      147 FORMAT (1X,16HMAXIMUM TIME OUT,1X,16F7.0)                         MATX1340
          WRITE(NPRNT,107)                                                  MATX1350
      107 FORMAT(//51X,10H-TABLE IV-)                                       MATX1360
      117 CONTINUE                                                          MATX1370
C                                                                           MATX1380
C*****PRINT SUMMARY RESULT FOR COMPLETED FILM REQUIREMENTS                  MATX1390
C                                                                           MATX1400
          WRITE(NPRNT,899)                                                  MATX1410
      899 FORMAT(1H1, 30X,  53H***SUMMARY RESULTS FOR COMPLETED FILM REQUIREMATX1420
         1MENTS***)                                                         MATX1430
          WRITE (NPRNT,905)                                                 MATX1440
      905 FORMAT (//33X,8HACTIVITY,6X,9HFILM TYPE,3X,7HFOOTAGE,2X          MATX1450
         1,7HFOOTAGE,4X,10HPERCENT OF,/55X,8HREQUIRED,4X,4HSHOT,5X,        MATX1460
         2,12HREQUIREMENTS,/76X,9HCOMPLETED/)                               MATX1470
          JCOUNT=0                                                          MATX1480
          DO 161 II=1,NOFXP                                                 MATX1490
          KK=NCODE(II)                                                      MATX1500
          JJ=20*KK                                                          MATX1510
          IF(JCOUNT.LE.40)GO TO 163                                         MATX1520
          WRITE(NPRNT,108)                                                  MATX1530
      108 FORMAT(//51X,10H-TABLE  V-)                                       MATX1540
          JCOUNT=3                                                          MATX1550
          WRITE(NPRNT,907)                                                  MATX1560
      907 FORMAT(1H1)                                                       MATX1570
          WRITE(NPRNT,905)                                                  MATX1580
C                                                                           MATX1590
C*****CHECK IF EXPERIMENT HAS REQUIREMENTS WHICH HAVE BEEN COMPLETED.       MATX1600
C                                                                           MATX1610
      163 CALL FINDN(KK,5,20,3,KCOL,NSET,QSET)                              MATX1620
          IF(KCOL.EQ.0)GO TO 162                                            MATX1630
          CALL RMOVE (KCOL,20),NSET,QSET)                                   MATX1640
          PERCNT=100.                                                       MATX1650
          MEXP=1                                                            MATX1660
          IF(JTRIB(2).EQ.2)MEXP=2                                           MATX1670
          WRITE (NPRNT,906) NAME1(KK),NAME2(KK),JTRIB(1),NEXP(MEXP),ATRIB(1)MATX1680
         1,ATRIB(5),PERCNT                                                  MATX1690
      906 FORMAT (30X,2A6,2X,I5,4X,A1,F8.0,1X,F8.0,1X,F10.0)                MATX1700
```

TABLE A-8. (Concluded)

```
171             JCOUNT=JCOUNT+1                                                 MATX1710
172             GO TO 163                                                       MATX1720
173           162 CONTINUE                                                      MATX1730
174           C                                                                 MATX1740
175           C*****CHECK IF EXPERIMENT HAS REQUIREMENTS WHICH HAVE NOT BEEN COMPLETEDMATX1750
176           C                                                                 MATX1760
177           164 IF(NQ(JJ     ).EQ.0)GO TO 161                                 MATX1770
178             CALL RMOVE (MFE(JJ     ),200+KK,NSET,QSET)                    MATX1780
179             PERCNT=(ATRIB(5)/ATRIB(1))*100.                                 MATX1790
180             MEXP=1                                                          MATX1800
181             IF(JTRIB(2).EQ.2)MEXP=2                                         MATX1810
182             WRITE (NPRNT,906) NAME1(KK),NAME2(KK),JTRIB(1),MEXP(MEXP),ATRIB(1)MATX1820
183            1,ATRIB(5),PERCNT                                                MATX1830
184             JCOUNT=JCOUNT+1                                                 MATX1840
185             GO TO 164                                                       MATX1850
186           161 CONTINUE                                                      MATX1860
187             WRITE(NPRNT,999)                                                MATX1870
188           999 FORMAT(//51X,10H-TABLE  V-)                                   MATX1880
189             IF(JTEST.EQ.1)END FILE KOUT                                     MATX1890
190             IF(JTEST.EQ.1)CALL WRITEO                                       MATX1900
191             CALL PFILE(NSET,QSET)                                           MATX1910
192             RETURN                                                          MATX1920
193             END                                                             MATX1930
```

TABLE A-9. FORTRAN LISTING OF USER-WRITTEN SUBPROGRAM NXEVT

```
437557*TPFS.NXEVT
      1            SUBROUTINE NXEVT(X2,NSET,QSET)                                    NXEV  10
      2      C                                                                       NXEV  20
      3      C*****COLLECTS STATISTICS AND DETERMINE THE NEXT EXPERIMENT REQUIRING   NXEV  30
      4      C*****FILM.                                                             NXEV  40
      5            DIMENSION NSET(1),QSET(1)                                         NXEV  50
      6            DIMENSION TFILM(2)                                                NXEV  60
      7            COMMON ID,IM,INIT,JEVNT,JMNIT,MFA,MSTOP,MX,MXC,NCLCT,NHIST,       NXEV  70
      8           1NOQ,NORPT,NOT,NPRMS,NRUN,NRUNS,NSTAT,OUT,SCALE,ISEED,TNOW,       NXEV  80
      9           2TBEG,TFIN,MXX,NPRNT,NCRDR,NEP,VNQ(400),IMM,MAXQS,MAXNS           NXEV  90
     10            COMMON ATRIB(15),ENQ(400),IVN(400),JCELS(20,22),KRANK(400),       NXEV 100
     11           1MAXNQ(400),MFE(400),MLC(400),MLE(400),NCELS(20),NQ(400),          NXEV 110
     12           2TAR8M(4,4),QTIME(400),SSUM8(20,5),SUMA(27,5),VAME(6),VPROJ,MON,   NXEV 120
     13           3NDAY,NYR,JCLR,JTRIB(17)                                           NXEV 130
     14            COMMON A(1),ATIME,FTIME,IA(1),ICAN(40),JCOUNT,JTEST,KFILE,KOUT,   NXEV 140
     15           1 KFILM(25),NAME1(200),NAME2(200),NCODE(40),NFILM,NOFXP,NRECYC,    NXEV 150
     16           2 NWRITE,OTTIME,PFOOT,PRTIME,REOOT,TRANS(4),VATIME,XDAY,XTIME      NXEV 160
     17            DATA TFILM/6H S.E. ,6H MOVIE/                                     NXEV 170
     18      C                                                                       NXEV 180
     19      C*****VARIABLE PFOOT IS THE TOLERANCE ON THE FOOTAGE SHOT PER           NXEV 190
     20      C*****PERFORMANCE.                                                      NXEV 200
     21      C                                                                       NXEV 210
     22            PFOOT=1.                                                          NXEV 220
     23      C                                                                       NXEV 230
     24      C                                                                       NXEV 240
     25      C*****STORE ATTRIBUTES OF EXPERIMENT IN IA AND A ARRAYS.                NXEV 250
     26      C                                                                       NXEV 260
     27            DO 10 I=1,IM                                                      NXEV 270
     28         10 IA(I)=JTRIB(I)                                                    NXEV 280
     29            DO 11 I=1,IMM                                                     NXEV 290
     30         11 A(I)=ATRIB(I)                                                     NXEV 300
     31      C                                                                       NXEV 310
     32      C*****CALL SCANT TO DETERMINE IF THE EXPERIMENT HAS FILM THAT IS IN     NXEV 320
     33      C*****STAND-BY.                                                         NXEV 330
     34      C                                                                       NXEV 340
     35            CALL SCANT(IA(2),2,3,F,IA(4),4,IA(3),KCOL,NSET,QSET)             NXEV 350
     36            IF(KCOL)2,2,1                                                     NXEV 360
     37          1 CALL RMOVE(KCOL,IA(2),NSET,QSET)                                  NXEV 370
     38      C                                                                       NXEV 380
     39      C*****CHECK IF ALL OF THE CANISTER CAN BE USED                          NXEV 390
     40      C                                                                       NXEV 400
     41            IF(X2-ATRIB(4))3,4,4                                              NXEV 410
     42      C                                                                       NXEV 420
     43      C*****ALL THE CANISTER CAN BE USED                                      NXEV 430
     44      C                                                                       NXEV 440
     45          4 X2=X2-ATRIB(4)                                                    NXEV 450
     46            JTRIB(2)=5                                                        NXEV 460
     47            JTRIB(8)=0                                                        NXEV 470
     48            I=IA(7)                                                           NXEV 480
     49      C                                                                       NXEV 490
     50      C*****COMPUTE SHOOT TIME, TRANSFER TIME, AND WAIT                       NXEV 500
     51      C                                                                       NXEV 510
     52            IF(TNOW-ATRIB(5))41,40,40                                         NXEV 520
     53         40 ATRIB(3)=ATRIB(3)+(A(4)-A(5))-ATRIB(4)/A(3)                       NXEV 530
     54            GO TO 42                                                          NXEV 540
     55         41 ATRIB(3)=ATRIB(3)-ATRIB(4)/A(3)                                   NXEV 550
     56         42 CONTINUE                                                          NXEV 560
```

TABLE A-9. (Continued)

```
      ATRIB(1)=ATRIB(1)                                                 NXEV 570
      ATRIB(2)=A(RIB(2)+ATRIB(4)/A(3)                                   NXEV 580
      X1=ATRIB(4)                                                       NXEV 590
      ATRIB(4)=0.                                                       NXEV 600
      ATRIB(5)=A(4)                                                     NXEV 610
      CALL FILEM (IA(2),NSET,QSET)                                      NXEV 620
      CALL SCAN(NSET,QSET)                                              NXEV 630
      CALL OTPUT (X1,NSET,QSET)                                         NXEV 640
      GO TO 2                                                           NXEV 650
    3 CONTINUE                                                          NXEV 660
C                                                                       NXEV 670
C*****ALL THE CANISTER CANNOT BE USED.  COLLECT STATISTICS AND STORE    NXEV 680
C*****CANISTER AS AN IN USE CANISTER.                                   NXEV 690
      JTRIB(2)=4                                                        NXEV 700
      JTRIB(8)=1                                                        NXEV 710
C                                                                       NXEV 720
C*****COMPUTE SHOOT TIME, TRANSFER TIME, AND WAIT                       NXEV 730
C                                                                       NXEV 740
      IF(TNOW-ATRIB(5))44,43,43                                         NXEV 750
   43 ATRIB(3)=ATRIB(3)+(A(4)-A(5))-X2/A(3)                             NXEV 760
      GO TO 45                                                          NXEV 770
   44 ATRIB(3)=ATRIB(3)-X2/A(3)                                         NXEV 780
   45 CONTINUE                                                          NXEV 790
      ATRIB(1)=ATRIB(1)                                                 NXEV 800
      ATRIB(2)=ATRIB(2)+X2/A(3)                                         NXEV 810
      ATRIB(4)=ATRIB(4)-X2                                              NXEV 820
      ATRIB(5)=A(4)                                                     NXEV 830
      CALL FILEM (IA(2),NSET,QSET)                                      NXEV 840
      CALL SCAN(NSET,QSET)                                              NXEV 850
      CALL OTPUT (X2,NSET,QSET)                                         NXEV 860
      X2=0.0                                                            NXEV 870
    2 CONTINUE                                                          NXEV 880
C                                                                       NXEV 890
C*****CHECK IF THERE IS A PARTIALLY USED CANISTER IS IN THE VAULT.      NXEV 900
C                                                                       NXEV 910
   20 IF(ABS(X2)-PFOOT)25,25,21                                         NXEV 920
   21 CALL SCANT(IA(2),2,2,6,IA(4),4,IA(3),KCOL,NSET,QSET)              NXEV 930
      IF(KCOL)6,6,7                                                     NXEV 940
C                                                                       NXEV 950
C*****REMOVE THE PARTIALLY USED CANISTER.                               NXEV 960
C                                                                       NXEV 970
    7 CALL RMOVE (KCOL,IA(2),NSET,QSET)                                 NXEV 980
C                                                                       NXEV 990
C*****CHECK IF ALL THE CANISTER CAN BE USED.                            NXEV1000
C                                                                       NXEV1010
      IF(X2-ATRIB(4))8,9,9                                              NXEV1020
C                                                                       NXEV1030
C*****ALL THE CANISTER CAN BE USED.                                     NXEV1040
C                                                                       NXEV1050
    9 X2=X2-ATRIB(4)                                                    NXEV1060
      JTRIB(2)=5                                                        NXEV1070
      JTRIB(8)=0                                                        NXEV1080
      I=IA(7)                                                           NXEV1090
C                                                                       NXEV1100
C*****COMPUTE SHOOT TIME, TRANSFER TIME, AND WAIT                       NXEV1110
C                                                                       NXEV1120
      IF(TNOW-ATRIB(5))47,46,46                                         NXEV1130
```

TABLE A-9. (Continued)

```
      46 ATRIB(3)=ATRIB(3)+(A(4)-A(5))-ATRIB(4)/A(3)-2.*TRANS(I)          NXEV1140
         GO TO 48                                                        NXEV1150
      47 ATRIB(3)=ATRIB(3)-ATRIB(4)/A(3)                                 NXEV1160
      48 CONTINUE                                                        NXEV1170
         ATRIB(1)=ATRIB(1)+2.*TRANS(I)                                   NXEV1180
         ATRIB(2)=ATRIB(2)+ATRIB(4)/A(3)                                 NXEV1190
         X1=ATRIB(4)                                                     NXEV1200
         ATRIB(4)=0.                                                     NXEV1210
         ATRIB(5)=A(4)                                                   NXEV1220
         CALL FILEM (IA(2),NSET,QSET)                                    NXEV1230
         CALL SCAN(NSET,QSET)                                            NXEV1240
         CALL OTPUT (X1,NSET,QSET)                                       NXEV1250
         GO TO 20                                                        NXEV1260
       8 CONTINUE                                                        NXEV1270
C                                                                        NXEV1280
C*****ALL THE CANISTER CANNOT BE USED.                                   NXEV1290
C                                                                        NXEV1300
         JTRIB(2)=4                                                      NXEV1310
         JTRIB(9)=0                                                      NXEV1320
         I=IA(7)                                                         NXEV1330
C                                                                        NXEV1340
C*****COMPUTE SHOOT TIME, TRANSFER TIME, AND WAIT                        NXEV1350
C                                                                        NXEV1360
         IF(TNOW-ATRIB(5))50,49,49                                       NXEV1370
      49 ATRIB(3)=ATRIB(3)+(A(4)-A(5))-X2/A(3)-2.*TRANS(I)               NXEV1380
         GO TO 51                                                        NXEV1390
      50 ATRIB(3)=ATRIB(3)-X2/A(3)                                       NXEV1400
      51 CONTINUE                                                        NXEV1410
         ATRIB(1)=ATRIB(1)+2.*TRANS(I)                                   NXEV1420
         ATRIB(2)=ATRIB(2)+X2/A(3)                                       NXEV1430
         ATRIB(4)=ATRIB(4)-X2                                            NXEV1440
         ATRIB(5)=A(4)                                                   NXEV1450
         CALL FILEM (IA(2),NSET,QSET)                                    NXEV1460
         CALL SCAN(NSET,QSET)                                            NXEV1470
         CALL OTPUT (X2,NSET,QSET)                                       NXEV1480
         X2=0.0                                                          NXEV1490
         GO TO 25                                                        NXEV1500
       6 CONTINUE                                                        NXEV1510
C                                                                        NXEV1520
C*****REMOVE CANISTERS THAT HAVE NOT BEEN USED.                          NXEV1530
C                                                                        NXEV1540
      22 IF(ABS(X2)-PFOOT)25,25,26                                       NXEV1550
      26 CALL SCANT(IA(2),2,1,6,IA(4),4,IA(3),KCOL,NSET,QSET)            NXEV1560
         IF(KCOL)30,30,31                                                NXEV1570
      30 CALL ERROR(12,NSET,QSET)                                        NXEV1580
      31 CALL RMOVE (KCOL,IA(2),NSET,QSET)                               NXEV1590
C                                                                        NXEV1600
C*****CHECK IF ALL THE CANISTER CAN BE USED.                             NXEV1610
C                                                                        NXEV1620
         IF(X2-ATRIB(4))27,28,28                                         NXEV1630
C                                                                        NXEV1640
C*****ALL THE CANISTER CAN BE USED.                                      NXEV1650
C                                                                        NXEV1660
      28 X2=X2-ATRIB(4)                                                  NXEV1670
C                                                                        NXEV1680
C*****COMPUTE SHOOT TIME, TRANSFER TIME, AND WAIT                        NXEV1690
C                                                                        NXEV1700
```

TABLE A-9. (Concluded)

```
171           JTRIB(2)=5                                                    NXEV1710
172           JTRIB(8)=0                                                    NXEV1720
173           I=IA(7)                                                       NXEV1730
174           ATRIB(1)=ATRIB(1)+2.*TRANS(I)                                 NXEV1740
175           ATRIB(2)=ATRIB(2)+ATRIB(4)/A(3)                               NXEV1750
176           ATRIB(3)=ATRIB(3)+(A(4)-A(5))-ATRIB(4)/A(3)-2.*TRANS(I)       NXEV1760
177           X1=ATRIB(4)                                                   NXEV1770
178           ATRIB(4)=0.0                                                  NXEV1780
179           ATRIB(5)=A(4)                                                 NXEV1790
180           CALL FILEM (IA(2),NSET,QSET)                                  NXEV1800
181           CALL SCAN(NSET,QSET)                                          NXEV1810
182           CALL OTPUT (X1,NSET,QSET)                                     NXEV1820
183           GO TO 22                                                      NXEV1830
184     C                                                                   NXEV1840
185     C*****ALL THE CANISTER CANNOT BE USED.                              NXEV1850
186     C                                                                   NXEV1860
187        27 CONTINUE                                                      NXEV1870
188           JTRIB(2)=4                                                    NXEV1880
189           JTRIB(8)=0                                                    NXEV1890
190           I=IA(7)                                                       NXEV1900
191     C                                                                   NXEV1910
192     C*****COMPUTE SHOOT TIME, TRANSFER TIME, AND WAIT                   NXEV1920
193     C                                                                   NXEV1930
194           ATRIB(1)=ATRIB(1)+2.*TRANS(I)                                 NXEV1940
195           ATRIB(2)=ATRIB(2)+X2/A(3)                                     NXEV1950
196           ATRIB(3)=ATRIB(3)+(A(4)-A(5))-X2/A(3)-2.*TRANS(I)             NXEV1960
197           ATRIB(4)=ATRIB(4)-X2                                          NXEV1970
198           ATRIB(5)=A(4)                                                 NXEV1980
199           CALL FILEM (IA(2),NSET,QSET)                                  NXEV1990
200           CALL SCAN(NSET,QSET)                                          NXEV2000
201           CALL OTPUT (X2,NSET,QSET)                                     NXEV2010
202           X2=0.0                                                        NXEV2020
203        25 CONTINUE                                                      NXEV2030
204     C                                                                   NXEV2040
205     C*****CHECK IF FILM IS COMPLETE FOR THIS EXPERIMENT/FILM TYPE.      NXEV2050
206     C                                                                   NXEV2060
207           IF(IA(8).NE.2)GO TO 223                                       NXEV2070
208           ICODE=IA(2)                                                   NXEV2080
209           NT=1                                                          NXEV2090
210           IF(IA(5).EQ.2)NT=2                                            NXEV2100
211           IF(NWRITE.EQ.1)GO TO 223                                      NXEV2110
212           WRITE(NPRNT,222)IA(3),TFILM(NT),NAME1(ICODE),NAME2(ICODE)     NXEV2120
213         222 FORMAT(10X,10H*ALL TYPE ,I2,A6,21H FILM ASSIGNED TO :  ,2A6, 18H HNXEV2130
214            1AS BEEN USED UP*)                                           NXEV2140
215           JCOUNT=JCOUNT+1                                               NXEV2150
216     C                                                                   NXEV2160
217     C*****CALL PICK TO DETERMINE THE NEXT EXPERIMENT REQUIRING FILM.    NXEV2170
218     C                                                                   NXEV2180
219         223 CALL        PICK(NSET,QSET)                                 NXEV2190
220           RETURN                                                        NXEV2200
221           END                                                           NXEV2210
```

TABLE A-10. FORTRAN LISTING OF USER-WRITTEN SUBPROGRAM OTPUT

```
400550*TPES.OTPUT
      1            SUBROUTINE OTPUT(X2,NSET,QSET)                                    OTPT  10
      2            DIMENSION NSET(1),QSET(1)                                         OTPT  20
      3            COMMON ID,IM,INIT,JEVNT,JMNIT,MFA,MSTOP,MX,MXC,NCLCT,NHIST,       OTPT  30
      4           1NQQ,NORPT,NOT,NPRMS,NRUN,NRUNS,NSTAT,OUT,SCALE,ISEED,TNOW,        OTPT  40
      5           2TBEG,TFIN,MXX,NPRNT,NCRDR,NEP,VNQ(400),IMM,MAXQS,MAXNS            OTPT  50
      6            COMMON ATRIB(15),ENQ(400),INN(400),JCELS(20,22),RANK(400),        OTPT  60
      7           1MAXNQ(400),MFE(400),MLC(400),MLE(400),NCELS(20),NQ(400),         OTPT  70
      8           2PARM(9,4),QTIME(400),SSUMA(20,5),SUMA(20,5),NAME(6),NPROJ,MON,    OTPT  80
      9           3NDAY,NYR,JCLR,JTRIB(17)                                          OTPT  90
     10            COMMON A(1),BTIME,FTIME,IA(10),ICAN(40),JCOUNT,JTEST,KFILE,KOUT,  OTPT 100
     11           1 KFILM(25),NAME1(200),NAME2(200),NCODE(40),NFILM,NOEXP,NRECYC,    OTPT 110
     12           2 NWRITE,OTTIME,PFOOT,PRTIME,RFOOT,TRANS(4),VATIME,XDAY,XTIME      OTPT 120
     13      C                                                                       OTPT 130
     14      C*****ARRAY CAMERA DEFINES THE CAMERA TYPES                             OTPT 140
     15      C                                                                       OTPT 150
     16            DIMENSION CAMERA(4)                                               OTPT 160
     17            DATA  CAMERA              /1HH,1HM,1HU,1H /                       OTPT 170
     18          111 FORMAT (3I5,3X,2A6,2X,I4,7X,A2,I8,I6,F10.2,4F12.2)              OTPT 180
     19            XHR=XDAY/60.                                                      OTPT 190
     20            IDAY=A(4)/XDAY+1.                                                 OTPT 200
     21            XI=(A(4)/XDAY-FLOAT(IDAY-1))*XHR                                  OTPT 210
     22            IHR=XI                                                            OTPT 220
     23            IMIN=(XI-FLOAT(IHR))*60.                                          OTPT 230
     24            Y=ATRIB(1)+ATRIB(2)+ATRIB(3)                                      OTPT 240
     25            ICODE=IA(2)                                                       OTPT 250
     26            I1=IA(5)                                                          OTPT 260
     27            JCOUNT=JCOUNT+1                                                   OTPT 270
     28            IF(JCOUNT.LT.40)GO TO 110                                         OTPT 280
     29            WRITE(NPRNT,101)                                                  OTPT 290
     30          101  FORMAT(//51X,10H-TABLE II-)                                   OTPT 300
     31            JCOUNT=0                                                          OTPT 310
     32            WRITE (NPRNT,304)                                                 OTPT 320
     33          304 FORMAT (1H1)                                                    OTPT 330
     34            WRITE (NPRNT,301)                                                 OTPT 340
     35            WRITE (NPRNT,302)                                                 OTPT 350
     36            WRITE (NPRNT,303)                                                 OTPT 360
     37          301 FORMAT (50X,4HFILM,3X,3HCAN,4X,7HCURRENT,2X,4(10HCUMULATIVE,2X)) OTPT 370
     38          302 FORMAT (3X,3HDAY,3X,2HHR,2X,3HMIN,2X,10HEXPERIMENT,4X,8HLOCATION, OTPT 380
     39             12X,6HCAMERA,2X,4HTYPE,3X,3HNO.,4X,7HREMAIN.,5X,5HTRANS,7X,      OTPT 390
     40             25HSHOOT,8X,4HWAIT,5X,8HTIME OUT)                                OTPT 400
     41          303 FORMAT (65X,4HFILM,3(6X,4HTIME),5X,8HOF REPOS/)                 OTPT 410
     42          110 WRITE(NPRNT,130)IDAY,IHR,IMIN,NAME1(ICODE),NAME2(ICODE),IA(7),  OTPT 420
     43             1CAMERA(I1),IA(3),                                               OTPT 430
     44             2JTRIB(1),ATRIB(4),ATRIB(1),ATRIB(2),ATRIB(3),Y                  OTPT 440
     45              BFILM=(BTIME-XTIME)/60.                                         OTPT 450
     46              EFILM=(ETIME-XTIME)/60.                                         OTPT 460
     47      C                                                                       OTPT 470
     48      C*****GENERATE CANISTER USAGE TIMELINE TRACE TAPE IF REQUIRED           OTPT 480
     49      C                                                                       OTPT 490
     50            IF(JTEST.EQ.1)WRITE(KOUT,104)IA(3),JTRIB(1),BFILM,EFILM,IA(7)     OTPT 500
     51          104 FORMAT(2I2,2F10.3,I4)                                           OTPT 510
     52            RETURN                                                            OTPT 520
     53            END                                                               OTPT 530
```

TABLE A-11. FORTRAN LISTING OF USER-WRITTEN SUBPROGRAM PFILE

```
401550*TPF$,PFILE
     1            SUBROUTINE PFILE(NSET,QSET)                                    PFIL  10
     2            DIMENSION NSET(1),QSET(1)                                      PFIL  20
     3            COMMON ID,IM,INIT,JEVNT,JMNIT,MFB,MSTOP,MX,MXC,NCLCT,NHIST,    PFIL  30
    4            1NOQ,NORPT,NOT,NPRMS,NRUN,NRUNS,NSTAT,OUT,SCALE,ISEED,TNOW,    PFIL  40
    5            2TBEG,TFIN,MXX,NPRNT,NCRDR,NEP,VNQ(400),IMM,MAXQS,MAXNS        PFIL  50
     6            COMMON ATRI3(15),ENQ(400),INN(400),JCELS(20,22),KRANK(400),    PFIL  60
     7           1MAXNQ(400),MFE(400),MLC(400),MLE(400),NCELS(20),NQ(400),       PFIL  70
     8           2PARAM(4,4),QTIME(400),SSUMA(20,5),SUMA(20,5),NAME(6),NPROJ,MON, PFIL  80
     9           3NDAY,NYR,JCLR,JTRIB(17)                                       PFIL  90
    10            WRITE (NPRNT,240) TNOW                                        PFIL 100
    11          240 FORMAT (1H1,//10X,22HPRINT OF FILES AT TIME,F10.2//)        PFIL 110
    12            DO 213 I=1,NOQ                                                PFIL 120
    13            IF(NQ(I))210,210,221                                          PFIL 130
    14      C                                                                   PFIL 140
    15      C*****PRINT THE NSET ARRAY                                          PFIL 150
    16      C                                                                   PFIL 160
    17          221 I2=0                                                        PFIL 170
    18            WRITE (NPRNT,91) I                                            PFIL 180
    19             91 FORMAT (//20X,4HFILE,I7,2X,8HCONTENTS//,25X,4HNSET/)      PFIL 190
    20            I1=MFE(I)                                                     PFIL 200
    21          223 IL=(I1-1)*MXX+1                                             PFIL 210
    22            IV=IL+MXX-1                                                   PFIL 220
    23            WRITE (NPRNT,90) I1,(NSET(IJ),IJ=IL,IV)                       PFIL 230
    24             90 FORMAT (3X,I5,5X,13I8,/13X,13I8)                          PFIL 240
    25            I1=NSET(IV-1)                                                 PFIL 250
    26            IF(I1-7777)223,224,224                                        PFIL 260
    27      C                                                                   PFIL 270
    28      C*****PRINT THE QSET ARRAY                                          PFIL 280
    29      C                                                                   PFIL 290
    30          224 I2=0                                                        PFIL 300
    31            WRITE (NPRNT,92)                                              PFIL 310
    32             92 FORMAT(//25X,4HQSET/)                                     PFIL 320
    33            I1=MFE(I)                                                     PFIL 330
    34          225 I3=(I1-1)*MXX+1                                             PFIL 340
    35            I4=I3+MXX-1                                                   PFIL 350
    36            IL=(I1-1)*IMM+1                                               PFIL 360
    37            IV=IL+IMM-1                                                   PFIL 370
    38            WRITE (NPRNT,95) I1,(QSET(IJ),IJ=IL,IV)                       PFIL 380
    39             95 FORMAT (3X,I5,4X,8(E12.6,2X),/12X,8(E12.6,2X))            PFIL 390
    40            I1=NSET(I4-1)                                                 PFIL 400
    41            IF(I1-7777)225,210,210                                        PFIL 410
    42          213 CONTINUE                                                    PFIL 420
    43            RETURN                                                        PFIL 430
    44            END                                                           PFIL 440
```

TABLE A-12. FORTRAN LISTING OF USER-WRITTEN SUBPROGRAM SCAN

```
403550*TPFS.SCAN
      1              SUBROUTINE SCAN(NSET,QSET)                                        SCAN  10
      2              DIMENSION NSET(1),QSET(1)                                         SCAN  20
      3              COMMON ID,IM,INIT,JEVNT,JMNIT,MFA,MSTOP,MX,MXC,NCLCT,NHIST,       SCAN  30
      4             1NOQ,NORPT,NOT,NPRMS,NRUN,NRUNS,NSTAT,OUT,SCALE,ISEED,TNOW,       SCAN  40
      5             2TBFG,TFIN,MXX,NPRNT,NCRDR,NEP,VNQ(400),IMM,MAXQS,MAXNS           SCAN  50
      6              COMMON ATRIB(15),ENQ(400),INN(400),JCELS(20,22),KRANK(400),      SCAN  60
      7             1MAXNQ(400),MFE(400),MLC(400),MLE(400),NCELS(20),NQ(400),         SCAN  70
      8             2PARAM(4,4),QTIME(400),SSUMA(20,5),SUMA(20,5),NAME(6),NPROJ,MON,  SCAN  80
      9             3NDAY,NYR,JCLR,JTRIB(17)                                          SCAN  90
     10              COMMON A(1),BTIME,ETIME,IA(10),ICAN(40),JCOUNT,JTEST,KFILE,KOUT,  SCAN 100
     11             1 KFTLM(25),NAME1(200),NAME2(200),NCODE(40),NFILM,NOFXP,NRECYC,    SCAN 110
     12             2 NWRITE,QTTIME,PFOOT,PRTIME,RFOOT,TRANS(4),VATIME,XDAY,XTIME      SCAN 120
     13       C                                                                        SCAN 130
     14       C*****DETERMINES IF THIS CANISTER IS TO BE SHARED WITH ANOTHER FILMING   SCAN 140
     15       C      EVENT                                                             SCAN 150
     16       C                                                                        SCAN 160
     17              IF(JTRIB(5).EQ.0)GO TO 110                                        SCAN 170
     18              Y1=ATRIB(1)                                                       SCAN 180
     19              Y2=ATRIB(2)                                                       SCAN 190
     20              Y3=ATRIB(3)                                                       SCAN 200
     21              Y4=ATRIB(4)                                                       SCAN 210
     22              DO 111 I1=3,199                                                   SCAN 220
     23              IF(I1.EQ.IA(2))GO TO 111                                          SCAN 230
     24              IF(NQ(I1).EQ.0)GO TO 111                                          SCAN 240
     25              CALL FINDN(JTRIB(5),5,I1,5,KCOL,NSET,QSET)                       SCAN 250
     26              IF(KCOL.EQ.0)GO TO 111                                            SCAN 260
     27              CALL RMOVE (KCOL,I1,NSET,QSET)                                    SCAN 270
     28              ATRIB(1)=Y1                                                       SCAN 280
     29              ATRIB(2)=Y2                                                       SCAN 290
     30              ATRIB(3)=Y3                                                       SCAN 300
     31              ATRIB(4)=Y4                                                       SCAN 310
     32              CALL FILEM(I1,NSET,QSET)                                          SCAN 320
     33          111 CONTINUE                                                          SCAN 330
     34          110 RETURN                                                            SCAN 340
     35              END                                                               SCAN 350
```

TABLE A-13. FORTRAN LISTING OF USER-WRITTEN SUBPROGRAM SCANT

```
403557*TPF$.SCANT
      1            SUBROUTINE SCANT (I1,I2,I3,I4,I5,I6,I7,KCOL,NSET,QSET)          SCAT  10
      2            DIMENSION NSET(1),QSET(1)                                       SCAT  20
      3            COMMON ID,IM,INIT,JEVNT,JMNIT,MFA,MSTOP,MX,MXC,NCLCT,NHIST,     SCAT  30
      4           1NOQ,NORPT,NOT,NPRMS,NRUN,NRUNS,NSTAT,OUT,SCALE,ISEED,TNOW,      SCAT  40
      5           2TBEG,TFIN,MXX,NPRNT,NCRDR,NEP,VNQ(400),IMM,MAXQS,MAXNS          SCAT  50
      6            COMMON ATRIB(15),ENQ(400),INN(400),JCELS(20,22),RANK(400),      SCAT  60
      7           1MAXNQ(400),MFE(400),MLC(400),MLE(400),NCELS(20),NQ(400),       SCAT  70
      8           2PARAM(4,4),QTIME(400),SSUMA(20,5),SUMA(20,5),NAME(6),NPROJ,MON, SCAT  80
      9           3NDAY,NYR,JCLR,JTRIB(17)                                        SCAT  90
     10            COMMON A(1),BTIME,ETIME,IA(1),ICAN(40),JCOUNT,JTEST,KFILE,KOUT, SCAT 100
     11           1 KFILM(25),NAME1(200),NAME2(200),NCODE(40),NFILM,NOFXP,NRECYC,  SCAT 110
     12           2 NWRITE,OTTIME,PFOOT,PRTIME,RFOOT,TRANS(4),VATIME,XDAY,XTIME    SCAT 120
     13      C                                                                     SCAT 130
     14      C*****I1 IS FILE NUMBER.  I2 IS COLUMN AND I3 IS NVAL, ETC.           SCAT 140
     15      C                                                                     SCAT 150
     16            KCOL=0                                                          SCAT 160
     17            K=NQ(I1)                                                        SCAT 170
     18            K1=MFE(I1)                                                      SCAT 180
     19            IF(K.EQ.0)RETURN                                                SCAT 190
     20            DO 100 J=1,K                                                    SCAT 200
     21            INDX=(K1-1)*MXX                                                 SCAT 210
     22            L1=INDX+I2                                                      SCAT 220
     23            J1=NSET(L1)                                                     SCAT 230
     24            IF(J1.NE.I3)GO TO 102                                           SCAT 240
     25            L1=INDX+I4                                                      SCAT 250
     26            J1=NSET(L1)                                                     SCAT 260
     27            IF(J1.NE.I5)GO TO 102                                           SCAT 270
     28            L1=INDX+I6                                                      SCAT 280
     29            J1=NSET(L1)                                                     SCAT 290
     30            IF(J1.NE.I7)GO TO 102                                           SCAT 300
     31            KCOL=K1                                                         SCAT 310
     32            GO TO 101                                                       SCAT 320
     33          102 L1=INDX+IM+1                                                  SCAT 330
     34            K1=NSET(L1)                                                     SCAT 340
     35          100 CONTINUE                                                      SCAT 350
     36          101 RETURN                                                        SCAT 360
     37            END                                                             SCAT 370
```

TABLE A-14. FORTRAN LISTING OF USER-WRITTEN SUBPROGRAM STEVT

```
403550*TPF$.STEVT
      1              SUBROUTINE STEVT(NSET,QSET)                                        STEV  10
      2              DIMENSION NSET(1),QSET(1)                                          STEV  20
      3              COMMON ID,IM,INIT,JEVNT,JMNIT,MFA,MSTOP,MX,MXC,NCLCT,NHIST,        STEV  30
      4             1NOQ,NORPT,NOT,NPRMS,NRUN,NRUNS,NSTAT,OUT,SCALE,ISEED,TNOW,        STEV  40
      5             2TBEG,TFIN,MXX,NPRNT,NCRDR,NEP,VNQ(400),IMM,MAXQS,MAXNS            STEV  50
      6              COMMON ATRIB(15),ENQ(400),INN(400),JCELS(20,22),KRANK(403),       STEV  60
      7             1MAXNQ(400),MFE(400),MLC(400),MLE(400),NCELS(20),NQ(400),         STEV  70
      8             2PARAM(9,4),QTIME(400),SSUMA(20,5),SUMA(20,5),NAME(5),NPROJ,MON,   STEV  80
      9             3NDAY,NYR,JCLR,JTRIB(17)                                           STEV  90
     10              COMMON A(10),BTIME,ETIME,IA(10),ICAN(40),JCOUNT,JTEST,KFILE,KOUT,  STEV 100
     11             1 KFILM(25),NAME1(200),NAME2(200),NCODE(40),NFILM,NOEXP,NRECYC,     STEV 110
     12             2 NWRITE,OTTIME,PFOOT,PRTIME,RFOOT,TRANS(4),VATIME,XDAY,XTIME       STEV 120
     13       C                                                                         STEV 130
     14       C*****COMPUTE THE TIME FOR ENDING THE EVENT AND STORE IN FILE 1.          STEV 140
     15       C                                                                         STEV 150
     16       C                                                                         STEV 160
     17       C*****CHECK IF THE EVENT IS THE FIRST EVENT.                              STEV 170
     18       C                                                                         STEV 180
     19             IF(JTRIB(2).NE.0)GO TO 20                                           STEV 190
     20             CALL EPICK (NSET,QSET)                                              STEV 200
     21             RETURN                                                              STEV 210
     22          20 JTRIB(1)=2                                                          STEV 220
     23             ATRIB(1)=TNOW+ATRIB(2)                                              STEV 230
     24             CALL FILEM (1,NSET,QSET)                                            STEV 240
     25       C                                                                         STEV 250
     26       C*****COMPUTE THE TOTAL USAGE OF ITEM DURING THIS EVENT.  ATRIB(2)        STEV 260
     27       C*****IS THE ELAPSED TIME FOR THE EVENT.  ATRIB(3) IS THE USAGE RATE.     STEV 270
     28       C                                                                         STEV 280
     29             X=ATRIB(2)*ATRIB(3)                                                 STEV 290
     30       C                                                                         STEV 300
     31       C*****CALL NXEVT TO COLLECT STATISTICS AND DETERMINE THE NEXT EVENT       STEV 310
     32       C*****TO OCCUR.                                                           STEV 320
     33       C                                                                         STEV 330
     34             CALL NXEVT(X,NSET,QSET)                                             STEV 340
     35             RETURN                                                              STEV 350
     36             END                                                                 STEV 360
```

TABLE A-15. FORTRAN LISTING OF USER-WRITTEN SUBPROGRAM WRITEO

```
400550*TPF$.WRITEO
      1              SUBROUTINE WRITEO                                                  WRTO  10
      2              DIMENSION FMT(3)                                                   WRTO  20
      3              DATA FMT/14H(I4,2F10.3,I4)/                                        WRTO  30
      4              COMMON ID,IM,INIT,JEVNT,JMNIT,MFA,MSTOP,MX,MXC,NCLCT,NHIST,        WRTO  40
      5             1NOQ,NORPT,NOT,NPRMS,NRUN,NRUNS,NSTAT,OUT,SCALE,ISEED,TNOW,        WRTO  50
      6             2TREG,TFIN,MXX,NPRNT,NCROR,NEP,VNQ(400),IMM,MAXQS,MAXNS            WRTO  60
      7              COMMON ATRIB(15),ENQ(400),INN(400),JCELS(20,22),KRANK(400),       WRTO  70
      8             1MAXNQ(400),MFE(400),MLC(400),MLE(400),NCELS(20),NQ(400),         WRTO  80
      9             2PARAM(9,4),QTIME(400),SSUMA(20,5),SUMA(20,5),NAME(6),NPROJ,MON,  WRTO  90
     10             3NDAY,NYR,JCLR,JTRIB(17)                                           WRTO 100
     11              COMMON A(10),BTIME,ETIME,IA(10),ICAN(40),JCOUNT,JTEST,KFILE,KOUT, WRTO 110
     12             1 KFILM(25),NAME1(200),NAME2(200),NCODE(40),NFILM,NOEXP,NRECYC,    WRTO 120
     13             2 NWRITE,OTTIME,PFOOT,PRTIME,RFOOT,TRANS(4),VATIME,XDAY,XTIME      WRTO 130
     14              REWIND KOUT                                                       WRTO 140
     15            5 JCOUNT =0                                                         WRTO 150
     16              WRITE(6,99)                                                       WRTO 160
     17           99 FORMAT(1H1,/1X,34HPRINTOUT OF CANISTER TIMELINE TAPE)             WRTO 170
     18            3 CALL REDTPD(KOUT,FMT,IER,1,NUMBER,1,BFILM,1,EFILM,1,LOC)         WRTO 180
     19              GO TO (2,2),20),IER                                               WRTO 190
     20            2 WRITE(6,101)NUMBER,BFILM,EFILM,LOC                                WRTO 200
     21          101 FORMAT(1X,I4,2F10.3,I4)                                           WRTO 210
     22              JCOUNT=JCOUNT+1                                                   WRTO 220
     23              IF(JCOUNT.GT.50)GO TO 5                                           WRTO 230
     24              GO TO 3                                                           WRTO 240
     25           20 WRITE(6,102)IER                                                   WRTO 250
     26          102 FORMAT(////5H IER=,I2,24H END OF FILE(2)/ERROR(3))                WRTO 260
     27              RETURN                                                            WRTO 270
     28              END                                                               WRTO 280
```

APPENDIX B
GASP FILE AND PROGRAM INFORMATION

TABLE B-1. ATTRIBUTES FOR EVENT FILE

Attributes	Description
Fixed-Point	
1	Event code: 1 – start filming, 2 – end filming, and 4 – end of mission.
2	Experiment code. Used in communicating with the experiment/ canister files.
3	File type. Used for output purposes.
4	Entry number in experiment/film requirements file. This attribute is used to communicate between the files for file updating.
5	Camera type. Used for output purposes.
6	Footage per canister. Used for output purposes.
7	Code for location in which experiment is performed. Used for output purposes.
8	Indicator used to determine if all assigned film is depleted.
Floating-Point	
1	Time the event occurs. Required by GASP to perform next event simulation.
2	Filming time per experiment performance. This attribute is used in conjunction with the camera rate to determine the footage.
3	Camera rate.
4	Time the performance of experiment ends. This attribute is used in conjunction with the time that filming starts to compute statistics for the canister.
5	Time in which the filming event begins.

TABLE B-2. ATTRIBUTES FOR EXPERIMENT/FILM REQUIREMENT FILES

Attribute	Description
Fixed Point	
1	Film type. Used by event file and experiment/canister files for information purposes.
2	Camera type. Used by event file.
3	Common canister code. All experiment requirements with the same code use the same canister.
4	Footage per canister. Used by event and experiment canister file.
5	Code to indicate that the film is to be returned to the vault immediately after filming versus waiting until the experiment is complete.
6	Entry number in file. Each entry in a file is numbered in ascending order. This is used to communicate between the experiment/film requirements files and the experiment/canister files.
7	Code for the location where filming occurs. Used for determining the amount of transfer time between the film vault and shoot area.
Floating Point	
1	Total footage or exposures of film required for the experiment. Used to determine the number of canisters to assign to the experiment. Also used in conjunction with the cumulative footage or exposures during the simulation to determine when all of the filming requirement has been met.
2	Filming time per experiment performance. This is used by the event file.
3	Camera rate. This is used by the event file.
4	Not used.
5	Cumulative footage or exposures used.

TABLE B-3. ATTRIBUTES FOR EXPERIMENT/CANISTER FILES

Attributes	Description
Fixed Point	
1	Canister numbers. The canisters are numbered in ascending order by film type. Used for output purposes.
2	Canister status code: 1 – has not been used, 2 – partially used and in the vault, 3 – partially used and out of the vault, 4 – in use, 5 – no film remaining.
3	Footage per canister. Used to initially define the remaining footage or exposures. Also used for output purposes.
4	Film type. Used for output purposes.
5	Common canister code. Used to determine if the canister is used by more than one experiment.
6	Entry number in experiment/film requirements file which the canister is allocated to.
Floating Point	
1	Cumulative transfer time. This is the time that the canister is in transit between the vault and the filming location.
2	Cumulative filming time. This is the time that the canister is being used for filming.
3	Cumulative wait time. This is the time that the canister is out of the vault but not being transferred or filmed. The sum of the transfer time, filming time, and wait time gives the total time out of the protective vault.
4	Remaining footage or exposures. Used to determine when all of the canister has been used.

TABLE B-4. GASP SUBPROGRAM DESCRIPTION

Subprogram	Function
COLCT	Used in computing the mean, standard deviation, the number of observations, and the minimum and maximum values of a variable.
DATAN	Initializes GASP variables and sets up to experiment/film requirements from the input data.
ERROR	Called when an error is detected in any GASP subroutine except PRNTQ, SUMRY, and MONTR, all of which print their own error messages.
FILEM	Called to file an entry in file JQ of the arrays NSET and QSET.
FINDN	Used to locate a row called KCOL in file JQ of the array NSET.
FINDQ	Used to locate a row called KCOL in file JQ of the array QSET. The only difference in FINDN and FINDQ is that the first argument of FINDQ is a floating-point variable, and additional argument TOL is added. TOL is the tolerance used in the search for the specified condition.
GASP	Executive control for GASP written programs.
HISTO	Used to obtain the histogram of observed observations.
RMOVE	Called to remove an entry from file JQ of the arrays NSET and QSET. KCOL is the row to be removed.
SET	This subroutine maintains and updates the filing arrays NSET and QSET.

TABLE B-5. GASP VARIABLES AND ARRAYS

Variable	Definition
ATRIB(IMM)	Buffer for floating-point attribute values stored in or retrieved from QSET array.
ENQ(NOQ)	Time-integrated number of entries in a file.
ID	Number of rows of NSET and QSET, limited only by available storage.
IM	Number of attribute columns in NSET.
IMM	Number of attribute columns in QSET.
INN(NOQ)	If INN(J) = 1, entries in file J are ordered with lowest value first (LVF). If INN(J) = 2, entries in file J are ordered with highest value first (HVF).
INIT	Indicator. The statements INIT = 1, CALL SET (1, NSET, QSET) initializes NSET and QSET.
ISEED	Initial random number.
JCELS(NHIST, MXC)	Storage array for histograms.
JCLR	If JCLR $\leq$ 0, the statistical storage areas are not initialized. If JCLR > 0, the statistical storage areas are initialized.
JEVNT	Code of event being processed. Also used as a control in subroutine MONTR.
JMNIT	If JMNIT = 1, each event is monitored. If JMNIT = 0, no monitoring occurs.
JSEED	Local variable used in subroutine DATAN to read the initial random number seed value. JSEED must be positive for TNOW to be set to TBEG.
JTRIB(IM)	Buffer for fixed-point attribute values being stored in or retrieved from NSET.

TABLE B-5. (Continued)

Variable	Definition
KRANK(NOQ)	KRANK(J) is the attribute column on which File J is ranked.
MAXNQ(NOQ)	MAXNQ(J) is the maximum number of entries in File J.
MFA	Identifier of first row in NSET that is available for storing an event or entity.
MFE(NOQ)	MFE(J) is the first entry in File J.
MLC(NOQ)	MLC(J) is the next entry in File J to be removed. If not specified, MLC(J) is set equal to MFE(J).
MLE(NOQ)	MLE(J) is the last entry in File J.
MSTOP	Indicator for specifying method of ending the simulation.
MX	Successor column in NSET array. (MX = IM + 1.)
MXC	Largest number of cells to be used in any histogram.
MXX	Predecessor column in array NSET. (MXX = IM + 2.)
NCELS(NHIST)	NCELS(J) is the number of cells in histogram J, not including end cells.
NCLCT	Number of sets of statistics that can be collected in COLCT.
NEP	Indicator used in DATAN for initialization. NEP specifies the data card type at which reading of initialization cards is to begin for the next simulation run.
NHIST	Number of histograms that can be generated by HISTO.
NOQ	Number of files in NSET and QSET.
NORPT	If NORPT > 0, SUMRY and OTPUT are bypassed. If NORPT = 0, SUMRY and OTPUT are used.
NOT	If NOT = 0, simulation starts from beginning. If NOT > 0, a check on NEP is made.

TABLE B-5. (Concluded)

Variable	Definition
NPRMS	Number of sets of parameters.
NQ(NOQ)	NQ(J) is the current number of entries in File J.
NRUN	Number of the current simulation run.
NRUNS	Number of runs remaining, including the one remaining.
NSET(ID*MXX)	Integer part of the filing array.
QSET(ID*IMM)	Real valued part of the filing array.
QTIME(NOQ)	QTIME(J) is the time of the last use of File J.
SSUMA(NSTAT,J)	Array for storing time statistics generated by TMST.
SUMA(NCLCT,J)	Array for storing statistics generated by COLCT.
TBEG	Initial value of TNOW.
TFIN	Time to end the simulation if MSTOP > 0.
TNOW	Current time of a simulation.
VNQ(NOQ)	Time-integrated square of the number of entries in a file.
OUT	If OUT = 1, an entry is to be removed from NSET and QSET. If OUT = 0, an entry is to be stored in NSET and QSET.

TABLE B-6. FORTRAN LISTING OF GASP SUBPROGRAM COLCT

```
400550*TPF$.COLCT
      1            SUBROUTINE COLCT (X,N,NSET,QSET)                                  COLC  10
      2            DIMENSION NSET(1),QSET(1)                                         COLC  20
      3            COMMON ID,IM,INIT,JEVNT,JMNIT,MFA,MSTOP,MX,MXC,NCLCT,NHIST,       COLC  30
      4           1NOQ,NORPT,NOT,NPRMS,NRUN,NRUNS,NSTAT,OUT,SCALE,ISEED,TNOW,       COLC  40
      5           2TBEG,TFIN,MXX,NPRNT,NCRDR,NEP,VNQ(400),IMM,MAXQS,MAXNS           COLC  50
      6            COMMON ATRIB(15),ENQ(400),INN(400),JCELS(20,22),KRANK(400),      COLC  60
      7           1MAXNQ(400),MFE(400),MLC(400),MLE(400),NCELS(20),NQ(400),         COLC  70
      8           2PARAM(4,4),QTIME(400),SSUMA(20,5),SUMA(20,5),NAME(6),NPROJ,MON,  COLC  80
      9           3NDAY,NYR,JCLR,JTRIB(17)                                          COLC  90
     10            IF (N) 2,2,1                                                     COLC 100
     11          2 CALL ERROR(90,NSET,QSET)                                         COLC 110
     12          1 IF (N- NCLCT) 3,3,2                                              COLC 120
     13          3 SUMA(N,1) = SUMA(N,1)+X                                          COLC 130
     14            SUMA(N,2) = SUMA(N,2)+X*X                                        COLC 140
     15            SUMA(N,3) = SUMA(N,3)+1.0                                        COLC 150
     16            SUMA(N,4) = AMIN1(SUMA(N,4),X)                                   COLC 160
     17            SUMA(N,5) = AMAX1(SUMA(N,5),X)                                   COLC 170
     18            RETURN                                                           COLC 180
     19            END                                                              COLC 190
```

TABLE B-7. FORTRAN LISTING OF GASP SUBPROGRAM DATAN

```
400550*TPFS.DATAN
      1            SUBROUTINE DATAN(NSET,QSET)                                      DATN  10
      2            DIMENSION NSET(1),QSET(1)                                        DATN  20
      3            COMMON ID,IM,INIT,JEVNT,JMNIT,MFA,MSTOP,MX,MXC,NCLCT,NHIST,      DATN  30
      4           1NOQ,NORPT,NOT,NPRMS,NRUN,NRUNS,NSTAT,OUT,SCALE,ISEED,TNOW,       DATN  40
      5           2TBEG,TFIN,MXX,NPRNT,NCRDR,NEP,VNQ(400),IMM,MAXQS,MAXNS           DATN  50
      6            COMMON ATRIB(15),ENQ(400),INN(400),JCELS(20,22),KRANK(400),      DATN  60
      7           1MAXNQ(400),MFE(400),MLC(400),MLE(400),NCELS(20),N3(400),         DATN  70
      8           2PARAM(40,4),QTIME(400),SSUMA(20,5),SUMA(20,5),NAME(6),NPROJ,MON, DATN  80
      9           3NDAY,NYR,JCLR,JTRIB(17)                                         DATN  90
     10            COMMON A(10),BTIME,ETIME,IA(10),ICAN(40),JCOUNT,JTEST,KFILE,KOUT, DATN 100
     11           1 KFILM(25),NAME1(200),NAME2(200),NCODE(40),NFILM,NJEXP,NRECYC,   DATN 110
     12           2 NWRITE,QTTIME,RFOOT,PRTIME,RFOOT,TRANS(4),VATIME,XDAY,XTIME     DATN 120
     13            DIMENSION NEXP(2),RET(2)                                         DATN 130
     14            DATA NEXP/1H*,1H /                                               DATN 140
     15            DATA RET/3HYES,3HNO /                                            DATN 150
     16      C                                                                      DATN 160
     17      C*****INITIALIZE GASP VARIABLES                                        DATN 170
     18      C                                                                      DATN 180
     19            NRUN = 1                                                         DATN 190
     20            ID=400                                                           DATN 200
     21            IM=8                                                             DATN 210
     22            IMM=5                                                            DATN 220
     23            NOQ=400                                                          DATN 230
     24            MSTOP=0                                                          DATN 240
     25            NORPT=1                                                          DATN 250
     26            TNOW=BTIME                                                       DATN 260
     27            TFIN=0.0                                                         DATN 270
     28            JMNIT=0                                                          DATN 280
     29            NRUNS=1                                                          DATN 290
     30      C                                                                      DATN 300
     31      C*****SET UP FILE RANKINGS                                             DATN 310
     32      C                                                                      DATN 320
     33            KRANK(1)=1                                                       DATN 330
     34            INN(1)=1                                                         DATN 340
     35            KRANK(2)=100                                                     DATN 350
     36            INN(2)=1                                                         DATN 360
     37            DO 203 I=3,199                                                   DATN 370
     38            KRANK(I)=105                                                     DATN 380
     39          203 INN(I)=1                                                       DATN 390
     40            DO 201 I=200,NOQ                                                 DATN 400
     41            KRANK(I)=106                                                     DATN 410
     42          201 INN(I)=1                                                       DATN 420
     43            DO 142 J=1,NOQ                                                   DATN 430
     44          142 QTIME(J)=TNOW                                                  DATN 440
     45      C                                                                      DATN 450
     46      C*****INITIALIZE NSET                                                  DATN 460
     47      C                                                                      DATN 470
     48            INIT=1                                                           DATN 480
     49            CALL SET(1,NSET,QSET)                                            DATN 490
     50      C                                                                      DATN 500
     51      C*****SET UP INITIAL EVENT AT TIME ZERO TO START THE PROGRAM.          DATN 510
     52      C                                                                      DATN 520
     53            JTRIB(1)=1                                                       DATN 530
     54            JTRIB(2)=0                                                       DATN 540
     55            ATRIB(1)=TNOW                                                    DATN 550
     56            CALL FILEM (1,NSET,QSET)                                         DATN 560
```

TABLE B-7. (Continued)

```
      NOEXP=0                                                                  DATN 570
      NFILM=0                                                                  DATN 580
  450 CONTINUE                                                                 DATN 590
      WRITE(NPRNT,9999)                                                        DATN 600
 9999 FORMAT (1HI,38X,55H***INITIAL FILM REQUIREMENTS DATA FOR SKYLAB MI DATN 610
     1SSION***)                                                                DATN 620
      WRITE(NPRNT,9998)                                                        DATN 630
 9998 FORMAT(//117H ----------------------------------------------------DATN 640
     1---------------------------------------------------------------- )DATN 650
      WRITE(NPRNT,9997)                                                        DATN 660
 9997 FORMAT(113H CODE   EXPERIMENT     TYPE  CAMERA  SPECIAL CAN.  FOOTDATN 670
     1/CAN.  FOOTAGE  SHOOT-TIME  CAMERA-RATE  IMMEDIATE RETURN )            DATN 680
      WRITE(NPRNT,9994)                                                        DATN 690
 9994 FORMAT(1194 ----------------------------------------------------DATN 700
     1---------------------------------------------------------------  )DATN 710
      JCOUNT=0                                                                 DATN 720
  299 DO 300 JS = 1,ID                                                         DATN 730
      JCOUNT=JCOUNT+1                                                          DATN 740
      READ(NCRDR,1110)JQ,NAME1(JQ),NAME2(JQ), JTRIB(1),JTRIB(2),JTRIB(4)DATN 750
     1 ,JTRIB(3),JTRIB(5),JTRIB(7),(ATRIB(JKA),JKA=1,3)                        DATN 760
 1110 FORMAT(I3,5X,2A6,6I5,   3F10.1)                                         DATN 770
      IF(JQ)23,23,319                                                          DATN 780
  319 CONTINUE                                                                 DATN 790
C                                                                              DATN 800
C*****CHECK IF THE EXPERIMENT AND FILM TYPE ARE NEW.                           DATN 810
C                                                                              DATN 820
      IF(NOEXP.EQ.0)GO TO 350                                                  DATN 830
      DO 351 II=1,NOEXP                                                        DATN 840
      IF(JQ.EQ.NCODE(II))GO TO 352                                             DATN 850
  351 CONTINUE                                                                 DATN 860
  350 NOEXP=NOEXP+1                                                            DATN 870
      NCODE(NOEXP)=JQ                                                          DATN 880
  352 CONTINUE                                                                 DATN 890
      IF(NFILM.EQ.0)GO TO 353                                                  DATN 900
      DO 354 II=1,NFILM                                                        DATN 910
      IF(JTRIB(1).EQ.KFILM(II))GO TO 355                                       DATN 920
  354 CONTINUE                                                                 DATN 930
  353 NFILM=NFILM+1                                                            DATN 940
      KFILM(NFILM)=JTRIB(1)                                                    DATN 950
  355 CONTINUE                                                                 DATN 960
      NCLCT=NFILM                                                              DATN 970
      NHIST=NFILM                                                              DATN 980
      DO 312 II=1,NHIST                                                        DATN 990
  312 NCELS(II)=20                                                             DATN1000
      MEXP=1                                                                   DATN1010
C*****TEST TO SEE IF SINGLE EXPOSURE FILM OR MOVIE FILM IS USED              DATN1020
C                                                                              DATN1030
C                                                                              DATN1040
      IF(JTRIB(2).EQ.2)MEXP=2                                                  DATN1050
      JTRIB(5)=NO(JQ+200)+1                                                    DATN1060
      MR=2                                                                     DATN1070
C                                                                              DATN1080
C*****TEST TO SEE IF FILM IS TO BE PLACED BACK INTO THE VAULT IMMEDIATELDATN1090
C     AFTER USE                                                                DATN1100
C                                                                              DATN1110
      IF(JTRIB(5).EQ.1)MR=1                                                    DATN1120
      WRITE(NPRNT,9996)JQ,NAME1(JQ),NAME2(JQ),(JTRIB(JK),JK=1,4),              DATN1130
```

TABLE B-7. (Concluded)

```
114           1 NEXP(MEXP),(ATRIB(JKA),JKA=1,3),RET(MR)                          DATN1140
115        9995 FORMAT(1X,I3,4X,2A6,3X ,I2,5X ,I2,7X ,I3,11X,I3,5X,A1,F6.0,3X ,  DATN1150
116           1F6.1,6X,F7.2,9X,A3)                                                DATN1160
117            JQ=JQ+200                                                         DATN1170
118           298 CALL FILEM(JQ,NSET,QSET)                                       DATN1180
119            IF(JCOUNT.EQ.40)WRITE(NPRNT,9300)                                 DATN1190
120            IF(JCOUNT.EQ.40)WRITE(NPRNT,9001)                                 DATN1200
121            IF(JCOUNT.EQ.40)GO TO 450                                         DATN1210
122           300 CONTINUE                                                       DATN1220
123            20 CONTINUE                                                       DATN1230
124            WRITE(NPRNT,9000)                                                 DATN1240
125        9000 FORMAT(//10X,52H*-INDICATES NUMBER OF EXPOSURES RATHER THAN FOOTAGDATN1250
126           1E )                                                              DATN1260
127            WRITE(NPRNT,9001)                                                 DATN1270
128        9001 FORMAT(//61X,10H-TABLE  I-)                                      DATN1280
129            DO 400 I=200,400                                                  DATN1290
130            IF(NG(I).NE.1)GO TO 400                                           DATN1300
131            CALL RMOVE(MFF(I),I,NSET,QSET)                                    DATN1310
132            JTRIB(6)=0                                                        DATN1320
133            CALL FILEM (I,NSET,QSET)                                          DATN1330
134           400 CONTINUE                                                       DATN1340
135        C                                                                     DATN1350
136        C*****CALL CDATA TO SET UP THE EXPERIMENT/CANISTER FILES.              DATN1360
137        C                                                                     DATN1370
138            CALL CDATA (NSET,QSET)                                            DATN1380
139        C                                                                     DATN1390
140        C*****INITIALIZE JCELS AND SUMA ARRAYS                                DATN1400
141        C                                                                     DATN1410
142            JCOUNT=0                                                          DATN1420
143            50 RETURN                                                         DATN1430
144            END                                                               DATN1440
```

TABLE B-8. FORTRAN LISTING OF GASP SUBPROGRAM ERROR

```
400550*TPFS.ERROR
      1            SUBROUTINE ERROR(J,NSET,QSET)                                    EROR  10
      2            DIMENSION NSET(1),QSET(1)                                        EROR  20
      3            COMMON ID,IM,INIT,JEVNT,JMNIT,MFA,MSTOP,MX,MXC,NCLCT,NHIST,      EROR  30
     4            1NOQ,NORPT,NOT,NPRMS,NRUN,NRUNS,NSTAT,OUT,SCALE,ISEED,TNOW,      EROR  40
     5            2TBEG,TFIN,MXX,NPRNT,NCRDR,NEP,VNQ(400),IMM,MAXQS,MAXNS          EROR  50
     6            COMMON ATRIB(15),ENQ(400),INN(400),JCELS(20,22),KRANK(400),      EROR  60
     7            1MAXNQ(400),MFE(400),MLC(400),MLE(400),NCELS(20),NQ(400),        EROR  70
     8            2PARAM(4,4),QTIME(400),SSUMA(20,5),SUMA(20,5),NAME(6),NPROJ,MON, EROR  80
     9            3NDAY,NYR,JCLR,JTRIB(17)                                         EROR  90
    10            WRITE(NPRNT,99)                                                  EROR 100
    11          99 FORMAT (1H1)                                                    EROR 110
    12             WRITE (NPRNT,100) J,TNOW                                        EROR 120
    13         100 FORMAT(//36X16HERROR EXIT, TYPE,I3,7H ERROR.//21H FILE STATUS AT EROR 130
    14            1TIME,F10.4/)                                                    EROR 140
    15             CALL PFILE(NSET,QSET)                                           EROR 150
    16           4 CALL GASP(NSET,QSET)                                            EROR 160
    17             END                                                             EROR 170
```

TABLE B-9. FORTRAN LISTING OF GASP SUBPROGRAM FILEM

```
400550*TPF$.FILEM
      1              SUBROUTINE FILEM (JQ,NSET,QSET)                                    FILE  10
      2              DIMENSION NSET(1),QSET(1)                                          FILE  20
      3              COMMON ID,IM,INIT,JEVNT,JMNIT,MFA,MSTOP,MX,MXC,NCLCT,NHIST,        FILE  30
      4             1NOQ,NORPT,NOT,NPRMS,NRUN,NRUNS,NSTAT,OUT,SCALE,ISEED,TNOW,         FILE  40
      5             2TBEG,TFIN,MXX,NPRNT,NCRDR,NEP,VNQ(400),IMM,MAXQS,MAXNS             FILE  50
      6              COMMON ATRIB(15),ENQ(400),INN(400),JCELS(20,22),KRANK(400),        FILE  60
      7             1MAXNQ(430),MFE(400),MLC(400),MLE(400),NCELS(20),NQ(400),          FILE  70
      8             2PARAM(40,4),QTIME(400),SSUMA(20,5),SUMA(20,5),NAME(6),NPROJ,MON,  FILE  80
      9             3NDAY,NVR,JCLR,JTRIB(17)                                           FILE  90
     10       C                                                                        FILE 100
     11       C*****TEST TO SEE IF THERE IS AN AVAILABLE COLUMN FOR STORAGE            FILE 110
     12       C                                                                        FILE 120
     13              IF (MFA - ID ) 2,2,3                                              FILE 130
     14            3 WRITE (NPRNT,4)                                                   FILE 140
     15            4 FORMAT (///24H OVERLAP SET GIVEN BELOW/)                          FILE 150
     16              CALL ERROR(87,NSET,QSET)                                          FILE 160
     17       C                                                                        FILE 170
     18       C*****PUT ATTRIBUTE VALUES IN FILE                                       FILE 180
     19       C                                                                        FILE 190
     20            2 INDX=(MFA-1)*IMM                                                  FILE 200
     21              DO 1 I=1,IMM                                                      FILE 210
     22              INDX=INDX+1                                                       FILE 220
     23            1 QSET(INDX)=ATRIB(I)                                               FILE 230
     24              INDX=(MFA-1)*MXX                                                  FILE 240
     25              DO 10 I=1,IM                                                      FILE 250
     26              INDX=INDX+1                                                       FILE 260
     27           10 NSET(INDX)=JTRIB(I)                                               FILE 270
     28       C                                                                        FILE 280
     29       C*****CALL SET TO PUT NEW ENTRY IN PROPER PLACE IN NSET                  FILE 290
     30       C                                                                        FILE 300
     31              CALL SET (JQ,NSET,QSET)                                           FILE 310
     32              RETURN                                                            FILE 320
     33              END                                                               FILE 330
```

TABLE B-10. FORTRAN LISTING OF GASP SUBPROGRAM FINDN

```
400550*TPFS.FINDN
      SUBROUTINE FINDN(NVAL,MCODE,JQ,JATT,KCOL,NSET,QSET)                FINN  10
      DIMENSION NSET(1),QSET(1)                                          FINN  20
      COMMON ID,IM,INIT,JEVNT,JMNIT,MFA,MSTOP,MX,MXC,NCLCT,NHIST,        FINN  30
     1NOQ,NORPT,NOT,NPRMS,NRUN,NRUNS,NSTAT,OUT,SCALE,ISEED,TNOW,         FINN  40
     2TBEG,TFIN,MXX,NPRNT,NCRDR,NEP,VNQ(400),IMM,M4X0S,MAXNS             FINN  50
      COMMON ATRIB(15),ENQ(400),INN(400),JCELS(20,22),KRANK(400),        FINN  60
     1MAXNQ(400),MFE(400),MLC(400),MLE(400),NCELS(20),N3(400),           FINN  70
     2PARAM(40,4),QTIME(400),SSUMA(20,5),SUMA(20,5),NAME(6),NPROJ,MON,   FINN  80
     3NDAY,NYR,JCLR,JTRIB(17)                                           FINN  90
C                                                                        FINN 100
C*****THE COLUMN WHICH IS THE BEST CANDIDATE IS KBEST                    FINN 110
C                                                                        FINN 120
      KBEST=0                                                            FINN 130
C                                                                        FINN 140
C*****THE NEXT COLUMN TO BE CONSIDERED AS A CANDIDATE IS NEXTK           FINN 150
C                                                                        FINN 160
      NEXTK=MFE(JQ)                                                      FINN 170
      IF(NEXTK) 16,1,2                                                   FINN 180
   15 CALL ERROR (89,NSET,QSET)                                          FINN 190
    1 KCOL=KBEST                                                         FINN 200
      RETURN                                                             FINN 210
C                                                                        FINN 220
C*****MGRNV IS +1 FOR GREATER THAN SEARCH AND -1 FOR LESS THAN SEARCH    FINN 230
C*****NMAMN IS +1 FOR MAXIMUM AND -1 FOR MINIMUM                         FINN 240
C*****FOR SEARCH FOR EQUALITY THE SIGN OF MGRNV AND NMAMN ARE NOT USED   FINN 250
C                                                                        FINN 260
    2 GO TO (11,12,13,14,11),MCODE                                       FINN 270
   11 MGRNV=1                                                            FINN 280
      NMAMN=1                                                            FINN 290
      GO TO 20                                                           FINN 300
   12 MGRNV=1                                                            FINN 310
      NMAMN=-1                                                           FINN 320
      GO TO 20                                                           FINN 330
   13 MGRNV=-1                                                           FINN 340
      NMAMN=1                                                            FINN 350
      GO TO 20                                                           FINN 360
   14 MGRNV=-1                                                           FINN 370
      NMAMN=-1                                                           FINN 380
   20 INDX=(NEXTK-1)*MXX+JATT                                            FINN 390
      IF(MGRNV*(NSET(INDX)-NVAL))4,21,66                                 FINN 400
C                                                                        FINN 410
C*****WHEN EQUALITY IS OBTAINED TEST FOR MCODE=5, THE SEARCH FOR A       FINN 420
C*****SPECIFIED VALUE                                                    FINN 430
C                                                                        FINN 440
   21 IF(MCODE-5) 4,15,4                                                 FINN 450
   66 IF(MCODE-5)6,4,6                                                   FINN 460
    5 IF(KBEST)16,8,7                                                    FINN 470
    7 IF(NMAMN*(NSET(INDX)-NSET(KINDX)))4,4,8                            FINN 480
    8 KBEST=NEXTK                                                        FINN 490
      KINDX=INDX                                                         FINN 500
    4 INDS=(NEXTK)*MXX-1                                                 FINN 510
      NEXTK=NSET(INDS)                                                   FINN 520
      IF(NEXTK-7777120,1,1                                               FINN 530
   15 KCOL=NEXTK                                                         FINN 540
      RETURN                                                             FINN 550
      END                                                                FINN 560
```

TABLE B-11. FORTRAN LISTING OF GASP SUBPROGRAM FINDQ

```
4031550*TPFS,FINDQ
      1            SUBROUTINE FINDQ(QVAL,MCODE,JQ,JATT,TOL,KCOL,NSET,QSET)          FINQ  10
      2            DIMENSION NSET(1),QSET(1)                                        FINQ  20
      3            COMMON ID,IM,INIT,JEVNT,JMNIT,MFA,MSTOP,MX,MXC,NCLCT,NHIST,      FINQ  30
      4           1NQS,NORPT,NOT,NPRMS,NRUN,NRUNS,NSTAT,OUT,SCALE,ISEED,TNOW,       FINQ  40
      5           2IREG,IFIN,MXX,NPRNT,NCRDR,NFP,VNQ(400),IMM,MAXGS,MAXNS           FINQ  50
      6            COMMON ATRIB(15),ENQ(400),INNT(400),JCELS(20,22),KRANK(400),     FINQ  60
      7           1MAXNG(400),MFE(400),MLC(400),MLE(400),NCELS(20),NQ(400),         FINQ  70
      8           2PARM(40,9),QTIME(400),SSUMA(20,5),SUMA(20,5),NAME(6),NPROJ,MON,  FINQ  80
      9           3NDAY,NYR,JCLR,JTRIP(17)                                         FINQ  90
     10      C                                                                     FINQ 100
     11      C*****THE COLUMN WHICH IS THE BEST CANDIDATE IS KBEST                 FINQ 110
     12      C                                                                     FINQ 120
     13            KBEST=0                                                         FINQ 130
     14      C                                                                     FINQ 140
     15      C*****THE NEXT COLUMN TO BE CONSIDERED AS A CANDIDATE IS NEXTK        FINQ 150
     16      C                                                                     FINQ 160
     17            NEXTK=MFE(JQ)                                                   FINQ 170
     18            IF(NEXTK)16,1,2                                                 FINQ 180
     19         1E CALL ERROR(89,NSET,QSET)                                        FINQ 190
     20          1 KCOL=KBEST                                                      FINQ 200
     21            RETURN                                                          FINQ 210
     22      C                                                                     FINQ 220
     23      C*****XGRNV IS +1 FOR GREATER THAN SEARCH AND -1 FOR LESS THAN SEARCH FINQ 230
     24      C*****XMAMN IS +1 FOR MAXIMUM AND -1 FOR MINIMUM                      FINQ 240
     25      C*****FOR SEARCH FOR EQUALITY THE SIGN OF XGRNV AND XMAMN ARE NOT USED FINQ 250
     26      C                                                                     FINQ 260
     27          2 GO TO (11,12,13,14,11),MCODE                                    FINQ 270
     28         11 XGRNV=1.                                                        FINQ 280
     29            XMAMN=1.                                                        FINQ 290
     30            GO TO 21                                                        FINQ 300
     31         12 XGRNV=1.                                                        FINQ 310
     32            XMAMN=-1.                                                       FINQ 320
     33            GO TO 20                                                        FINQ 330
     34         13 XGRNV=-1.                                                       FINQ 340
     35            XMAMN=1.                                                        FINQ 350
     36            GO TO 21                                                        FINQ 360
     37         14 XGRNV=-1.                                                       FINQ 370
     38            XMAMN=-1.                                                       FINQ 380
     39         20 INDX=(NEXTK-1)*IMM+JATT                                         FINQ 390
     40            TEMP=XGRNV*(QSET(INDX)-QVAL)                                    FINQ 400
     41            TEM=TEMP                                                        FINQ 410
     42            IF(TEMP)30,31,31                                                FINQ 420
     43         30 TEM=-TEMP                                                       FINQ 430
     44         31 IF(TEM-TOL)21,21,33                                             FINQ 440
     45         33 IF(TEMP)4,21,66                                                 FINQ 450
     46      C                                                                     FINQ 460
     47      C*****WHEN EQUALITY IS OBTAINED TEST FOR MCODE=5, THE SEARCH FOR A    FINQ 470
     48      C*****SPECIFIED VALUE                                                 FINQ 480
     49      C                                                                     FINQ 490
     50         21 IF(MCODE-5)4,15,4                                               FINQ 500
     51         66 IF(MCODE-5)6,4,6                                                FINQ 510
     52          5 IF(KBEST)16,8,7                                                 FINQ 520
     53          7 IF(XMAMN*(QSET(INDX)-QSET(KINDX)))4,4,8                         FINQ 530
     54          8 KBEST=NEXTK                                                     FINQ 540
     55            KINDX=INDX                                                      FINQ 550
     56          4 INDX=(NEXTK)*MXX-1                                              FINQ 560
```

TABLE B-11. (Concluded)

```
57              NEXTK=NSET(INDS)                                        FIND 570
58              IF(NEXTK-7777)20,1,1                                    FIND 580
59          15  KCOL=NEXTK                                             FIND 590
60              RETURN                                                  FIND 600
61              END                                                     FIND 610
```

TABLE B-12. FORTRAN LISTING OF GASP SUBPROGRAM GASP

```
400550*TPFS,GASP
     1            SUBROUTINE GASP(NSET,QSET)                                        GASP  10
     2            DIMENSION NSET(1),QSET(1)                                         GASP  20
     3            COMMON ID,IM,INIT,JEVNT,JMNIT,MFA,MSTOP,MX,MXC,NCLCT,NHIST,       GASP  30
     4           1NOQ,NORPT,NOT,NPRMS,NRUN,NRUNS,NSTAT,OUT,SCALE,ISEED,TNOW,        GASP  40
     5           2TBEG,TFIN,MXX,NPRNT,NCRDR,NEP,VNG(400),IMM,MAXGS,MAXNS            GASP  50
     6            COMMON ATRIB(15),ENQ(400),INN(400),JCELS(20,22),KRANK(400),       GASP  60
     7           1MAXNQ(400),MFE(400),MLC(400),MLE(400),NCELS(20),NG(400),         GASP  70
     8           2PARAM(40,4),QTIME(400),SSUMA(20,5),SUMA(20,5),NAME(6),NPROJ,MON,  GASP  80
     9           3NDAY,NYR,JCLR,JTRIB(17)                                          GASP  81
    10            NOT = 0                                                          GASP  90
    11           1 CALL DATAN(NSET,QSET)                                           GASP 100
    12      C                                                                      GASP 110
    13      C*****OBTAIN NEXT EVENT WHICH IS FIRST ENTRY IN FILE 1. ATRIB(1) IS EVE GASP 160
    14      C*****TIME, JTRIB(1) IS EVENT CODE                                     GASP 161
    15      C                                                                      GASP 170
    16         10 CALL RMOVE(MFE(1),1,NSET,QSET)                                   GASP 180
    17            TNOW = ATRIB(1)                                                  GASP 190
    18            JEVNT = JTRIB(1)                                                 GASP 200
    19      C                                                                      GASP 201
    20      C*****TEST TO SEE IF THIS EVENT IS A MONITOR EVENT                     GASP 210
    21      C                                                                      GASP 211
    22            IF(JEVNT - 100)13,12,6                                           GASP 220
    23         13 I = JEVNT                                                        GASP 230
    24      C                                                                      GASP 240
    25      C*****CALL PROGRAMMERS EVENT ROUTINES                                  GASP 240
    26      C                                                                      GASP 241
    27            CALL EVNTS (I,NSET,QSET)                                         GASP 250
    28      C                                                                      GASP 251
    29      C*****TEST METHOD FOR STOPPING                                         GASP 260
    30      C                                                                      GASP 270
    31            IF (MSTOP) 40,8,42                                               GASP 271
    32         40 MSTOP = 0                                                        GASP 280
    33      C                                                                      GASP 290
    34      C*****TEST NUMBER OF RUNS REMAINING                                    GASP 340
    35      C                                                                      GASP 341
    36         42 IF(NRUNS-1)14,9,23                                               GASP 350
    37         23 NRUNS = NRUNS - 1                                                GASP 360
    38            NRUN = NRUN + 1                                                  GASP 370
    39            GO TO I                                                          GASP 380
    40         14 CALL ERROR(93,NSET,QSET)                                         GASP 390
    41          6 CALL PFILE(NSET,QSET)                                            GASP 400
    42            GO TO 10                                                         GASP 410
    43      C                                                                      GASP 411
    44      C*****RESET JMNIT                                                      GASP 420
    45      C                                                                      GASP 421
    46         12 IF(JMNIT)14,30,31                                                GASP 430
    47         30 JMNIT = 1                                                        GASP 440
    48            GO TO 10                                                         GASP 450
    49         31 JMNIT = 0                                                        GASP 460
    50            GO TO 10                                                         GASP 470
    51      C                                                                      GASP 471
    52      C*****TEST TO SEE IF EVENT INFORMATION IS TO BE PRINTED                GASP 480
    53      C                                                                      GASP 481
    54          8 IF(JMNIT)14,10,32                                                GASP 490
    55         32 CALL PFILE(NSET,QSET)                                            GASP 500
    56            GO TO 10                                                         GASP 530
```

TABLE B-12. (Concluded)

```
      C                                                                       GASP 531
      C*****IF ALL RUNS ARE COMPLETED RETURN TO MAIN PROGRAM FOR INSTRUCTIONS GASP 540
      C                                                                       GASP 541
          9 RETURN                                                            GASP 550
            END                                                               GASP 560
```

TABLE B-13. FORTRAN LISTING OF GASP SUBPROGRAM HISTO

```
400550*TPFS.HISTO
      1              SUBROUTINE HISTO (X1,A,W,N)                                        HIST  10
      2              COMMON ID,IM,INIT,JEVNT,JMNIT,MFA,MSTOP,MX,MXC,NCLCT,NHIST,        HIST  20
      3             1NOQ,NORPT,NOT,NPRMS,NRUN,NRUNS,NSTAT,OUT,SCALE,ISEED,TNOW,         HIST  30
      4             2TBEG,TFIN,MXX,NPRNT,NCRDR,NEP,VNQ(400),IMM,MAXQS,MAXNS             HIST  40
      5              COMMON ATRIB(15),ENQ(400),INN(400),JCELS(20,22),KRANK(400),        HIST  50
      6             1MAXNQ(400),MFE(400),MLC(400),MLE(400),NCELS(20),NQ(400),          HIST  60
      7             2PARAM(40,4),QTIME(400),SSUMA(20,5),SUMA(20,5),NAME(6),NPROJ,MON,  HIST  70
      8             3NDAY,NYR,JCLR,JTRIB(17)                                           HIST  80
      9            5 IF (N-NHIST) 11,11,2                                              HIST  90
     10            2 WRITE (NPRNT,250) N                                               HIST 100
     11          250 FORMAT(19H ERROR IN HISTOGRAM,I4//)                               HIST 110
     12              CALL EXIT                                                         HIST 120
     13           11 IF(N)2,2,3                                                        HIST 130
     14        C                                                                       HIST 140
     15        C*****TRANSLATE X1 BY SUBTRACTING A IF X.LE.A THEN ADD 1 TO FIRST CELL  HIST 150
     16        C                                                                       HIST 160
     17             3 X = X1 - A                                                       HIST 170
     18               IF (X)5,7,7                                                      HIST 180
     19             6 IC = 1                                                           HIST 190
     20               GO TO 8                                                          HIST 200
     21        C                                                                       HIST 210
     22        C*****DETERMINE CELL NUMBER IC. ADD 1 FOR LOWER LIMIT CELL AND 1 FOR    HIST 220
     23        C*****TRUNCATION                                                        HIST 230
     24        C                                                                       HIST 240
     25             7 IC = X/W + 2.+.0001                                              HIST 250
     26               IF (IC - NCELS(N) - 1) 8,8,9                                     HIST 260
     27             9 IC = NCELS(N)+2                                                  HIST 270
     28             8 JCELS(N,IC) = JCELS(N,IC) + 1                                    HIST 280
     29               RETURN                                                           HIST 290
     30               END                                                              HIST 300
```

TABLE B-14. FORTRAN LISTING OF GASP SUBPROGRAM RMOVE

```
400550*TPF$.RMOVE
      1              SUBROUTINE RMOVE (KCOLL,JQ,NSET,QSET)                          RMOV  10
      2              DIMENSION NSET(1),QSET(1),KCOLL(1)                             RMOV  20
      3              COMMON ID,IM,INIT,JEVNT,JMNIT,MFA,MSTOP,MX,MXC,NCLCT,NHIST,    RMOV  30
      4             1NOQ,NORPT,NOT,NPRMS,NRUN,NRUNS,NSTAT,OUT,SCALE,ISEED,TNOW,     RMOV  40
      5             2TBEG,TFIN,MXX,NPRNT,NCRDR,NEP,VNQ(400),IMM,MAXQS,MAXNS         RMOV  50
      6              COMMON ATRIB(15),ENQ(400),INN(400),JCELS(20,22),KRANK(400),     RMOV  60
      7             1MAXNQ(400),MFE(400),MLC(400),MLE(400),NCELS(20),NQ(400),       RMOV  70
      8             2PARAM(40,4),QTIME(400),SSUMA(20,5),SUMA(20,5),NAME(6),NPROJ,MON,RMOV  80
      9             3NDAY,NYR,JCLR,JTRIB(17)                                        RMOV  90
     10              KCOL=KCOLL(1)                                                  RMOV 100
     11              IF(KCOL)16,16,2                                                RMOV 110
     12           16 CALL ERROR (97,NSET,QSET)                                      RMOV 120
     13            2 MLC(JQ) = KCOL                                                 RMOV 130
     14        C                                                                    RMOV 140
     15        C*****PUT VALUES OF KCOL IN ATTRIB                                   RMOV 150
     16        C                                                                    RMOV 160
     17              INDX=(KCOL-1)*IMM                                              RMOV 170
     18              DO 3 I=1,IMM                                                   RMOV 180
     19              INDX=INDX+1                                                    RMOV 190
     20            3 ATRIB(I)=QSET(INDX)                                            RMOV 200
     21              INDX=(KCOL-1)*MXX                                              RMOV 210
     22              DO 10 I=1,IM                                                   RMOV 220
     23              INDX=INDX+1                                                    RMOV 230
     24           10 JTRIB(I)=NSET(INDX)                                            RMOV 240
     25        C                                                                    RMOV 250
     26        C*****SET OUT=1 AND CALL SET TO REMOVE ENTRY FROM NSET               RMOV 260
     27        C                                                                    RMOV 270
     28              OUT = 1.                                                       RMOV 280
     29              CALL SET (JQ,NSET,QSET)                                        RMOV 290
     30              RETURN                                                         RMOV 300
     31              END                                                            RMOV 310
     32              END                                                            RMOV 320
```

TABLE B-15. FORTRAN LISTING OF GASP SUBPROGRAM SET

```
4D3557*TPFS.SET
      SUBROUTINE SET (JQ,NSET,QSET)                                          SET   10
      DIMENSION NSET(1),QSET(1)                                              SET   20
      COMMON ID,IM,INIT,JEVNT,JMNIT,MFA,MSTOP,MX,MXC,NCLCT,NHIST,            SET   30
     1NOQ,NORPT,NOT,NPRMS,NRUN,NRUNS,NSTAT,OUT,SCALE,ISEED,TNOW,             SET   40
     2TBEG,TFIN,MXX,NPRNT,NCRDR,NFP,VNQ(400),IMM,MAXQS,MAXNS                 SET   50
      COMMON ATRI(15),ENQ(400),INN(400),JCELS(20,22),KRANK(400),             SET   60
     1MAXNQ(400),MFE(400),MLC(400),MLE(400),NCELS(20),NQ(400),               SET   70
     2PARM(4),4),QTIME(400),SSUM8(20,5),SUMA(20,5),NAME(6),NPROJ,MON,        SET   80
     3NDAY,NYR,JCLR,JTRIB(17)                                                SET   90
C                                                                            SET  100
C*****INIT SHOULD BE ONE FOR INITIALIZATION OF FILE                          SET  110
C                                                                            SET  120
      IF (INIT-1) 27,28,27                                                   SET  130
C                                                                            SET  140
C*****INITIALIZE FILE TO ZERO.  SET UP POINTERS                              SET  150
C*****MUST INITIALIZE KRANK(JQ)                                              SET  160
C*****MUST INITIALIZE INN(JQ)****INN(JQ)=1 IS FIFO**INN(JQ)=2 IS LIFO        SET  170
C                                                                            SET  180
   28 KOL = 7777                                                             SET  190
      KOF = 8888                                                             SET  200
      KLF = 9999                                                             SET  210
      MX = IM+1                                                              SET  220
      MXX = IM*2                                                             SET  230
      MAXQS=ID*IMM                                                           SET  240
      MAXNS=ID*MXX                                                           SET  250
C                                                                            SET  260
C*****INITIALIZE POINTING CELLS OF NSET AND ZERO OTHER CELLS OF NSET         SET  270
C                                                                            SET  280
      DO 2 J=1,MAXQS                                                         SET  290
    2 QSET(J)=0.0                                                            SET  300
      DO 4 J=1,MAXNS                                                         SET  310
    4 NSET(J)=0                                                              SET  320
      DO 1 I=1,ID                                                            SET  330
      INDX=I*MXX                                                             SET  340
      NSET(INDX-1)=I+1                                                       SET  350
    1 NSET(INDX)=I-1                                                         SET  360
      NSET(MAXNS-1)=KOF                                                      SET  370
      DO 3 K = 1,NOQ                                                         SET  380
      NQ(K)=0                                                                SET  390
      MLC(K)=0                                                               SET  400
      MFE(K)=0                                                               SET  410
      MAXNQ(K) = 0                                                           SET  420
      MLE(K)=0                                                               SET  430
      ENQ(K)=0.0                                                             SET  440
      VNQ(K)=0.                                                              SET  450
    3 QTIME(K)=TNOW                                                          SET  460
C                                                                            SET  470
C*****FIRST AVAILABLE COLUMN = 1                                             SET  480
C                                                                            SET  490
      MFA = 1                                                                SET  500
      INIT = 0                                                               SET  510
      OUT = 0.0                                                              SET  520
      RETURN                                                                 SET  530
C                                                                            SET  540
C*****MFFX IS FIRST ENTRY IN FILE WHICH HAS NOT BEEN COMPARED WITH ITEM      SET  550
C*****TO BE INSERTED                                                         SET  560
```

TABLE B-15. (Continued)

```
      C                                                                       SET  570
   27 MFEX = MFE(JQ)                                                          SET  580
      C                                                                       SET  590
C*****KNT IS A CHECK CODE TO INDICATE THAT NO COMPARISONS HAVE BEEN MADE     SET  600
      C                                                                       SET  610
      KNT = 2                                                                 SET  620
      C                                                                       SET  630
C*****KS, IS THE ROW ON WHICH ITEMS OF FILE JQ ARE RANKED                    SET  640
      C                                                                       SET  650
      KS = KRANK(JQ)                                                          SET  660
      KSJ=1                                                                   SET  670
      IF(KS-100)1020,100,1000                                                 SET  680
 1000 KSJ=2                                                                   SET  690
      KS=KS-100                                                               SET  700
      C                                                                       SET  710
C*****TEST FOR PUTTING VALUE IN OR OUT.                                      SET  720
C*****IF OUT EQUALS ONE AN ITEM IS TO BE REMOVED FROM FILE JQ.  IF OUT       SET  730
C*****IS LESS THAN ONE AN ITEM IS TO BE INSERTED IN FILE JQ                  SET  740
      C                                                                       SET  750
 1020 IF (OUT-1.0) 6,5,100                                                    SET  760
      C                                                                       SET  770
C*****PUTTING AN ENTRY IN FILE JQ                                           SET  780
C*****NXFA IS THE SUCCESSOR COLUMN OF THE FIRST AVAILABLE COLUMN FOR         SET  790
C*****STORING INFORMATION                                                   SET  800
C*****THE ITEM TO BE INSERTED WILL BE PUT IN COLUMN MFA                      SET  810
      C                                                                       SET  820
    8 INDX=MFA*MXX-1                                                          SET  830
      NXFA=NSET(INDX)                                                         SET  840
      C                                                                       SET  850
C*****IF INN(JQ) EQUALS TWO THE FILE IS A HVF FILE. IF INN(JQ) IS            SET  860
C*****ONE THE FILE IS A LVF FILE. FOR LVF FILES TRY TO INSERT                SET  870
C*****STARTING AT END OF FILE.  MLFX IS LAST ENTRY IN FILE WHICH HAS         SET  880
C*****NOT BEEN COMPARED WITH ITEMS TO BE INSERTED.                          SET  890
      C                                                                       SET  900
      IF (INN(JQ)-1) 100,7,6                                                  SET  910
    7 MLFX=MLF(JQ)                                                            SET  920
      C                                                                       SET  930
C*****IF MLFX IS ZERO FILE IS EMPTY.  ITEM TO BE INSERTED WILL BE ONLY       SET  940
C*****ITEM IN FILE.                                                         SET  950
      C                                                                       SET  960
      IF (MLFX) 133,10,11                                                     SET  970
   10 INDX=MFA*MXX                                                            SET  980
      NSET(INDX)=KLF                                                          SET  990
      MFE(JQ)=MFA                                                             SET 1000
      C                                                                       SET 1010
C*****THERE IS NO SUCCESSOR OF ITEM INSERTED.  SINCE ITEM WAS INSERTED       SET 1020
C*****IN COLUMN MFA THE LAST ENTRY OF FILE JQ IS IN COLUMN MFA.              SET 1030
      C                                                                       SET 1040
   17 INDX=MFA*MXX-1                                                          SET 1050
      NSET(INDX)=KOL                                                          SET 1060
      MLF(JQ) = MFA                                                           SET 1070
      C                                                                       SET 1080
C*****SET NEW MFA EQUAL TO SUCCESSOR OF OLD MFA.  THAT IS NXFA.  THE         SET 1090
C*****NEW MFA HAS NO PREDECESSOR SINCE IT IS THE FIRST AVAILABLE COLUMN      SET 1100
C*****FOR STORAGE.                                                          SET 1110
      C                                                                       SET 1120
   14 MFA = NXFA                                                              SET 1130
```

TABLE B-15. (Continued)

```
114           IF (MFA-KOF) 237,238,238                                  SET 1140
115         237 INDX=NXFA*MXX                                           SET 1150
116           NSET(INDX)=KLF                                            SET 1160
117           C                                                         SET 1170
118           C*****UPDATE STATISTICS OF FILE JQ                        SET 1180
119           C                                                         SET 1190
120         239 XNQ = NQ(JQ)                                            SET 1200
121           ENQ(JQ) = ENQ(JQ)+XNQ*(TNOW-QTIME(JQ))                   SET 1210
122           VNQ(JQ) = VNQ(JQ) + XNQ*XNQ*( TNOW-QTIME(JQ))            SET 1220
123           QTIME(JQ) = TNOW                                          SET 1230
124           NQ(JQ) = NQ(JQ) + 1                                       SET 1240
125           MAXNQ(JQ) = AMAX0(MAXNQ(JQ),NQ(JQ))                       SET 1250
126           MLC(JQ) = MFE(JQ)                                         SET 1260
127           RETURN                                                    SET 1270
128           C                                                         SET 1280
129           C*****TEST RANKING VALUE OF NEW ITEM AGAINST VALUE OF ITEM IN COLUMN   SET 1290
130           C*****MLEX                                                SET 1300
131           C                                                         SET 1310
132              11 GO TO (1100,1120),KSJ                               SET 1320
133            1100 INDX1=(MFA-1)*IMM+KS                                SET 1330
134           INDX2=(MLEX-1)*IMM+KS                                     SET 1340
135           IF(QSET(INDX1)-QSET(INDX2))12,13,13                       SET 1350
136            1120 INDX1=(MFA-1)*MXX+KS                               SET 1360
137           INDX2=(MLEX-1)*MXX+KS                                     SET 1370
138           IF(NSET(INDX1)-NSET(INDX2))12,13,13                       SET 1380
139           C                                                         SET 1390
140           C*****INSERT ITEM AFTER COLUMN MLEX.  LET SUCCESSOR OF MLEX BE MSU.   SET 1400
141           C                                                         SET 1410
142              13 INDX=MLEX*MXX-1                                     SET 1420
143           MSU=NSET(INDX)                                            SET 1430
144           NSET(INDX)=MFA                                            SET 1440
145           INDX=MFA*MXX                                              SET 1450
146           NSET(INDX)=MLEX                                           SET 1460
147           GO TO (18,17),KNT                                         SET 1470
148           C                                                         SET 1480
149           C*****SINCE KNT EQUALS ONE A COMPARISON WAS MADE AND THERE IS A        SET 1490
150           C*****SUCCESSOR TO MLEX, I.E., MSU IS NOT EQUAL TO KOL.  POINT COLUMN  SET 1500
151           C*****MFA TO MSU AND VICE VERSA.                          SET 1510
152           C                                                         SET 1520
153              18 INDX=MFA*MXX-1                                      SET 1530
154           NSET(INDX)=MSU                                            SET 1540
155           INDX=MSU*MXX                                              SET 1550
156           NSET(INDX)=MFA                                            SET 1560
157           GO TO 14                                                  SET 1570
158           C                                                         SET 1580
159           C*****SET KNT TO ONE SINCE A COMPARISON WAS MADE.         SET 1590
160           C                                                         SET 1600
161              17 KNT = 1                                             SET 1610
162           C                                                         SET 1620
163           C*****TEST MFA AGAINST PREDECESSOR OF MLEX BY LETTING MLEX EQUAL       SET 1630
164           C*****PREDECESSOR OF MLEX.                                SET 1640
165           C                                                         SET 1650
166                 INDX=MLEX*MXX                                       SET 1660
167           MLEX=NSET(INDX)                                           SET 1670
168           IF(MLEX-KLF) 11,16,11                                     SET 1680
169           C                                                         SET 1690
170           C*****IF MLEX HAD NO PREDECESSOR MFA IS FIRST IN FILE.    SET 1700
```

TABLE B-15. (Continued)

```
      C                                                                       SET 1710
   16 INDX=MFA*MXX                                                            SET 1720
         NSET(INDX)=KLE                                                      SET 1730
         MFE(JQ)=MFA                                                         SET 1740
      C                                                                       SET 1750
      C*****SUCCESSOR OF MFA IS MFEX AND PREDECESSOR OF MFEX IS MFA. (NOTE AT SET 1760
      C*****THIS POINT MLEX = MFEX IF _VF WAS USED).                          SET 1770
      C                                                                       SET 1780
   25 INDX=MFA*MXX-1                                                          SET 1790
         NSET(INDX)=MFEX                                                     SET 1800
         INDX=MFEX*MXX                                                       SET 1810
         NSET(INDX)=MFA                                                      SET 1820
         GO TO 14                                                            SET 1830
      C                                                                       SET 1840
      C***** FOR AVF OPERATION TRY TO INSERT ITEM STARTING AT BEGINNING OF   SET 1850
      C*****FILE JQ.                                                         SET 1860
      C*****IF MFEX IS 0, NO ENTRIES ARE IN FILE JQ.  THIS CASE WAS CONSIDEREDSET 1870
      C*****PREVIOUSLY AT STATEMENT 10.                                      SET 1880
      C                                                                       SET 1890
    6 IF (MFEX) 100,10,19                                                     SET 1900
      C                                                                       SET 1910
      C*****TEST RANKING VALUE OF NEW ITEM AGAINST VALUE OF ITEM IN COLUMN    SET 1920
      C*****MFEX.                                                            SET 1930
      C                                                                       SET 1940
   19 GO TO (120),1220),KSJ                                                   SET 1950
 1200 INDX1=(MFA-1)*IMM+KS                                                    SET 1960
         INDX2=(MFEX-1)*IMM+KS                                               SET 1970
         IF(QSET(INDX1)-QSET(INDX2))20,21,21                                 SET 1980
 1220 INDX1=(MFA-1)*MXX+KS                                                    SET 1990
         INDX2=(MFEX-1)*MXX+KS                                               SET 2000
         IF(NSET(INDX1)-NSET(INDX2))20,21,21                                 SET 2010
      C                                                                       SET 2020
      C*****IF NEW VALUE IF LOWER, MFA MUST BE COMPARED AGAINST SUCCESSOR OF  SET 2030
      C*****MFEX.                                                            SET 2040
      C                                                                       SET 2050
   20 KNT = 1                                                                 SET 2060
      C                                                                       SET 2070
      C*****LET MPRE = MFEX AND LET MFEX BE THE SUCCESSOR OF MFEX.           SET 2080
      C                                                                       SET 2090
         MPRE = MFEX                                                         SET 2100
         INDX=MFEX*MXX-1                                                     SET 2110
         MFEX=NSET(INDX)                                                     SET 2120
         IF (MFEX-KOL) 19,24,19                                              SET 2130
      C                                                                       SET 2140
      C*****IF NEW VALUE IS HIGHER, IT SHOULD BE INSERTED BETWEEN MFEX AND ITSSET 2150
      C*****PREDECESSOR.                                                     SET 2160
      C*****IF KNT = 2, MFEX HAS NO PREDECESSOR,  GO TO STATEMENT 16.  IF KNT SET 2170
      C*****= 1, A COMPARISON WAS MADE AND A VALUE OF MPRE HAS ALREADY BEEN   SET 2180
      C*****OBTAINED ON THE PREVIOUS ITERATION.  SET KNT = 2 TO INDICATE THIS.SET 2190
      C                                                                       SET 2200
   21 GO TO (22,16),KNT                                                       SET 2210
   22 KNT = 2                                                                 SET 2220
      C                                                                       SET 2230
      C*****MFA IS TO BE INSERTED AFTER MPRE.  MAKE MPRE THE PREDECESSOR OF   SET 2240
      C*****MFA AND MFA THE SUCCESSOR OF MPRE.                               SET 2250
      C                                                                       SET 2260
   24 INDX=MFA*MXX                                                            SET 2270
```

TABLE B-15. (Continued)

```
228           NSET(INDX)=MPRE                                                  SET 2280
229           INDX=MPRE*MXX-1                                                  SET 2290
230           NSET(INDX)=MFA                                                   SET 2300
231     C                                                                      SET 2310
232     C*****IF KNT WAS NOT RESET TO 2, THERE IS NO SUCCESSOR OF MFA.  POINTERSSET 2320
233     C*****ARE UPDATED AT STATEMENT 17.  IF KNT = 2, IT WAS RESET AND THE   SET 2330
234     C*****SUCCESSOR OF MFA IS MFEX.                                        SET 2340
235     C                                                                      SET 2350
236           GO TO (17,25), KNT                                               SET 2360
237     C                                                                      SET 2370
238     C*****REMOVAL OF AN ITEM FROM FILE JQ.                                 SET 2380
239     C*****RESET OUT TO 0 AND CLEAR COLUMN REMOVED.  LET JL EQUAL SUCCESSOR SET 2390
240     C*****OF COLUMN REMOVED AND JK EQUAL PREDECESSOR OF COLUMN REMOVED.    SET 2400
241     C*****IF JL = KOL, MLC WAS LAST ENTRY.  IF JK = KLF, MLC WAS FIRST ENTRYSET 2410
242     C*****MLC WAS NOT FIRST OR LAST ENTRY.  UPDATE POINTERS SO THAT JL IS  SET 2420
243     C*****SUCCESSOR OF JK AND JK IS PREDECESSOR OF JL.                     SET 2430
244     C                                                                      SET 2440
245         5 OUT = 0.0                                                        SET 2450
246     C                                                                      SET 2460
247     C*****UPDATE POINTING SYSTEM TO ACCOUNT FOR REMOVAL OF MLC (JQ).  COLUMNSET 2470
248     C*****REMOVED IS ALWAYS SET TO MLC(JQ) BY SUBROUTINE REMOVE.           SET 2480
249     C                                                                      SET 2490
250           INDX=(MLC(JQ)-1)*IMM                                             SET 2500
251           DO 32 I=1,IMM                                                    SET 2510
252           INDX=INDX+1                                                      SET 2520
253        32 QSET(INDX)=0.0                                                   SET 2530
254           INDX=(MLC(JQ)-1)*MXX                                             SET 2540
255           DO 1300 I=1,IM                                                   SET 2550
256           INDX=INDX+1                                                      SET 2560
257      1300 NSET(INDX)=0                                                     SET 2570
258           INDX=MLC(JQ)*MXX                                                 SET 2580
259           JL=NSET(INDX-1)                                                  SET 2590
260           JK=NSET(INDX)                                                    SET 2600
261           IF(JL-KOL)33,34,33                                               SET 2610
262        33 IF(JK-KLF)35,36,35                                               SET 2620
263        35 INDX=JK*MXX-1                                                    SET 2630
264           NSET(INDX)=JL                                                    SET 2640
265           INDX=JL*MXX                                                      SET 2650
266           NSET(INDX)=JK                                                    SET 2660
267     C                                                                      SET 2670
268     C*****UPDATE POINTERS.                                                 SET 2680
269     C                                                                      SET 2690
270        37 INDX=MLC(JQ)*MXX-1                                               SET 2700
271           NSET(INDX)=MFA                                                   SET 2710
272           NSET(INDX+1)=KLF                                                 SET 2720
273           IF(MFA-KOF)234,235,235                                           SET 2730
274      234 INDX=MFA*MXX                                                      SET 2740
275           NSET(INDX)=MLC(JQ)                                               SET 2750
276      235 MFA=MLC(JQ)                                                       SET 2760
277           MLC(JQ)=MFE(JQ)                                                  SET 2770
278     C                                                                      SET 2780
279     C*****UPDATING FILE STATISTICS                                         SET 2790
280     C                                                                      SET 2800
281           XNQ=NQ(JQ)                                                       SET 2810
282           ENQ(JQ)=ENQ(JQ)+XNQ*(TNOW-QTIME(JQ))                            SET 2820
283           VNQ(JQ)=VNQ(JQ)+XNQ*XNQ*(TNOW-QTIME(JQ))                        SET 2830
284           QTIME(JQ)=TNOW                                                   SET 2840
```

TABLE B-15. (Concluded)

```
285               NQ(JQ)=NQ(JQ)-1                                              SET 2850
286               RETURN                                                       SET 2860
287         C                                                                  SET 2870
288         C*****MLC WAS FIRST ENTRY BUT NOT LAST ENTRY.  UPDATE POINTERS.    SET 2880
289         C                                                                  SET 2890
290            36 INDX=JL*MXX                                                  SET 2900
291               NSET(INDX)=KLF                                               SET 2910
292               MFE(JQ) = JL                                                 SET 2920
293               GO TO 37                                                     SET 2930
294            34 IF (JK-KLF) 38,39,38                                         SET 2940
295         C                                                                  SET 2950
296         C*****MLC WAS LAST ENTRY BUT NOT FIRST ENTRY.  UPDATE POINTERS.    SET 2960
297         C                                                                  SET 2970
298            38 INDX=JK*MXX-1                                                SET 2980
299               NSET(INDX)=KOL                                               SET 2990
300               MLE(JQ)=JK                                                   SET 3000
301               GO TO 37                                                     SET 3010
302         C                                                                  SET 3020
303         C*****MLC WAS BOTH THE LAST AND FIRST ENTRY, THEREFORE, IT IS THE ONLY  SET 3030
304         C*****ENTRY.                                                       SET 3040
305         C                                                                  SET 3050
306            39 MFE(JQ) = 0                                                  SET 3060
307               MLE(JQ) = 0                                                  SET 3070
308               GO TO 37                                                     SET 3080
309           110 CALL ERROR(88,NSET,QSET)                                     SET 3090
310               RETURN                                                       SET 3100
311               END                                                          SET 3110
```

APPROVAL

SKYLAB FILM USAGE ANALYSIS PROGRAM

By Ronald A. Schlagheck

The information in this report has been reviewed for security classification. Review of any information concerning Department of Defense or Atomic Energy Commission programs has been made by the MSFC Security Classification Officer. This report, in its entirety, has been determined to be unclassified.

This document has been reviewed and approved for technical accuracy.

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