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COMPUTER SOFTWARE FOR ANALYSIS OF INFRARED TARGETS AND CLUTTER.(U)
JAN 78 G E GOWINS, H T JACKSON

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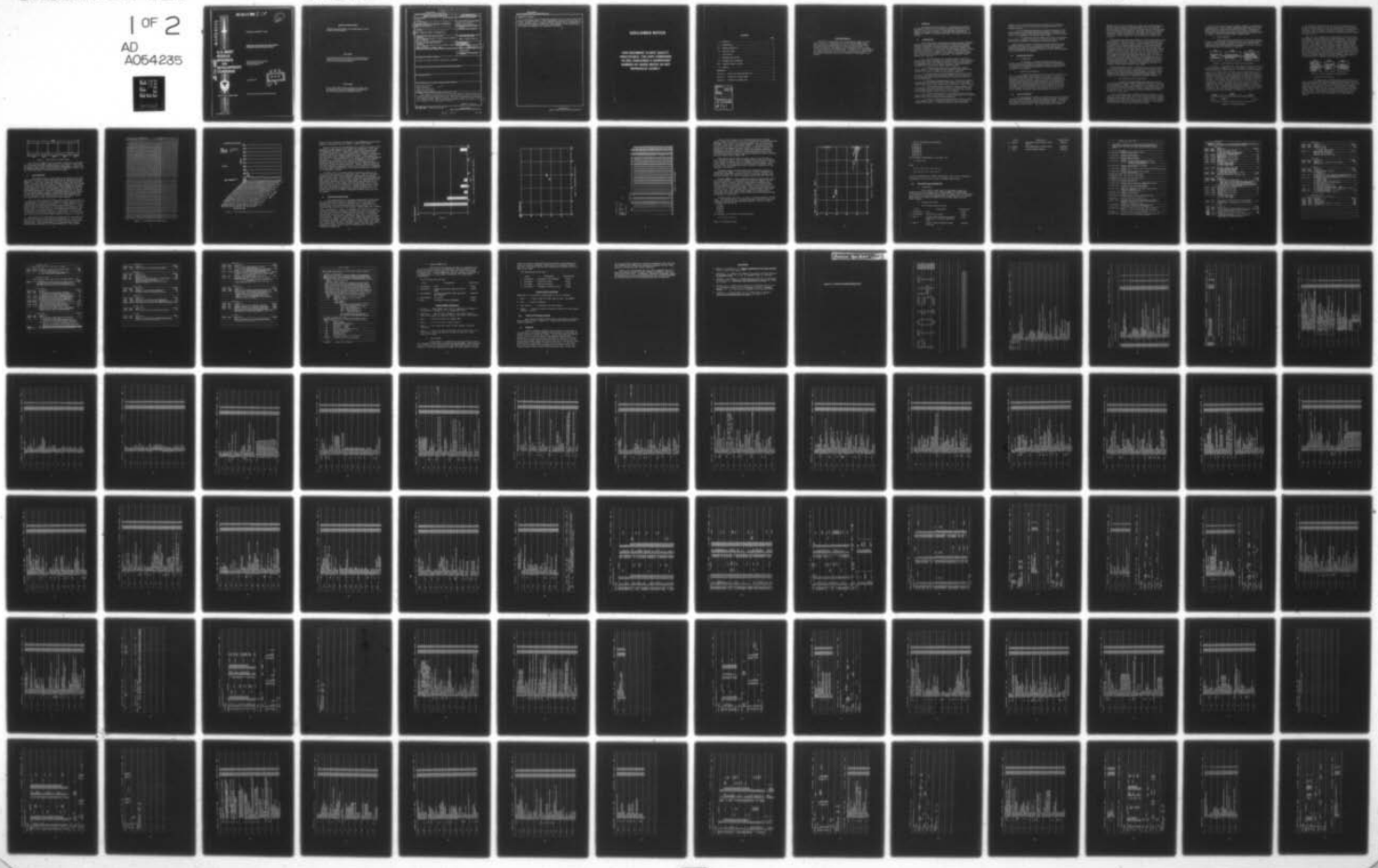

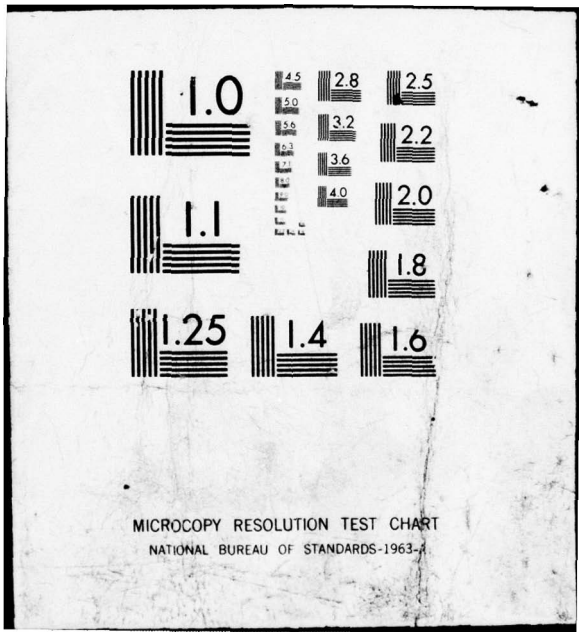
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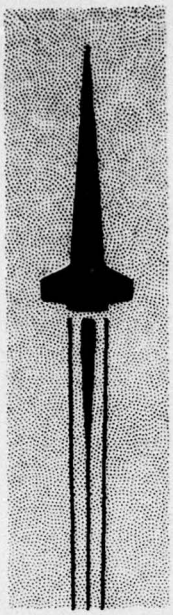

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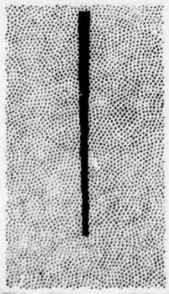

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TECHNICAL REPORT T-78-33

COMPUTER SOFTWARE FOR ANALYSIS OF INFRARED TARGETS AND CLUTTER

Gene E. Gowins and H. Tracy Jackson
Advanced Sensors Directorate
Technology Laboratory

JANUARY 1978

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This report is the second in an anticipated series of progress reports on target/background modeling related to the US Army Missile Research and Development Command's Target Signature Program. This report describes data collection and computer software used to characterize infrared targets and clutter in the 3- to 5-μm and 8- to 14-μm infrared spectrum.

ABSTRACT (Continued)

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ABSTRACT (Continued)

A raster type scanner Thermovision system is used to collect 10,000 data points per infrared picture. These Thermovision data points provide input to several different types of computer software routines used to investigate and evaluate passive infrared targets and clutter signatures and identify potential target discrimination and acquisition techniques.

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I. OBJECTIVE

The objective of this report is to describe data collection and computer software used to characterize armored targets and ground clutter in the 3- to 5-μm and 8- to 14-μm infrared (IR) spectrum. The software is designed to evaluate a conceptual seeker algorithm for effectiveness against an armored threat within the threat's operational scenario.

II. INTRODUCTION

The US Army Missile Research and Development Command (MIRADCOM) Advanced Sensors Directorate is conducting a Ground Target Signatures Program to investigate and evaluate passive IR targets and background (clutter) signatures and identify potential target discrimination and acquisition techniques. To these ends, several computer software routines have been developed which progress from a point of producing graphics which provide intuitive insight into the problem to qualitative evaluation of detection and acquisition algorithms. The computer software features are as follows:

a) Three-dimensional plot of target-clutter energy versus aspect position with a subroutine to convert the data to a two-dimensional plot of energy versus scan direction position — This is accomplished by an integration process in the vertical dimension. These data provide information for scan direction Weiner Spectrum analysis.

b) Two-dimensional matrix plot of energy versus target clutter position — This program provides a matrix of data values versus position to be used in a simple hot spot detection algorithm.

c) Target-clutter noise discrimination model used to vary a threshold on the matrix array provided in Routine b) — The program output is the number of data points exceeding the threshold and the location of those points.

d) Histogram of target-clutter scene. This routine generates an energy probability density function which can be used to evaluate target energy versus clutter energy and the setting of a seeker threshold.

e) Variable field-of-view (FOV) scan — This program is used to subdivide a large array of data into smaller increments as would be seen by a matrix array of detectors or a line array with scan direction data storage equivalent to the vertical scan dimension.

f) Fly-in simulation model — This program selects consecutive subsets of the original data matrix to simulate the reduced FOV encountered during seeker fly-in and calculates data statistics.

g) Graphics target-clutter frame-to-frame comparison model— — This program is used to accumulate statistics over a large number of scenes as in Routine d). It then calculates the mean and standard

deviation of the accumulated scenes and uses Routine c) to evaluate a threshold set to the scene mean value plus integer multiples of the standard deviation.

h) Two-dimensional gradient and spatial discriminator — This program generates a two-dimensional thermal gradient by evaluating the pixel to pixel changes in both horizontal and vertical directions through the use of a 2-horizontal by 2-vertical pixel window.

i) Two-dimensional thermal gradient and spatial discriminator— This routine is identical to Routine h) except for the window function which has been expanded to 3-horizontal by 3-vertical pixels.

These routines are used in conjunction with AGA Thermovision data to evaluate tactical scenes. The following sections provide the AGA thermovision raw data and data formating into a CDC 6600 compatible format, a mathematical and physical description of each computer program, and a users guide for each program.

III. PROBLEM DEFINITION

A. Introduction

The evaluation of seeker performance against armored threats requires a thorough understanding of the seeker algorithm and the nature of the threat and its expected environment. Once this basis is established, more sophisticated methods of target-background discrimination can be applied.

B. System Characterization

The first step which must be taken in any computer evaluation is characterization of the system to be analyzed. To do this, either the target must be characterized by some model or actual field measurements must be obtained. A model is usually a tradeoff between accurate representation of the target-background and the mathematical complexity which the analytic system can handle. Field measurements are real-world situations limited only by the similarity of the data acquisition system to possible seekers and by the number and variety of measurements that can be made. Once the data are collected, they can be analyzed on numerous levels from intuitive to analytical.

IV. DATA COLLECTION

The data collection system is a raster type scanner manufactured in Sweden by AGA AKTIEBOLAG. The system contains two major subassemblies; the camera head and an electronics control/display console. The camera head consists of a silicon lens with a 134-mm focal length and a maximum aperture opening of f/1.5. The optical system uses a variable

aperture stop to control the FOV and an image plane scanner designed to produce a raster scan at 16 frames/sec over a 10° by 10° square FOV. The scan rate is determined by the 280 vertical line 2/1 interlace raster with 140 unambiguous data points per horizontal line and 140 unambiguous vertical line resolution capability. The single detector is an InSb photovoltaic detector operating at 77°K by means of a nitrogen dewar. The detector angular subtense for both horizontal and vertical FOV is 1.3 mrad.

The detected video signal is supplied to the video amplifying circuits which amplify and filter the signal to drive a small cathode ray tube which generates a pictorial result. At the same time, the video signal is supplied to an analog-to-digital converter. The analog-to-digital converter presently digitizes approximately one frame per second and stores data serially in a PCM format on one track of a 14-track tape on an AMPEX-1300 tape recorder. Each digitized data frame consists of 140 vertical lines with 140 data points per line in a 10-bit word for each data point. This 14-track output tape, with one track of serially packed digitized Thermovision output data contains $140 \times 140 \times 10$ bits of information for each frame digitized. This information is then selected on a per frame basis and recorded on a digital parallel seven-track tape compatible with input data format requirements of an Army CDC-6600 digital computer. Further and more detailed descriptions of recording techniques and the reduction of Thermovision data will be addressed in the ensuing sections of this report.

The AGA Thermovision system is relatively small and may be mounted on a helicopter, elevated tower, or installed in a fixture at ground level to view a ground target or background scene. In support of many different air defense and ground target signature applications, the system has been equipped with eight different bandpass filters. Each of these filters represents an IR bandpass of military interest.

A. AGA Thermovision Field Measurements

In general, the AGA Thermovision system has been used in IR measurements of ground targets viewed from both ground level positions and elevated platforms. This system of data collection has proven to be reliable in many and varied applications. For example, this system has been used by the Air Force to record in-flight IR signatures of jet aircraft plumes. The Thermovision system was mounted in a pod on the wing of a chase plane.

For the current application, the Thermovisions were mounted on a helicopter to collect ground target and clutter data from various altitudes, ranges, and aspect angles near vertical. Due to the interaction between the target and ground clutter and a desire to gain more of an intuitive insight into the problem and evaluate seeker concepts, a large quantity of data has been taken for ground targets and clutter.

Data of these types, along with computer analysis, can evaluate and establish limits on seeker systems acquisition techniques which operate predominately on energy levels and spatial frequency. These types of data and computer analyses can also be used to assess the feasibility of automatic target cueing technology in detecting and recognizing tactical targets in forward looking IR (FLIR) imaging systems.

B. Data Formatting

The purpose of this section is to outline steps required to process and reduce the raw Thermovision data to a computer compatible format. The block diagram of Figure 1 will be used to describe the required process from the point of data inception to the point of inputting reduced data to the CDC-6600 for analysis.

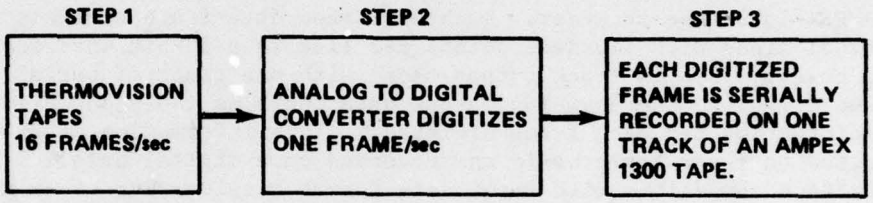

Figure 1. AGA Thermovision data recording process.

During Step 1, each Thermovision data frame is composed of 140 lines with 140 resolution elements per line; consequently, if each data point is represented with a 10-bit word ($16 \times 140 \times 140 \times 10$ bits of information), the string of 3.136×10^6 bits/sec would require recording on magnetic tape. This data rate is well beyond the tape drive operating capability; therefore, an analog-to-digital converter was developed to digitize one frame per second, approximately 196,000 bits of information per frame. This requires the matching of lines from frame to frame to reconstruct one frame out of every 16 frames. To assure correct frame reconstruction, the last two data points at the end of each frame have a special coded value. Therefore, at the end of Step 3, a 14-track AMPEX-1300 tape is generated with digital PCM Thermovision information on only one track. A physical representation of the one track is shown in Figure 2. Each line is composed of Data Point 1 (D1) through Data Point 140 (D140); each data point is represented by 10 bits.

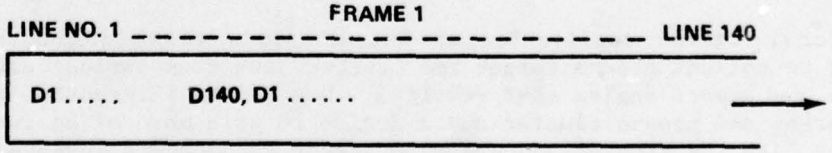

Figure 2. Data frame format.

For each line, Data Points 139 and 140 have the same special bit pattern to denote the end of a line; in addition, Data Points 139 and 140 of Line 140 are made up of a special bit pattern to identify the end of a frame. After one frame is recorded on the tape, a new frame is started; this process repeats itself until the measurements are completed or a tape is full.

Steps 4, 5, and 6 (Figure 3) are illustrated to show how the data are recorded to meet CDC-6600 input format requirements. During Step 4, a decommutator is used to select the correct coded words at the end of each line and at the end of each frame to reconstruct each data frame correctly. Each frame of data is input to a PDP-11 digital computer (Step 5). During Step 6, a PDP-11 digital computer takes the serial string of bits and generates a seven-track parallel digital packed tape which may be input to a CDC-6600 computer. It must be recalled that a 10-bit word was output from the analog to digital converter to represent each 10-bit data point. This 10-bit word is now right-adjusted in each of the 18-bit words output from the PDP-11 computer. Thus, at the end of Step 6, a magnetic digital tape composed of Thermovision data has been generated and is compatible with CDC-6600 software.

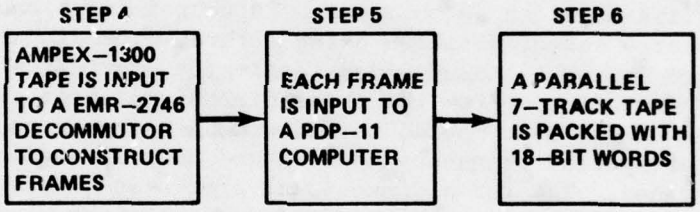

Figure 3. Data conversion to CDC-6600 format.

C. Validation of Data Format

The initial task in the Thermovision data analysis is to input to the Eglin BASES program the digital tape generated during the previously mentioned six steps of the data reduction process. The 10-bit input data are now contained in an 18-bit word and must be selected, sorted, and shifted into a 60-bit word. After processing through the BASES program's GETPIC routine, a new seven-track parallel data tape is created, which is made up of 60-bit words, with five 12-bit words in each 60-bit word. Furthermore, the 10 bits of meaningful data are packed in each of the 12 bits of information as in the example of Figure 4.

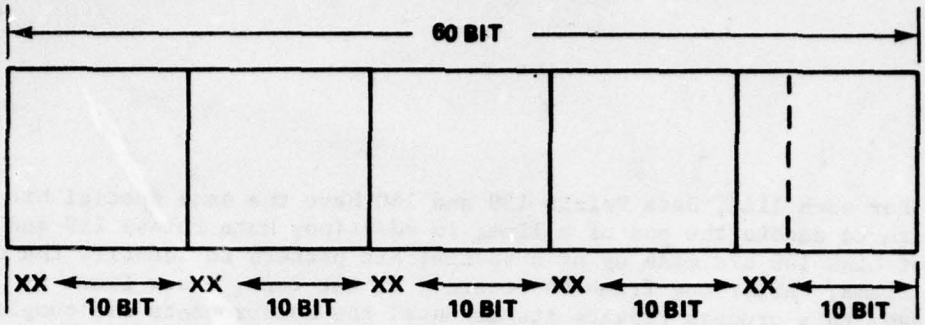

Figure 4. CDC 60-bit word data format.

After using the GETPIC routine one time to generate the new 60-bit word data tape, the BASES program may be run any number of times with the new data tape without using the GETPIC routine again. Outputs from the BASES program applied to measured data are tabulated in Table 1 for 100 of the 260 frames of data contained on the tape.

V. DATA ANALYSIS

The simplest level at which data can be analyzed is by a two-dimensional printout of data counts versus the two spatial coordinates (Figure 5). This gives a quick intuitive feel for the general distribution of energy in the data frame. Maximum, minimum, and rough average energy across the data can be obtained. Further insight can be gained by plotting energy versus position using a three-dimensional plotting program (Figure 6). This three-dimensional plot provides a wealth of qualitative information. From the three-dimensional plot, an evaluation of target energy as compared to background energy can be obtained. A rough idea of spatial frequency content and thermal gradients can also be determined. The three-dimensional plot also quickly reveals the distribution of equal energy levels (level slicing).

From this point, there are basically three different approaches to target-background discrimination: spatial filtering, feature selection-classification, and pattern recognition [1]. Spatial filtering can be achieved most easily by scanning with an array of detectors. A linear array of detectors whose output is summed while being scanned at right angles across a scene will produce a one-dimensional distribution of energy versus scan position (Figure 6). This output can be converted to a Weiner spectrum using the Fourier transform [2]. The Weiner spectrum can then be used to characterize target and background signatures.

The importance of characterizing IR backgrounds is unquestionable, but methods for doing so have been hotly debated [2-5]. Most recent efforts have centered around modeling IR backgrounds as Gaussian noise distributions. Such distributions can then be described by Weiner spectra, autocorrelations, or line scan distributions. Thus, the main

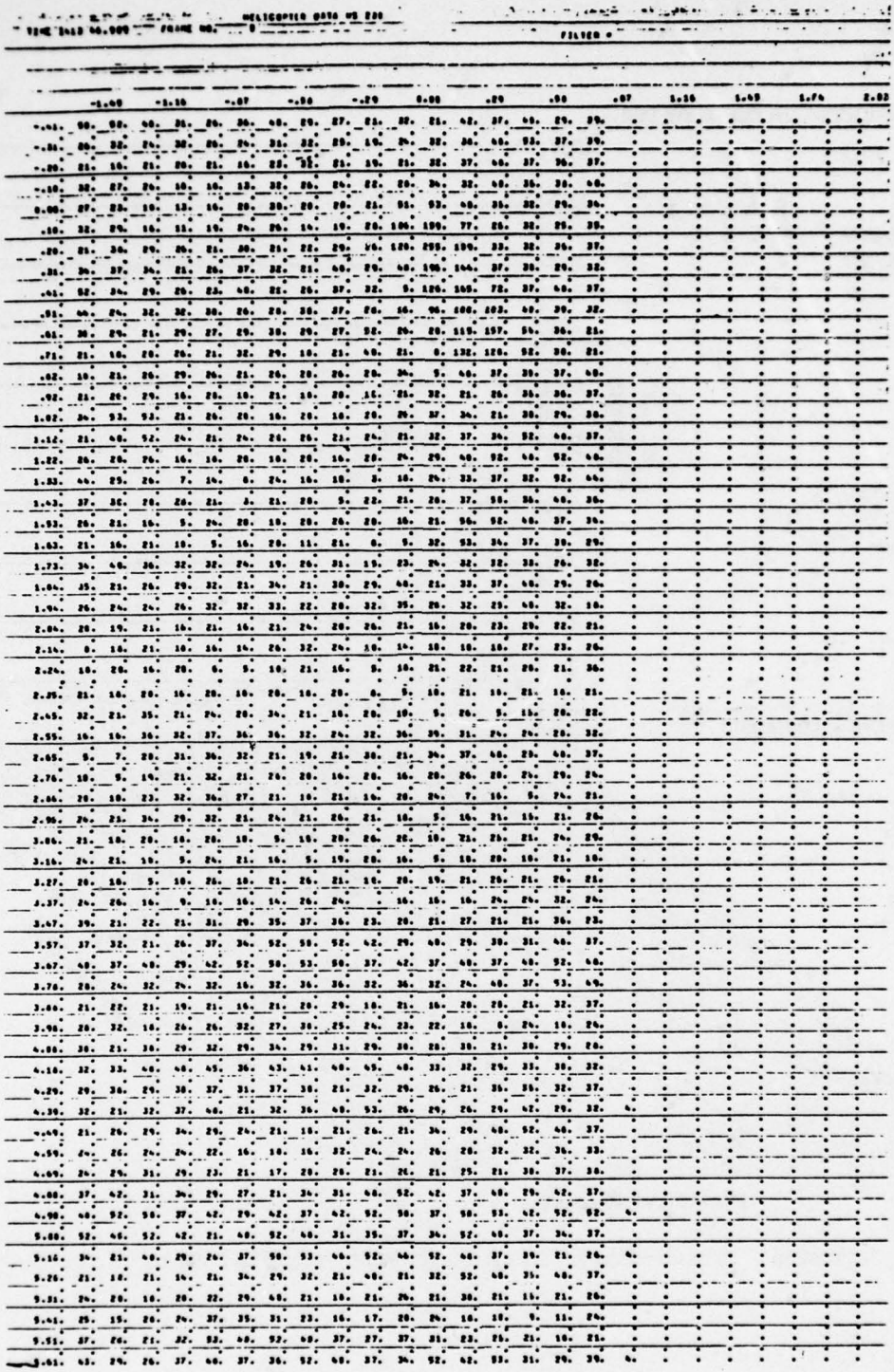

Figure 5. Two-dimensional matrix plot.

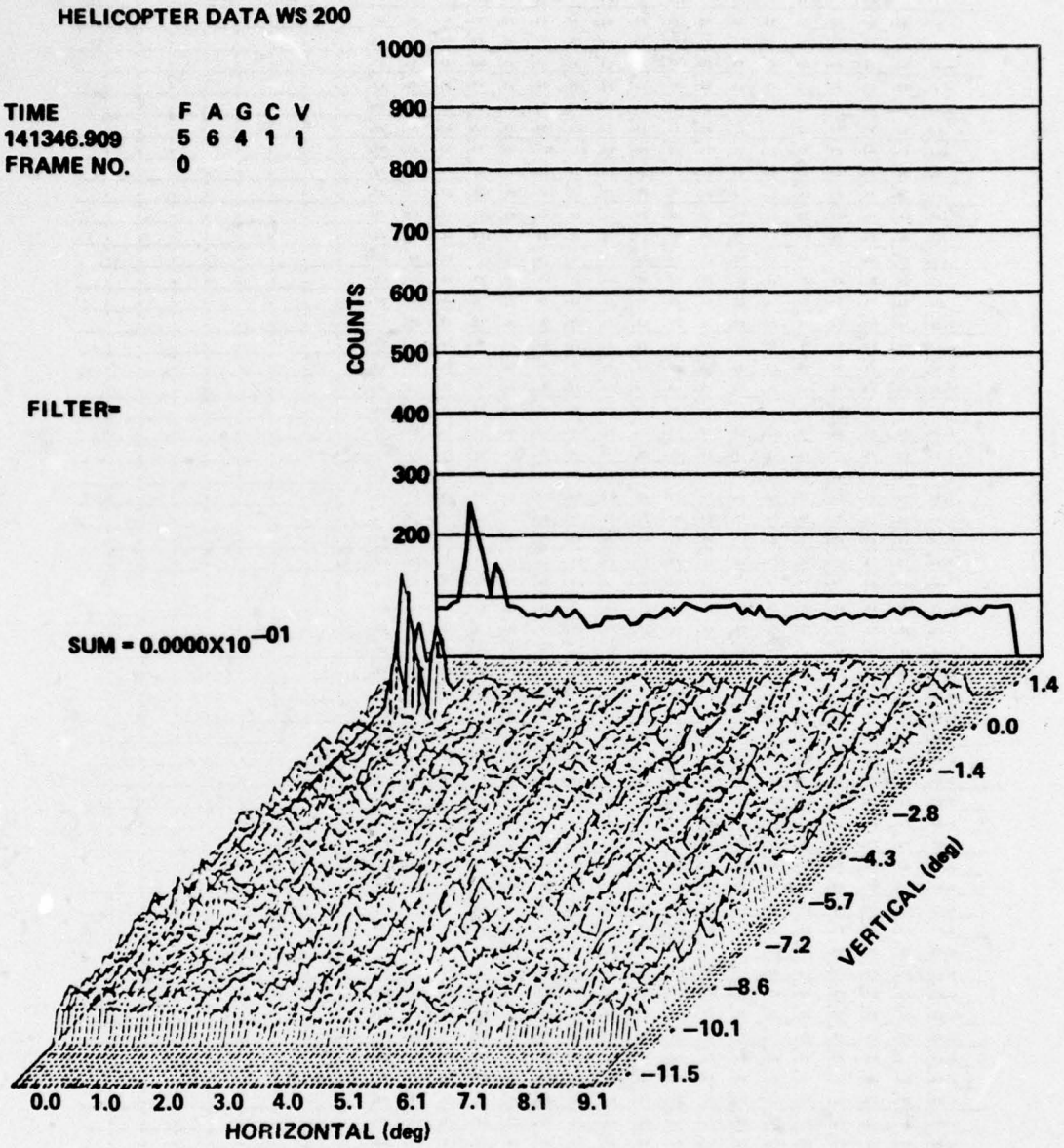

Figure 6. Three-dimensional plot with vertical scan plot.

thrust of data acquisition and analysis of the MIRADCOM IR ground target signatures program has been to confirm or refute these models.

Feature selection and classification also requires knowledge of the statistical energy signatures of targets and backgrounds. To do this, a histogram of the number of data points versus scene intensity must be accumulated (Figure 7). From the histogram (probability density function), target and background signatures can be fitted to statistical distributions, usually assumed normal or Gaussian. These statistics will then define error probabilities for various seeker-target-background combinations. A qualitative feel for the performance of an adaptive-threshold seeker algorithm can be gained by thresholding the two-dimensional matrix plot around the target mean at integer multiples of the target standard deviation (Figure 8). Further characterization of target and background signatures requires that statistics be accumulated on a large number of data frames to increase the statistical confidence in the signatures obtained.

The first step in performing pattern recognition studies is to define the shapes present in a particular scene. This is most easily accomplished by spatial differentiation, which essentially enhances edges of objects (this is also useful in evaluating the performance with edge tracker systems). There are many methods for edge enhancement but the simplest computationally are linear matrix approximations to the spatial gradient. These methods involve using either a two by two or three by three matrix as a window for calculating differences in absolute value among adjacent data points. Matrix windowing also allows simulation of various configurations of shaped detector arrays. By altering the size of the matrix, simulation of seeker fly-in can also be achieved.

VI. SOFTWARE DESCRIPTIONS

The program P2171 is a versatile package which provides many alternate methods to display the information in a particular scene. The program provides options to enable the user to read packed or unpacked data. Various operational modes can be selected due to the compartmentalized structure of the program. Energy levels can be output either uncalibrated as counts, or calibrated in W $cm^{-2} str^{-1}$ by using previously determined calibration constants and various parameters read from the input data tape. Coordinates can be output in three modes: uncalibrated (row and column), calibrated linear (ft), or calibrated angular (deg). Provision is made in this program for editing the data to decrease the effects of noise spikes or delete obviously bad data. The program can output a summary (Figure 9) of each frame of data which includes the following data: time before and after frame, time difference, frame number, instrument settings (filter, aperture, gain, etc.) maximum and average counts, location of maximum count, and other internally related data.

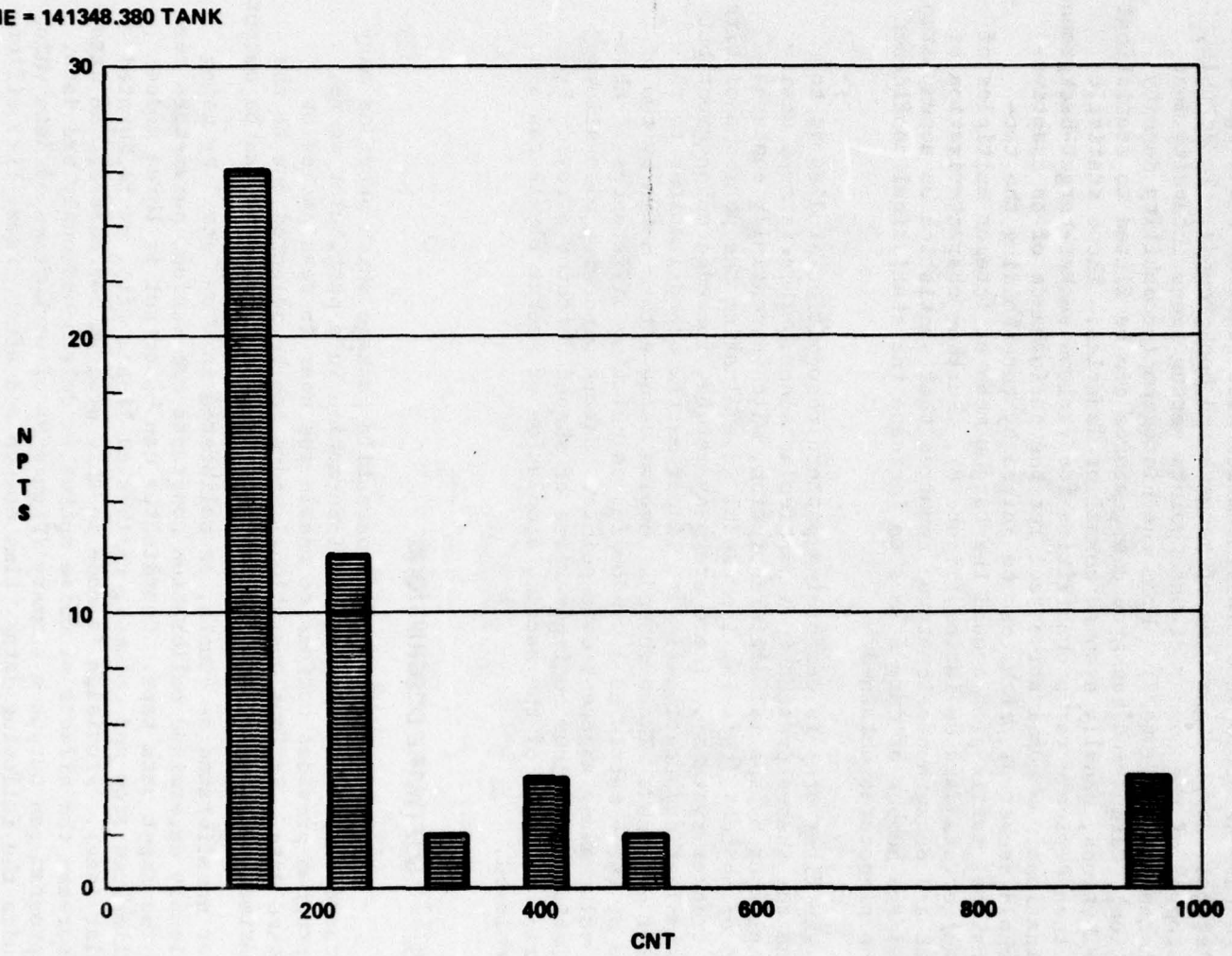

Figure 7. Histogram of probability density function.

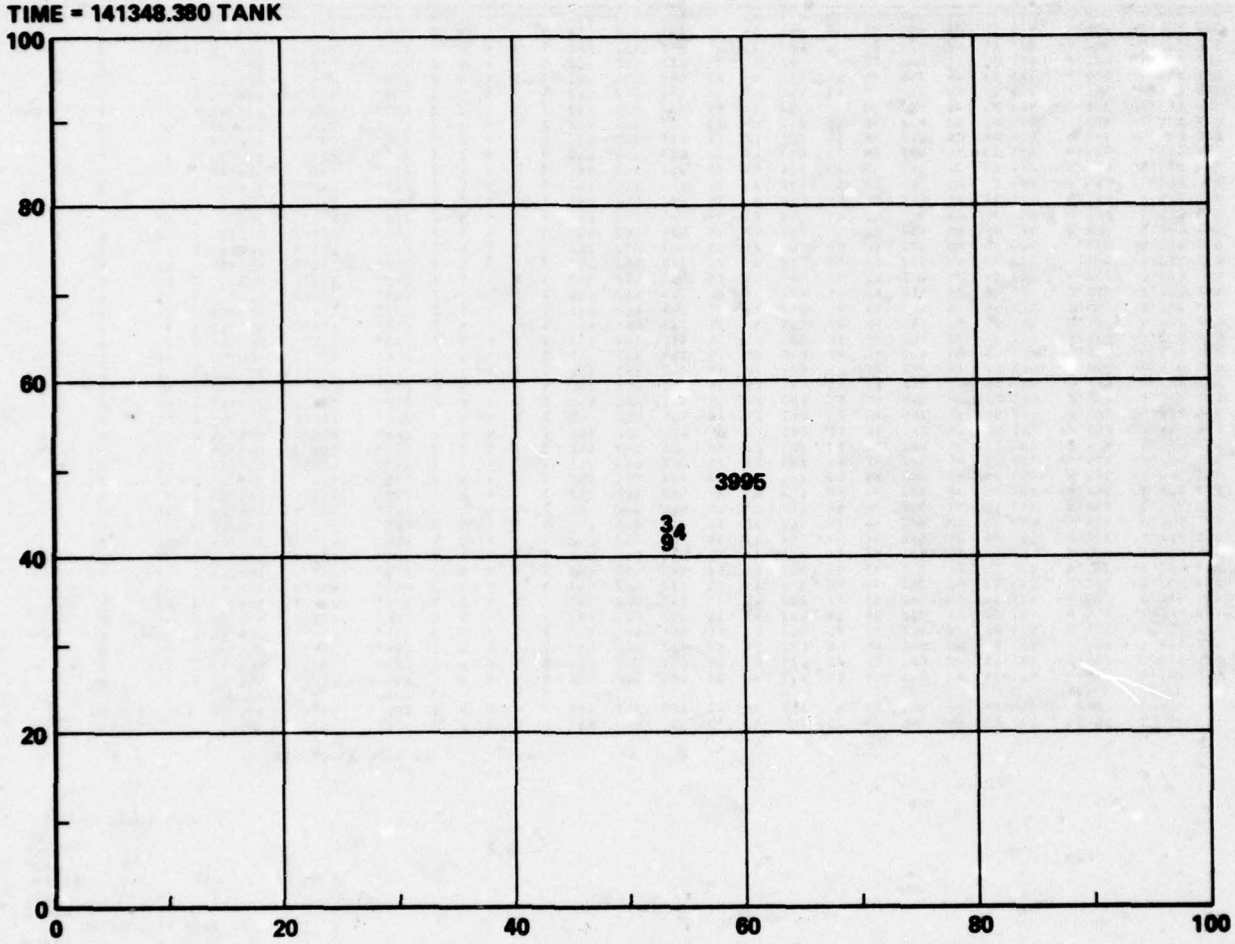

Figure 8. Thresholded matrix plot.

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MATRIX     01          01              -6.1
TAPE       02
EDIT                                          2.3
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HELICOPTER DATA 83

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0	11	2 57.430	1.313	.062	2	6	4	1	1	255	255	177	68	4	178	57	95	213	28	48	131	3.871	4.928	189
0	11	2 58.805	1.312	.062	2	6	4	1	1	255	255	192	62	44	212	44	64	225	34	95	132	9.182	3.758	185
0	11	3 .179	1.312	.062	2	6	4	1	1	255	255	192	48	44	234	42	95	234	42	95	134	5.182	2.689	189
0	11	3 1.554	1.312	.062	2	6	4	1	1	255	255	272	48	48	244	56	97	272	48	48	129	-.518	2.898	189
0	11	3 2.928	1.312	.062	2	6	4	1	1	255	255	222	53	7	232	61	65	256	79	48	131	.388	-2.029	189
0	11	3 4.302	1.313	.062	2	6	4	1	1	255	255	196	68	42	197	55	75	228	88	46	131	.182	-3.768	185
0	11	3 5.677	1.312	.062	2	6	4	1	1	255	255	208	42	23	208	49	78	288	49	78	134	8.998	1.594	189
0	11	3 7.051	1.313	.062	2	6	4	1	1	255	255	188	66	10	212	62	66	248	39	37	126	-.818	3.623	185
0	11	3 8.427	1.312	.062	2	6	4	1	1	255	255	248	44	1	256	63	96	256	63	86	134	4.184	-.439	185
0	11	3 9.801	1.312	.062	2	6	4	1	1	255	255	258	58	1	249	58	61	298	98	1	138	-4.498	.298	189
0	11	3 11.175	1.313	.062	2	6	4	1	1	255	255	245	53	24	228	68	64	255	92	26	132	-1.939	-4.638	185
0	11	3 12.550	1.312	.062	2	6	4	1	1	255	255	198	84	18	248	86	88	248	88	88	126	4.882	.888	185
0	11	3 13.924	1.312	.062	2	6	4	1	1	255	255	188	68	22	192	96	64	212	98	92	133	4.796	-4.493	189
0	11	3 15.299	1.312	.062	2	6	4	1	1	255	255	186	52	43	216	59	54	218	85	53	136	.816	3.823	185
0	11	3 16.673	1.312	.062	2	6	4	1	1	255	255	224	62	42	224	68	64	234	78	78	136	3.367	-1.739	185
0	11	3 18.047	1.314	.062	2	6	4	1	1	255	255	188	78	13	212	65	72	212	69	72	132	2.796	-.788	189
0	11	3 19.422	1.313	.061	2	6	4	1	1	255	255	256	52	48	248	53	46	256	98	48	131	-.518	1.159	189
0	11	13 18.697	1.313	597.962	2	6	4	1	1	255	255	226	46	22	224	57	61	255	32	42	119	-.386	4.058	198
0	11	13 22.421	1.313	2.811	2	6	4	1	1	255	255	208	67	1	208	57	82	226	79	13	136	-3.268	-2.178	315
0	11	13 24.195	1.312	.061	2	6	4	1	1	255	255	192	56	48	195	56	46	289	88	98	136	4.592	-3.913	189

Figure 9. Data summary.

Data can also be output as a two-dimensional matrix of energy values. Energy and position units can be selected as described previously. Highlights can be added such as marking maximum count or blanking out cells with counts below a selectable threshold. The matrix plot also provides the sum of all counts in the frame. A portion of the program provides the two-dimensional matrix output for the first intuitive examination of the data. After the target and background statistical distributions have been determined, the two-dimensional matrix can be thresholded and output to give a qualitative feeling for seeker effectiveness and probable errors (Figure 10).

This two-dimensional matrix of energy values can be plotted in three dimensions, that is a plot of energy (as the vertical coordinate) versus spatial coordinates with the benefits described earlier. The sum of the columns is also plotted as a two-dimensional projection along the edge of the three-dimensional plot to provide a simulation of scan direction line detectors.

The KPLOT program provides plots of the statistics of single or accumulated data frames. It can produce bar or point histogram plots of the data probability densities, as well as the mean, variance, and standard deviation of a normal distribution which best fits those data.

Program GOWENS is a fly-in simulation model and edge-tracker model. The fly-in simulation is implemented by iteratively reducing the full frame of data to a smaller subset of data points to simulate range closure, simultaneously finding the statistics for the reduced scene. The same program can simulate an edge tracker by the same process on a line-by-line or column-by-column basis. Level slicing and thresholding can also be done in this program using a subroutine which places only those data points with counts inside a gate into a reduced matrix. Coordinates are encoded with the data values so that the gated data may be accurately reconstructed.

Program Gradient does the 2×2 and 3×3 spatial gradient calculations. The program utilizes a moving matrix and an absolute value calculation to approximate the temperature gradient. The 2×2 method calculates from the matrix:

a	b
c	d

The gradient, s, at point, a, is then given by

$$S = |a - d| + |b - c|$$

where $||$ is absolute value.

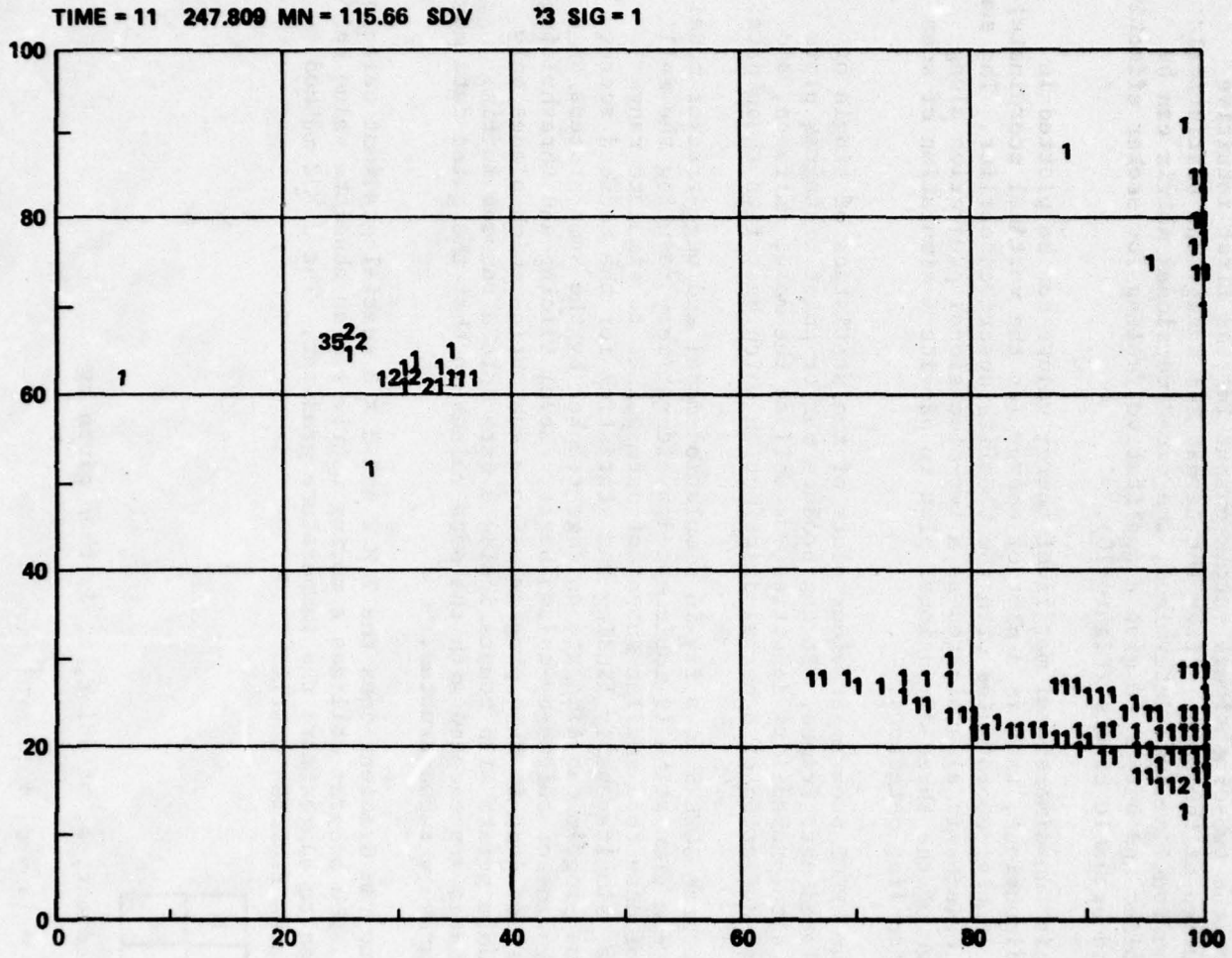


Figure 10. Threshold matrix sample plot.

The 3 × 3 method uses the matrix

a	b	c
c	e	f
g	h	i

and calculates the gradient, s, at point e as

$$S = |S_x| + |S_y|$$

where

$$S_x = (c + 2f + i) - (a + 2d + g)$$

$$S_y = (g + 2h + i) - (a + 2b + c) \quad .$$

S_x and S_y approximate the partial derivatives in the x and y directions, respectively, and can thus be used to simulate edge trackers.

VII. SOFTWARE USER INFORMATION

A. Introduction

This portion of the report is to provide a guide for prospective users of Program P2171, Program GOWENS and Program KPLOT. Setup procedures and various types of input and output will be demonstrated. It should also be noted that Program P2171 was modified from the original Eglin version to simulate IR-guided missile systems against certain armored targets.

B. Program P2171 Setup

The following files are used:

	Files	Description	Restrictions
1.	Input/Tape 5	Cards	Always
2.	Output/Tape 6	Time history listing	Always
3.	Tape 11	Primary data source PDP-15, picture data tapes or previous compressed P2171	Always
4.	Tape 10	P2385 or P2204 trackpoint range data tape	Optional

	Files	Description	Restrictions
5.	Tape 12	Compressed output tape of input Tape 11	Optional
6.	FILMPL	Three-dimensional picture plots	Optional
7.	Tape 9	Picture matrix listing	Optional

PROGRAM 2171 CARD INPUT

ALL CARDS ARE IDENTIFIED BY HOLLERITH CODES IN COLUMNS 1-5, COLUMNS 11-30 CONTAIN DATA AND/OR FLAGS DEPENDING ON CARD TYPE. FIELDS LEFT BLANK AND CARDS OMITTED ASSUME A DEFAULT VALUE.

CARD TYPES

1 TITLE CARD - INDICATES TITLE CARD TO FOLLOW
(DEFAULT BLANK TITLE)

2 PLOT CARD - DEFINES PLOT OPTIONS
(DEFAULT NO PLOT OUTPUT)

3 PRINT CARD - DEFINES PRINT OPTIONS
(DEFAULT NO PRINT OUTPUT)

4 TAPE CARD - DEFINES TAPE PARAMETERS, OUTPUT TAPE OPTION
DEFAULT - NUMBER SAMPLES/RECORD = 5
NUMBER MILLISECONDS/SAMPLE = 12.305
NO PACKED OUTPUT TAPE

5 TIME CARD - DEFINES START,STOP TIME TO PROCESS
(DEFAULT ENTIRE TAPE)

6 LIMIT CARD - DEFINES LINE TO PICK AS FIRST LINE OF THERMOVISION PICTURE
(DEFAULT 11)

7 CLASS CARD - DEFINES CLASSIFICATION OF PLOT OUTPUT
(DEFAULT UNCLASSIFIED)

7A MSN LABEL CARD - ONLY ON CLASS CARD OPTION

7B AUTHORITY CARD - ONLY ON CLASS CARD OPTION

7C DOWNGRADE CARD - ONLY ON CLASS CARD OPTION

8 MATRIX CARD- DEFINES MATRIX OPTIONS
(DEFAULT NO MATRIX)

9 TRACK CARD - DEFINE SOURCE OF RANGE, REL BRNG AND/OR TRACK PT
(DEFAULT NO I/P RANGE, RB, TRACK PT

10 VALID CARD - DEFINES VALID DATA SWITCH SETTING.
(DEFAULT- IGNORE VALID DATA SWITCH)

11 CONV CARD - SPECIFIES CONVERSION FACTOR FOR A GIVEN FILTER, GAIN, AND APERATURE.
DEFAULT- CONVERSION FACTOR = 1

12 DELETE CARD- SPECIFIES DELETE TIMES
(DEFAULT NO DELETES)

13 CENTER CARD- SPECIFIES LIN AND WORD OF BORESIGHT OF AGA.
(DEFAULT LINE=60, WORD =45)

14 CAL ONLY - SPECIFIES CALBRATION FRAMES ONLY

15 MIN CARD - SPECIFIES THE PEAK VALUE BELOW WHICH A PICTURE IS CONSIDERED TO BE NOT OF SIGNIFICANT LEVEL AND WILL NOT BE PLOTTED
(DEFAULT = 4*BACKGROUND LEVEL)

16 EDIT CARD - DEFINES EDIT OPTIONS AND BACKGROUND LEVELS
(DEFAULT-SEE DEFINITION OF THIS CARD)

17 LABEL CARD - DEFINES LOCATION AND HOLLERITH LABEL TO BE PUT ON PLOT.
(DEFAULT - BLANK LABEL FOR UNDEFINED LOCATIONS)

18 GO CARD - SIGNALS PROGRAM TO BEGIN EXECUTION

19 TAIL CARD - SPECIFIES A CONSTANT LOCATION OF TAILPIPE AND TRACK POINT (DEFAULT, NO CONSTANT LOCATION)

TITLE CARD

COLUMN 1-5 = TITLE
THIS CARD IS FOLLOWED BY A CARD CONTAINING HOLLERITH INFORMATION TO BE PUT ON ALL PICTURES AND TOP OF PAGE OF PRINTOUTS

PLOT CARD

COLUMN	NAME	DESCRIPTION	FORMAT
1-4	KARD	"PLOT"	
11-12	IPLOT	0 = NO PLOT OUTPUT (DEFAULT) 1 = 3D PLOT OF AGA 2 = 3D PLOTS PLUS MAX SCALE SELECT 3 = 3D PLOTS PLUS INPUT SCALING	I2
13-14	IP3DL1	LINE NUMBER TO BEGIN 3D PLOT (DEFAULT 11)	I2
15-16	IP3DL2	LINE NUMBER TO STOP 3D PLOT (DEFAULT 110)	I2
17-18	IP3DW1	WORD NUMBER TO BEGIN 3D PLOT (DEFAULT 1)	I2
19-20	IP3DW2	WORD NUMBER TO STOP 3D PLOT (DEFAULT 100)	I2
21-22	NPL3D	SPECIFIES 3D PLOT RATE 1 = EVERY FRAME (DEFAULT) 2 = EVERY OTHER FRAME 3 = EVERY THIRD FRAME • •	I2
23-24	IVIEW	SPECIFIES VIEWING DIRECTION 1 = VIEW FROM BOTTOM OF AGA 2 = VIEW FROM RIGHT OF AGA 3 = VIEW FROM TOP OF AGA 4 = VIEW FROM LEFT OF AGA	I2
29-30	ISUM	1 = PLOTS SUM IN W/STR ON 3-D PLOT	I2
31-40	WTOP	SCALE INPUT IF IPLOT .GT. 1 IN RASTER COUNTS 0 .LE. WTOP.LE. 1024	F10.0

PRINT CARD

COLUMN	NAME	DESCRIPTION	FORMAT
1-5	KARD	"PRINT"	A5
11-12	IPRINT	0 = NO PRINT OUTPUT (DEFAULT) 1 = PRINT TIMES, FILTER, APERATURE, GAIN, CALIBRATE, SOLID DATA, LENGTHS, AND A SPECIFIED CELL (SEE IPVL, IPVW - COL 23-26) FOR EACH PICTURE. 2 = PRINT OPTION 1 PLUS PRINT CELLS IN SPECIFIC LINES AND WORDS AT A SPECIFIED RATE. (SEE COL 13-22)	I2
		IF IPRINT.NE.2. COL 13-22 ARE IGNORED.	
13-14	IPRL1	LINE NUMBER TO BEGIN PRINT (DEFAULT 11)	I2
15-16	IPRL2	LINE NUMBER TO STOP PRINT (DEFAULT 100)	I2
17-18	IPRW1	WORD NUMBER TO BEGIN PRINT (DEFAULT 1)	I2
19-20	IPRW2	WORD NUMBER TO STOP PRINT (DEFAULT 100)	I2
21-22	NPRINT	SPECIFIES PRINT RATE 1 = EVERY FRAME (DEFAULT) 2 = EVERY OTHER FRAME 3 = EVERY THIRD FRAME • •	I2
23-24	IPVL	LINE NUMBER OF PARTICULAR CELL TO BE PRINTED. (DEFAULT 50)	I2
25-26	IPVW	WORD NUMBER OF PARTICULAR CELL TO BE PRINTED. (DEFAULT 50)	I2

TAPE CARD

COLUMN	NAME	DESCRIPTION	FORMAT
1-4	KARD	TAPE	A4
11-12	ITAPE	0 = NO PACKED TAPE OUTPUT (DEFAULT), I/P = POP15 TAPE 1 = MAKE PACKED OUTPUT TAPE, I/P = POP15 TAPE 2 = I/P IS PACKED TAPE	I2
13-14	NSR	NUMBER SAMPLES/RECORD ON INPUT TAPE (DEFAULT 5)	I2
15-16	ITSEND	/1=MAKE EXTERNAL TAPE TO BE SENT FROM TSX (SEE EXTERNAL TAPE O/P)	I2
41-50	DME	DELTA TIME BETWEEN SAMPLES ON INPUT TAPE IN MILLISECONDS. (DEFAULT 12.305 MS)	

TIME CARD

COLUMN	NAME	DESCRIPTION	FORMAT
1-4	KARD	"TIME"	A4
11-19	START	HHMMSSSSS = START	I9
21-29	STOP	HHMMSSSSS = STOP	I9
		NOTE: HH = HR	
		MM = MIN	
		SSSSS = MILLISECONDS	
31-40	M	IF NOT BLANK, THEN M= NO. OF FRAMES AFTER START TIME THAT IS TO BE OUTPUT. STOP TIME CAN BE LEFT BLANK IF THIS OPTION IS USED.	F10.6

LIMIT CARD

COLUMN	NAME	DESCRIPTION	FORMAT
1-4	KARD	"LIMIT"	A5
11-12	ITOP	LINE NUMBER TO CONSIDER TOP OF PICTURE (DEFAULT 11)	I2

CLASS CARD

COLUMN	NAME	DESCRIPTION	FORMAT
1-5	KARD	"CLASS"	A5
11-12	ICLASS	0 = UNCLASSIFIED (DEFAULT)	I2
		1 = CONFIDENTIAL	
		2 = SECRET	
		3 = TOP SECRET	
13-14	IR	0 = FILMPAC SAD OPTION (DEFAULT NO FURTHER OPTIONS)	I2
		2-5=NUMBER OF SPECIAL DOWNGRADE CARD INPUT + 1	
		11-19=NUMBER OF PURE SPECIAL DOWNGRADE CARDS INPUT +10	
15-16	ID	0 = NO DOWNGRADE STAMP (DEFAULT)	I2
		1 = XGDS-1 STAMP	
		2 = XGDS-2 STAMP	
		3 = XGDS-3 STAMP	
		4 = XGDS-4 STAMP FROM TO JUN 72	
		5 = GDS (XGDS-4 AFTER JUN 72) STAMP	
		6 = XGL STAMP	
		7 = XGDS NO CATAGORY STAMP	
17-18	IS	0 = NO STAMP (DEFAULT)	I2
		1 = "RESTRICTED DATA" STAMP	
		2 = "FORMERLY RESTRICTED DATA" STAMP	
		3 = "NATIONAL SECURITY SECURITY INFORMATION" STAMP	
19-20	IW	0 = NO STAMP (DEFAULT)	I2
		1 = "WARNING NOTICE SS & MI" STAMP	
21-22	IN	0 = NO STAMP (DEFAULT)	I2
		1 = "NO FOREIGN DISSEM" STAMP	

MSN LABEL CARD

(MUST FOLLOW CLASS CARD IF IR GT 0)

COLUMN	NAME	DESCRIPTION	FORMAT
1-4	IJOB	JOB NUMBER	A4
11-20	IPROJ	PROJECT NUMBER	A10
21-30	IMSN	MISSION NUMBER	A10
31-40	IDATE	MISSION DATE	A10
41-50	IRUN	HOLERITH JOB LABEL I. E. F. Q. L.	A10
51-60	IDAY	JOB RUN DAY	A10

AUTHORITY CARD

(MUST FOLLOW MSN LABEL CARD IF IR = 1 THRU 5)

COLUMN	NAME	DESCRIPTION	FORMAT
1-59	IAUTHR	CLASSIFING AUTHORITY FOR DOWNGRADE STAMP	A59
70-79	IDCLAS	DECLASSIFICATION DATE	A10
80	4	C = IF BLANK IDCLAS IS USED	A1
		L = UPON NOTIFICATION BY THE ORIGINATOR	
		N = NOT AUTOMATICALLY DECLASSIFIED	

DOWNGRADE CARD

(MUST FOLLOW AUTHORITY CARD IF IR>2, MSN LABEL CARD IF IR>10)

COLUMN	NAME	DESCRIPTION	FORMAT
1-80		HOLLERITH DOWNGRADE STAMP TO BE USED IF IR > 10 OR MODIFICATION TO DOWNGRADE STAMP STARTING WITH DECLASIFICATION LINE + 4 CARDS UNLESS XGL TO BE MOD THEN 6 CARDS ALLOWED IF IR >10,9 CARDS ALLOWED	8A10

MATRIX CARD

COLUMN	NAME	DESCRIPTION	FORMAT
1-4	KARD	"MATR"	A4
11-12	IMTX	=0, INDICATES NO MATRIX OUTPUT (DEFAULT)	I2
		=N, INDICATES SELECT EVERY NTH FRAME THAT IS CONSIDERED FOR OUTPUT (SEE COL 15-16)	
13-14	IFEET	=0, MATRIX WILL BE OUTPUT IN DEGREE CELL UNITS	I2
		=1, MATRIX WILL BE OUTPUT IN FEET CELL UNITS	
15-16	RBCELL	CONSIDER FOR MATRIX OUTPUT IF RELATIVE BEARING HAS CHANGED BY MORE THAN RBCELL (DEG). NOTE: IF=0, THEN EVERY FRAME WILL BE CONSIDERED.	I2
17-18	IFIND 1	= PROGRAM SELECTS OWN MATRIX LENGTH PARAMETERS	I2
19-20	IPRMTX	1 = MATRIX DISPOSITION TO TAPE9	I2
31-40	DLEFT	IF NE 0, THEN IS LEFT LIMIT OF MATRIX FROM THE TAIL PIPE LOCATION (DEFAULT =2.0)	F10.2
41-50	DRIGHT	IF NE 0, THEN IS RIGHT LIMIT OF MATRIX FROM TAIL PIPE LOCATION (DEFAULT = 8.0)	F10.2
51-60	NFRMTX	IF.NE.0 THEN IS MAXIMUM NO OF FRAMES TO USE FOR IR MATRIX. (DEFAULT 4) NOTE: PROGRAM WILL START AT CELL CORRESPONDING TO DLEFT AND CONSTRUCT THE MATRIX TO THE CELL CORRESPONDING TO DRIGHT OR NFRMTX FRAMES	F10.2

TRACK CARD

COLUMN	NAME	DESCRIPTION	FORMAT
1-4	KARD	"TRAC"	A4
11-12	ITRK	=-2, DO NOT READ TAPE10, USE MAX AGA VALUE TO FIND TAIL PIPE LOCATION	I2
		=-1, DO NOT READ TAPE, USE CONSTANT LOCATION FOR TRACK POINT AND TAIL PIPE.(SEE TAIL CARD)	
		= 0, DO NOT READ TAPE10, DO NOT OUTPUT IR MATRIX	
		= 1, READ TAPE10, TAIL PIPE LOCATION TO BE SELECTED FROM TV VIDEO LOCATION. WHEN NOT AVAILABLE, USE MAX AGA LOCATION. (TRACK PT FROM VCO SIGNAL)	
		= 2, READ TAPE10,USE MAX AGA TO FIND TAIL PIPE, USE TV VIDEO WHEN LOCATION FROM MAX AGA CANNOT BE FOUND.	
13-14	ITPT	1 = TRACK POINT MARK TO BE TAKEN FROM T V VIDEO	I2

VALID CARD

COLUMN	NAME	DESCRIPTION	FORMAT
1-4	KARD	"VALI"	A4
11-12	IVALID	VALID DATA SWITCH SETTING(DEFAULT=IGNORE)	I2

CONV CARD

COLUMN	NAME	DESCRIPTION	FORMAT
1-4	KARD	"CONV"	A4
11-12	IF	FILTER NUMBER	I2
13-14	IA	APERATURE NUMBER	I2
15-16	IG	GAIN NUMBER	I2
31-40	CONV	CONVERSION FACTOR FROM COUNTS TO W1(CM**2*SR) FOR IF,IA, IG COMBINATION NOTE: CONVERSION FACTOR EQUALS (AVERAGE INTERNAL LAB COUNT)*(SLOPE)/(AVG INFLIGHT CAL COUNT)	F10.2

DELETE CARD

COLUMN	NAME	DESCRIPTION	FORMAT
1-4	KARD	"DELE"	A4
11-19	TDELE	HHMMSSSSS =START OF DELETE INTERVAL	I9
21-29	TDELE	HHMMSSSSS =END OF DELETE INTERVAL NOTE: UP TO 25 DELETE CARDS MAY BE INPUT	I9

CENTER CARD

COLUMN	NAME	DESCRIPTION	FORMAT
1-4	KARD	"CENT"	A4
11-12	ILCENT	LINE NUMBER OF CENTER OF AGA (DEFAULT=60)	I2
13-14	IWCENT	WORD NUMBER OF CENTER OF AGA (DEFAULT=45)	I2
31-40	RESLIN	RESOLUTION OF ONE LINE OF AGA (DEFAULT=10/69 DEG)	F10.2
41-50	RESWD	RESOLUTION OF ONE WORD OF AGA (DEFAULT=5/49 DEG)	F10.2

CAL ONLY CARD

COLUMN	NAME	DESCRIPTION	FORMAT
1-4	KARD	"CAL"	A4
11-12	ICAL	=1, INDICATES SELECT CALIBRATION FRAMES ONLY	I2

MIN CARD

COLUMN	NAME	DESCRIPTION	FORMAT
1-4	KARD	"MIN"	A4
31-40	MNVAL	SPECIFIES MINIMUM COUNT FOR DELETING PLOT OF A PICTURE. IF MAX VALUE OF A PICTURE IS BELOW THIS LEVEL, IT WILL NOT BE PLOTTED.	

EDIT CARD

COLUMN	NAME	DESCRIPTION	FORMAT
1-4	KARD	"EDIT"	A4
11-12	IEDT	=0, DO NOT EDIT NOISE SPIKES IN PICTURE =1, EDIT NOISE SPIKES (DEFAULT)	I2
31-40	IEDUP	IF GT 1.0, THEN SPECIFIES COUNT VALUE ABOVE WHICH A CELL WILL BE CONSIDERED POSSIBLE NOISE SPIKE. (DEFAULT = MAX((4*AVG OF BACKGROUND PEAKS),30))	F10.2
41-50	IEDOWN	IF GT 1.0, THEN SPECIFIES VALUE THAT THE CORRESPONDING WORDS ON ADJACENT LINES MUST BE BELOW IN ORDER FOR A CELL TO BE CONSIDERED A NOISE SPIKE. (DEFAULT = 1.75* BACKGROUND)	F10.2
51-60	I3K	IF GT 1, THEN SPECIFIES COUNT VALUE TO BE CONSIDERED BACKGROUND LEVEL	F10.2
61-70	PCT	MULTIPLICATION FACTOR TO DETERMINE AND OPTIMAL BACKGROUND LEVEL. NOTE: LET AVG= AVERAGE OF PEAKS IN PICTURE BELOW 200 COUNTS THE OPTIMAL BACKGROUND= AVG + PCT* AVG (DEFAULT FOR PCT =.75)	

LABEL CARD

COLUMN	NAME	DESCRIPTION	FORMAT
1-4	KARD	"LABE"	A4
11-12	ILAB	LINE NO FOR PLACEMENT OF THIS LABEL ON 3D PLOTS	I2
21-40	LABEL	HOLLERITH LABEL INFORMATION TO PUT AT ILAB LOCATION NOTE: UP TO 25 LABEL CARDS MAY BE INPUT. AFTER A LABEL CARD HAS BEEN INPUT, THEN IT WILL BE DISPLAYED UNTIL A NEW LABEL CARD IS INPUT IN IT'S PLACE, THEREFORE, IF IT IS DESIRED TO REMOVE A PARTICULAR LINE OF INFO, A LABEL CARD WITH CORRESPONDING LINE NO. MUST BE INPUT WITH COL 21-40 BLANK.	A10

TAIL CARD

COLUMN	NAME	DESCRIPTION	FORMAT
1-4	KARD	"TAIL"	A4
31-40	ATP	CONSTANT LOCATION FOR AZIMUTH OF TAIL PIPE	F10.0
41-50	ETP	CONSTANT LOCATION FOR ELEVATION OF TAIL PIPE	F10.0
51-60	ATRK	CONSTANT LOCATION FOR AZIMUTH OF TRACK POINT	F10.0
61-70	ETRK	CONSTANT LOCATION FOR ELEVATION OF TRACK POINT NOTE: THIS CARD WOULD ONLY BE INPUT WHEN THE AZIMUTH AND ELEVATION OF TAIL PIPE AND TRACK POINT WERE KNOWN FOR A PARTICULAR PICTURE.	F10.0

GO CARD

COLUMN	NAME	DESCRIPTION	FORMAT
1-4	KARD	"GO" THIS CARD SIGNALS PROGRAM TO BEGIN PROCESSING AFTER REQUESTED DATA HAS BEEN PROCESSED, PROGRAM WILL READ NEW CONTROL CARD.	A4

TAPE11 (INPUT)

THE PROGRAM WILL ACCEPT ONE OF TWO TYPES OF TAPE AS INPUT ON UNIT 11, (SEE "TAPE" CARD).

TYPE 1. (WHEN ITAPE=0)
THIS IS A TAPE PRODUCED BY PROGRAM P520C ON PDP15 COMPUTER. NORMALL THIS TAPE WILL CONTAIN 720 EIGHTEEN BIT WORDS/RECORD. EACH RECORD MAY BE DIVIDED INTO TWO BUFFERS. THE FIRST BUFFER CONTAINS 5 SAMPLES OF 140 WORDS/SAMPLE OF RAW AGA DATA. THE SECOND BUFFER CONTAINS TIME WORDS IN THREE-WORD SETS AS FOLLOWS.
WORD 1 - TIME, SECONDS
WORD 2 - TIME, MILLESECONDS
WORDS 3 - SAMPLE COUNT
THE SAMPLE COUNT INDICATES THE LAST SAMPLE IN THE SAMPLE BUFFER FOR WHICH A TIME CAN BE COMPUTED USING THE TIME GIVEN + THE AVERAGE TIME BETWEEN SAMPLES. IF WORD 3 EQUALS NO OF SAMPLES (5) THEN ONLY ONE SET OF TIME WORDS WILL BE GIVEN. IF NOT, THEN THE NEXT SET OF TIME WORDS MUST BE USED TO COMPUTE THE TIME OF SAMPLES CORRESPONDING TO THE SAMPLE COUNT IN WORD THREE +1 TO THE SAMPLE COUNT OF WORD SIX. THIS CONTINUES UNTIL THE SAMPLE COUNT OF A SET OF TIME WORDS IS EQUAL TO THE NO OF SAMPLES. IF THERE WERE A TIME JUMP FOR EVERY SAMPLE OF A RECORD THEN THERE WOULD BE GIVEN A SET OF TIME WORDS FOR EACH SAMPLE.
EACH WORD IN THE SAMPLE BUFFER CONTAINS 10 BITS OF DATA, RIGHT ADJUSTED. THE FORMAT OF A SAMPLE IS AS FOLLOWS

WORD	DESCRIPTION
1-138	AGA DATA (IN RIGHT 10 BITS OF EACH WORD)
139	LINE COUNT WORD
140	FRAME SYNC WORD ////////////111/11

FORMAT OF WORD 139

BIT	
1-8	PADDING
9-16	COUNTER
17-18	DATA TYPE

IF=00, THEN SAMPLE IS BETWEEN PICTURES, THE COUNTER = A/C LENGTH
AND WORD 1 CONTAINS THE FOLLOWING

BIT	
(1-8)	=PADDING
9-11	=FILTER POSITION
12-14	=APERATURE POSITION
15-16	=GAIN POSITION
17	=VALID DATA SWITCH
18	=CALIBRATE SWITCH

IF = 11, THEN SAMPLE IS A LINE OF THE PICTURE, AND THE COUNTER IS THE LINE POSITION IN PICTURE OF NEXT LINE.

TYPE 2. (WHEN ITAPE = 02)
THIS IS A COMPACTED TAPE PRODUCED BY THE PROGRAM FROM A PREVIOUS RUN WITH ITAPE =1. EACH LOGICAL RECORD IS 2015 SIXTY BIT WORDS.

WORD	DESCRIPTION
1	TIME OF PICTURE
2	FILTER POSITION BEFORE
3	APERATURE POSITION BEFORE
4	GAIN POSITION BEFORE
5	CALIBRATE BEFORE
6	VALID DATA BEFORE
7	A/C LENGTH BEFORE
8	TIME OF FIRST LINE AFTER PICTURE
9	FILTER POSITION AFTER
10	APERATURE POSITION AFTER
11	GAIN POSITION AFTER
12	CALIBRATE AFTER
13	VALID DATA AFTER
14	A/C LENGTH AFTER
15	NO OF LINES INPUT FOR THIS PICTURE.
16-35	TOP LINE OF PICTURE
17-35	SECOND FROM TOP LINE OF PICTURE
.	
.	
.	
1995-2015	BOTTOM LINE OF PICTURE

C. Program GOWENS Setup

This program was developed in-house as a simulation tool to evaluate each frame of IR data efficiently without utilizing large amounts of computer resources (memory, time, etc.) which are required by Program P2171. Program GOWENS will read the same input tape (Tape 11) as Program P2171; sort and process IR data are to be plotted with Program KPLOT.

The following files are used:

	Files	Description	Restriction
1.	Input/Tape 5	Cards	Always
2.	Input/Tape 1	Primary data source, same as Tape 11, P2171	Always
3.	Output/Tape 6	Listing of variables (user may select any variable)	Optional
4.	Tape 2/Tape 3	Sort merge	Always
5.	Tape 7	Processed IR data (cataloged)	Always

Program GOWENS Input/Output

1. KT Card . . . Frame number card, 16I5, to identify those frames to be evaluated. If frame = 0 or -1, program will stop.

2. IFIL Card . . . Time ID card, 5I3,2F10.3, 4A10, select frame by time, filter, gain, and aperture setting. The view is also included.

3. Tape 1 . . . Primary IR data source (Eglin AFB).

4. Tape 2 . . . File to be sorted, input to Tape 3.

5. Tape 3 . . . File containing sorted IR data (maximal to minimal intensity).

6. Tape 7 . . . Output of processed IR data, contains frame times, the view if any, largest 200 data values, and the location of each value in the frame.

D. Program KPLOT

Program KPLOT is a mathematical model developed for graphical evaluation of the output produced by Program GOWENS. KPLOT generates bar and point plots by interacting with the Tektronix software plotting routines. In bar plot graphing, the number of IR data points is plotted

versus the intensity range which can be expressed in measurements of counts or watts per steradian. KPLOT will also illustrate a frame of data (100 × 100 matrix) and show the location and intensity of all hot spots in the frame.

The following files are used:

	Files	Description	Restrictions
1.	Input/Tape 5	Interaction with terminal	Always
2.	Input/Tape 7	Processed IR data	Always
3.	Input/AGII	Tektronix Software	Always
4.	Output/Tape 6	Information display (Plots)	Always

Program KPLOT Input/Output

NOTE KPLOT is an interactive program that is run on a terminal.

1. Tape 7 . . . Primary input for KPLOT (same as Tape 7 in GOWENS).

2. AGII . . . Tektronix Software.

3. Tape 5/Tape 6 . . . interactive I/O with terminal.

4. Output . . . barplots, display of frame and location of heat sources. (Figures 1 and 2).

VIII. COMPUTER PROGRAM LISTINGS

The listing for BASES Program P2171 is presented in Appendix A. Program GOWENS follows in Appendix B. Program KPLOT listings are contained in Appendix C.

IX. SUMMARY

The nine different computer models outlined and described in the introduction all utilize different discriminants to investigate the spatial radiance of target and clutter. Of the nine different computer models, only three are contained in the Computer Program Listing (Appendices A, B, and C) in order to minimize the size of this report. In the case of energy computer model described in the report the overlapping areas between target and clutter represent a loss function where targets would be classified as clutter or vice versa. In the search for a means to minimize this loss function, the authors believe the Graphics target clutter frame-to-frame comparison model coupled with

the two-dimensional gradient and spatial discriminator model offer the most effective and sophisticated approach to optimize the true target selection criteria for most clutter conditions.

However, it is anticipated that even after maximizing the use of these two computer models in complex clutter environments, some loss function may still exist. Consequently, additional independent samples of data should be utilized with multispectral data reduction algorithms for further reduction of the previously mentioned loss function.

REFERENCES

1. Duda, R. O. and Hart, P. E., Pattern Classification and Scene Analysis, New York, Wiley-Interscience, 1973.

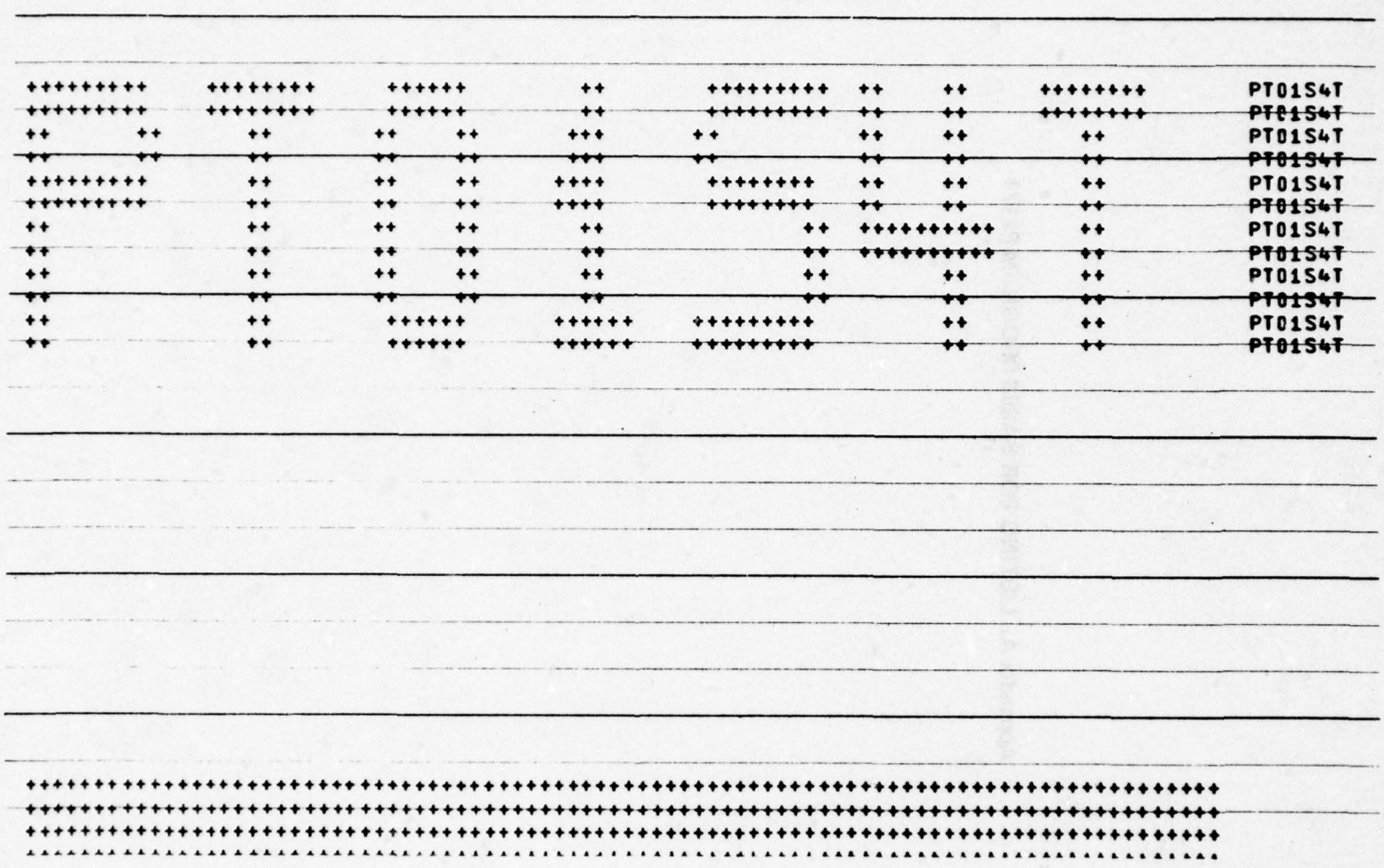
2. Robinson, D. Z., "Methods of Background Description and Their Utility," Proceedings of IRE, Vol. 47, No. 9, September 1959, pp. 1554-1561.

3. Tsutsumi, S. and Takgi, T., "Optimum Spatial Filter for an Anisotropic Background Noise," Electronics and Communications in Japan, Vol. 54-C, No. 9, 1971.

4. Itakura, et al., "Statistical Properties of the Background Noise for the Atmospheric Windows in the Intermediate IR Region," Infrared Physics, Vol. 14, Great Britain, Pergammon Press, 1974, pp. 17-29.

5. Tsutsumi, S., "Spatial Filter Used in Scanning Optical Systems," Electronics and Communications in Japan, June 1966, p. 13.

Appendix A. LISTING FOR BASES PROGRAM P2171


PT01S4T
PT01S4T
PT01S4T
PT01S4T
PT01S4T
PT01S4T
PT01S4T
PT01S4T
PT01S4T
PT01S4T
PT01S4T
PT01S4T

```
*****    *IDENT SEPT12
//////   *INSERT MAY75.38
               ICS=ICS*10
//////   *INSERT MAY75.44
               ICS=ICS*10
//////   *INSERT MAY75.49
               ICS=ICS*10
//////   *INSERT THERMC.1994
               SUBROUTINE UNPACK(IN,MTAB,MOUT)
               DIMENSION IN(1),MTAB(1),MOUT(1),MASK(60)
               CALL GETMSK(MASK)
               I=0
               M=0
               MWORD=1
               MBIT=60
            10 I=I+1
               KTAB=MTAB(I)
               IF(KTAB)20,90,40
            20 MBIT=MBIT+KTAB
            25 IF(MBIT)30,70,10
            30 MBIT=60+MBIT
               MWORD=MWORD+1
               GO TO 25
            40 M=M+1
               MDIF=MBIT-KTAB
               IF(MDIF)50,60,80
            50 IWORD=SHIFT(AND(IN(MWORD),MASK(MBIT)),-MDIF)
               MWORD=MWORD+1
               MBIT=60+MDIF
               MOUT(M)=OR(IWORD,AND(SHIFT(IN(MWORD),-MBIT),MASK(-MDIF)))
               GO TO 10
            60 MOUT(M)=AND(IN(MWORD),MASK(KTAB))
            70 MBIT=60
               MWORD=MWORD+1
               GO TO 10
            80 MBIT=MDIF
               MOUT(M)=AND(SHIFT(IN(MWORD),-MDIF),MASK(KTAB))
               GO TO 10
            90 RETURN
               END
               SUBROUTINE DONE(IT)
               SUBROUTINE TO DISMOUNT TAPE IT, AND MOUNT NEXT TAPE.
               PAUSE " MOUNT NEXT TAPE "
               RETURN
               END
               SUBROUTINE GETMSK(IM)
               DIMENSION IM(60)
               DATA MASK/0000000000000000001B/
               IM(1)=MASK
               DO 10 I=2,57
               IM(I)=OR(SHIFT(IM(I-1),1),MASK)
            10 CONTINUE
               IM(58)=177777777777777777E
               IM(59)=377777777777777777E
               IM(60)=777777777777777777E
```

```
      END
```

MODIFICATIONS / CONTROL CARDS

```
THERMO        ICS=ICS*10                                    SEPT12      1  I
THERMO        ICS=ICS*10                                    SEPT12      2  I
THERMO        ICS=ICS*10                                    SEPT12      3  I
THERMO        SUBROUTINE UNPACK(IN,MTAB,MOUT)               SEPT12      4  I
THERMO        DIMENSION IN(1),MTAB(1),MOUT(1),MASK(60)      SEPT12      5  I
THERMO        CALL GETMSK(MASK)                             SEPT12      6  I
THERMO        I=0                                           SEPT12      7  I
THERMO        M=0                                           SEPT12      8  I
THERMO        MWORD=1                                       SEPT12      9  I
THERMO        MBIT=60                                       SEPT12     10  I
THERMO     10 I=I+1                                         SEPT12     11  I
THERMO        KTAB=MTAB(I)                                  SEPT12     12  I
THERMO        IF(KTAB)20,90,40                              SEPT12     13  I
THERMO     20 MBIT=MBIT+KTAB                                SEPT12     14  I
THERMO     25 IF(MBIT)30,70,10                              SEPT12     15  I
THERMO     30 MBIT=60+MBIT                                  SEPT12     16  I
THERMO        MWORD=MWORD+1                                 SEPT12     17  I
THERMO        GO TO 25                                      SEPT12     18  I
THERMO     40 M=M+1                                         SEPT12     19  I
THERMO        MDIF=MBIT-KTAB                                SEPT12     20  I
THERMO        IF(MDIF)50,60,60                              SEPT12     21  I
THERMO     50 IWORD=SHIFT(AND(IN(MWORD),MASK(MBIT)),-MDIF)  SEPT12     22  I
THERMO        MWORD=MWORD+1                                 SEPT12     23  I
THERMO        MBIT=60+MDIF                                  SEPT12     24  I
THERMO        MOUT(M)=OR(IWORD,AND(SHIFT(IN(MWORD),-MBIT),MASK(-MDIF)))  SEPT12  25  I
THERMO        GO TO 10                                      SEPT12     26  I
THERMO     60 MOUT(M)=AND(IN(MWORD),MASK(KTAB))             SEPT12     27  I
THERMO     70 MBIT=60                                       SEPT12     28  I
THERMO        MWORD=MWORD+1                                 SEPT12     29  I
THERMO        GO TO 10                                      SEPT12     30  I
THERMO     80 MBIT=MDIF                                     SEPT12     31  I
THERMO        MOUT(M)=AND(SHIFT(IN(MWORD),-MDIF),MASK(KTAB))  SEPT12  32  I
THERMO        GO TO 10                                      SEPT12     33  I
THERMO     90 RETURN                                        SEPT12     34  I
THERMO        END                                           SEPT12     35  I
THERMO        SUBROUTINE DONE(IT)                           SEPT12     36  I
THERMO  C     SUBROUTINE TO DISMOUNT TAPE IT, AND MOUNT NEXT TAPE.  SEPT12  37  I
THERMO        PAUSE " MOUNT NEXT TAPE "                     SEPT12     38  I
THERMO        RETURN                                        SEPT12     39  I
THERMO        END                                           SEPT12     40  I
THERMO        SUBROUTINE GETMSK(IM)                         SEPT12     41  I
THERMO        DIMENSION IM(60)                              SEPT12     42  I
THERMO        DATA MASK/0000000000000000000010/             SEPT12     43  I
THERMO        IM(1)=MASK                                    SEPT12     44  I
THERMO        DO 10 I=2,57                                  SEPT12     45  I
THERMO        IM(I)=OR(SHIFT(IM(I-1),1),MASK)               SEPT12     46  I
```

```
THERMO      10 CONTINUE                                                    SEPT12      47      I
THERMO         IM(58)=177777777777777777778                                SEPT12      48      I
THERMO         IM(59)=377777777777777777778                                SEPT12      49      I
THERMO         IM(60)=777777777777777777778                                SEPT12      50      I
THERMO         END                                                         SEPT12      51      I
THERMO    *WEOR                                                            THERMO    1995
```

CORRECTION IDENTS ARE LISTED IN CHRONOLOGICAL ORDER OF INSERTION

THERMO. MAY75 SEPT12

DECKS ARE LISTED IN THE ORDER OF THEIR OCCURRENCE ON A NEW PROGRAM LIBRARY IF ONE IS CREATED BY THIS UPDATE

YANK$$$ THERMO

DECKS WRITTEN TO COMPILE FILE

THERMO

THIS UPDATE REQUIRED 336008 WORDS OF CORE.

```
      PROGRAM P2171(INPUT,OUTPUT,TAPE9=INPUT,TAPE6=OUTPUT,TAPE11,          THERMO     2
     1 TAPE9,TAPE10,TAPE12,TAPE14,TAPE4=INPUT)                              MAY75      1
      COMMON IBEFOR(7),IAFTER(7),ITOP,IPICT(10100)                          THERMO     4
       COMMON/IPMTX/NLEFT,NRIGHT,IWTP,ILTP,IBKGR,CONVF,MAXCNT,JEND,NFR,     THERMO     5
     5  .   RLSLFT,RESWFT,LABEL,LABEL1(2,6),XSUM,RESRAD,SR                  THERMO     6
     .,IWTRK,ILTRK,XTRK,YTRK,ITPT                                           THERMO     7
     .,IPRMTX,ISUMM                                                         THERMO     8
       COMMON/POPFT/NWS,NSR,ONE,IEND,JSTOP,START,STOP,ICKSTR,ICKSTP         THERMO     9
     . ,IVALID,ICAL,INPT                                                    THERMO    10
    10 COMMON/MAXVAL/UFCR,UBACK,VLEFT,VRIGHT,WBOT,WTOP,THETA,               THERMO    11
     .  UAXIS,VAXIS,UVPLNE ,IU(2,2),IV(2,2),IW(2,2)                         THERMO    12
       COMMON/PLIM/IFOR,IBACK,ILEFT,IRIGHT,IVIEW,IPASS                      THERMO    13
C**** THIS PROGRAM READS AN AGA THERMOVISION TAPE PRODUCED BY P9200.        THERMO    14
C     O/P MAY BE LISTING, 3-D PICTURES, AND PACKED TAPE AS PER OPTIONS.     THERMO    15
    15                                                                      THERMO    16
C***  VARIABLE IDENTIFICATION.                                             THERMO    17
C     NWS=NO. OF WORDS/SAMPLE ON I/P TAPE (1-40)                           THERMO    18
C     NSR=NO. OF SAMPLES/RECORD ON I/P TAPE (1-5)                          THERMO    19
C     ONE = NO OF MILLISECONDS/SAMPLE ON I/P TAPE6                         THERMO    20
    20C     IEND= NO@ OF FILES RIAD.                                        THERMO    21
C     JSTOP=1, IF TIME GREATER THAN STOP TIME                              THERMO    22
C          =0, OTHERWISE.                                                  THERMO    23
C     START= START TIME IN MILLISECONDS.                                   THERMO    24
C     STOP= STOP TIME IN MILLISECONDS.                                     THERMO    25
    29C     IPRINT= 0, NO PRINTED O/P                                       THERMO    26
C          =1, PRINT TIME AND SWITCH SETTINGS.                             THERMO    27
C          =1, PRINT TIME,SWITCH SETTINGS, AND SPECIFIED WORDS.            THERMO    28
C     IPLOT=0, NO PLOT O/P                                                 THERMO    29
C          =1, PLOT 3D IMAGE OF PICTURE                                    THERMO    30
    30C          =2, PLOT 2D OF LINES AND WORDS SPECIFIED.                  THERMO    31
C     ITAPE=0, NO O/P TAPE6                                                THERMO    32
C          =1, MAKE PACKED O/P TAPE                                        THERMO    33
                                                                            THERMO    34
                                                                            THERMO    35
    35   DIMENSION CONV(8,8,4),TAP10(30)                                    THERMO    36
      DIMENSION LABEL(2,25),KRD(8),IOPT(10)                                 THERMO    37
      DIMENSION IOELE(2,25)                                                 THERMO    38
      COMMON /CLASF/ ICLASS,TITLE(8)                                        THERMO    39
      DIMENSION IFILT(8)                                                    THERMO    40
    40DIMENSION IPIC(100,100)                                               THERMO    41
       DIMENSION XPICT(100)                                                 THERMO    42
      EQUIVALENCE(IPICT(10001),XPICT(1))                                    THERMO    43
       EQUIVALENCE(IPIC(1,1),IPICT(1)),(I1,IBEFOR(1)),(I2,IAFTER(1))        THERMO    44
       LOGICAL IPL3D,IPL2D                                                  THERMO    45
    45                                                                      THERMO    46
      DATA TAP10/30*0./                                                     THERMO    47
      DATA CONV/256*1.0/                                                    THERMO    48
       DATA LABEL/50*1H  /                                                  THERMO    49
      DATA IFILT / 10H2.0 - 5.5  ,                                          THERMO    50
    50.            10H3.97-4.81   ,                                         THERMO    51
     .             10H3.80-4.64   ,                                         THERMO    52
     .             10H2.0 - 5.5  ,                                          THERMO    53
     .             10H2.3 - 3.3   ,                                         THERMO    54
     .             10H2.9 - 3.8   ,                                         THERMO    55
    55.            10H4.05-4.9    ,                                         THERMO    56
     .             10H4.17-4.2    /                                        THERMO    57
          F(X,A1,A2,FA1,FA2)=(X-A2)*FA1/(A1-A2)+(X-A1)*FA2/(A2-A1)          THERMO    58
```

```
                C**** SET DEFAULT VALUES.                                    THERMO  59
                      NWS=140                                                THERMO  60
      60              NSR=9                                                  THERMO  61
                      ONE=12.305                                             THERMO  62
                       DO 2 I=1,6                                            THERMO  63
                       TITLE(I)=1H                                           THERMO  64
                      LABEL(1,1)=10H                                         THERMO  65
      65        2     CONTINUE                                               THERMO  66
                      NPICT=0                                                THERMO  67
                       LABEL(1,5)=10HFILTER =                                THERMO  68
                      ITRK=0                                                 THERMO  69
                       LIN9=-1                                               THERMO  70
      70              IT10=10                                                THERMO  71
                       ILCENT=60                                             THERMO  72
                       IWCENT=49                                             THERMO  73
                      RESLIN=10./69                                          THERMO  74
                       RESWD=5./49                                           THERMO  75
      75              RADLIN=RESLIN*.0174532952                              THERMO  76
                      RADWD=RESWD*.0174532952                                THERMO  77
                      RESRAD=RADLIN*RADWD                                    THERMO  78
                      IFIND=1                                                THERMO  79
                      ISLEFT=1                                               THERMO  80
      80              ISRITE=100                                             THERMO  81
                      IBOVE=1                                                THERMO  82
                       IBELOW=100                                            THERMO  83
                      IJSUM=0                                                THERMO  84
                       DLEFT=-2.0                                            THERMO  85
      85                DRIGHT=8.0                                           THERMO  86
                       DABOVE=2.2                                            THERMO  87
                       DBELOW=-2.2                                           THERMO  88
                       IPEET=0                                               THERMO  89
                      IDEL=0                                                 THERMO  90
      90              NFRMTX=4                                               THERMO  91
                       SR=500.                                               THERMO  92
                       ATP=0.0                                               THERMO  93
                      ETP=6.0                                                THERMO  94
                      XTRK=-9999.                                            THERMO  95
      95              YTRK=-9999.                                            THERMO  96
                       RB=270.0                                              THERMO  97
                       DA=6.0                                                THERMO  98
                        ATRK=0.0                                             THERMO  99
                       ETRK=0.0                                              THERMO 100
     100              ILTP=49                                                THERMO 101
                       ABIAS=0.0                                             THERMO 102
                       EBIAS=0.0                                             THERMO 103
                       IMXCT=-1                                              THERMO 104
                      ITSEND=0                                               THERMO 105
     105              IFSEND=0                                               THERMO 106
                        TTDIF=0.0                                            THERMO 107
                       IWTP=45                                               THERMO 108
                       IBK=0                                                 THERMO 109
                      MINVAL=0                                               THERMO 110
     110              MNVAL=0                                                THERMO 111
                      IEDCNT=100                                             THERMO 112
                       MINLOT=20                                             THERMO 113
                       IEOT=1                                                THERMO 114
                      IEOUF=0                                                THERMO 115
```

```
      IEDOWN=0                                                          THERMO  116
       IGLFRM=0                                                         THERMO  117
      MXL1=58                                                           THERMO  118
       IMXL=1                                                           THERMO  119
      IMXW=1                                                            THERMO  120
120   MXW1=23                                                           THERMO  121
      MXL2=60                                                           THERMO  122
      MXW2=63                                                           THERMO  123
       IMTX=0                                                           THERMO  124
       IPRMTX=0                                                         THERMO  125
125    NFRM=999999                                                      THERMO  126
       IEND=0                                                           THERMO  127
       JSTOP=0                                                          THERMO  128
      START=0.0                                                         THERMO  129
       STOP=99999999.                                                   THERMO  130
130   IPRINT=1                                                          THERMO  131
      TISAVE=0.0                                                        THERMO  132
       IVALID=2                                                         THERMO  133
       PCT=.5                                                           THERMO  134
       PCT=.75                                                          THERMO  135
135    ICAL=0                                                           THERMO  136
       IPLOT=0                                                          THERMO  137
      ITAPE=0                                                           THERMO  138
      IPL2D=.FALSE.                                                     THERMO  139
      IPL3D=.FALSE.                                                     THERMO  140
140   ITPT =0                                                           THERMO  141
       IPCNT=-1                                                         THERMO  142
        IP3DL1=1                                                        THERMO  143
        IP3DL2=100                                                      THERMO  144
        IP3DW1=1                                                        THERMO  145
145     IP3DW2=100                                                      THERMO  146
        IP2DL1=1                                                        THERMO  147
        IP2DL2=100                                                      THERMO  148
        IP2DW1=1                                                        THERMO  149
        IP2DW2=100                                                      THERMO  150
150    IPRL1=1                                                          THERMO  151
       IPRL2=100                                                        THERMO  152
      IPRW1=1                                                           THERMO  153
      IPRW2=100                                                         THERMO  154
       IPVL=58                                                          THERMO  155
155   IPVL2=60                                                          THERMO  156
      IPVW=26                                                           THERMO  157
      IPVW2=64                                                          THERMO  158
      NPL3D=1                                                           THERMO  159
      NPL2D=1                                                           THERMO  160
160   ITOP=11                                                           THERMO  161
       IGLASS=0                                                         THERMO  162
      ILINE=0                                                           THERMO  163
        UFOR=100.                                                       THERMO  164
       UBACK=1.                                                         THERMO  165
165    VLEFT=1.                                                         THERMO  166
       VRIGHT=100.                                                      THERMO  167
      WBOT=0.                                                           THERMO  168
       WTOP=1000.                                                       THERMO  169
       THETA=.785                                                       THERMO  170
170    UAXIS=1.                                                         THERMO  171
       VAXIS=1.                                                         THERMO  172
```

```
                      OVPLNE=0.                                                 THERMO  173
                      IFOR=100                                                  THERMO  174
                     IBACK=1                                                    THERMO  175
  175                 ILEFT=1                                                   THERMO  176
                      IRIGHT=100                                                THERMO  177
                      ICNTJO=-1                                                 THERMO  178
                      IVIEW=1                                                   THERMO  179
                      ICKSTR=1                                                  THERMO  180
  180                 ICKSTP=0                                                  THERMO  181
                C**** PRINT OUT ALL I/P CARDS                                   THERMO  182
                10    CONTINUE                                                  THERMO  183
                      CALL REPRNT                                               THERMO  184
                C**** READ I/P CARDS AND DETERMINE OPTIONS                      THERMO  185
  185              11 ITAP=1                                                    THERMO  186
                      RBSAV=-999.                                               THERMO  187
                      IF(IFSEND.EQ.1.AND.ITSEND.EQ.1)END FILE 12                THERMO  188
                      IFSEND=1                                                  THERMO  189
                     NEWPAS=1                                                   THERMO  190
  190                 ICNTJO=-1                                                 THERMO  191
                      NFR=0                                                     THERMO  192
                12     CONTINUE                                                 THERMO  193
                      READ(4,1002)KRD                                           THERMO  194
                     GO TO (15,16),ITAP                                         THERMO  195
  195              15 IF(EOF(4))999,14,999                                      THERMO  196
                   16 IF(EOF(4))200,14,200                                      THERMO  197
                   14 CONTINUE                                                  THERMO  198
                1002  FORMAT(8A10)                                            THERMO  199
                      IF(KRD(1).NE.5HLABEL )GO TO 13                            THERMO  200
  200                 DECODE(70,1003,KRD(2))ILAB,LABEL(1,ILAB),LABEL(2,ILAB)    THERMO  201
                1003  FORMAT(I2,8X,2A10)                                       THERMO  202
                      GO TO 12                                                  THERMO  203
                13    CONTINUE                                                  THERMO  204
                      DECODE(80,1000,KRD(1))KARD,IOPT,X1,X2,X3,X4               THERMO  205
  205                 ITAP=2                                                    THERMO  206
                                                                                THERMO  207
                1000   FORMAT(A4,6X,10I2,5F10.2)                                THERMO  208
                      IF(KARD.EQ.4HTITL)GO TO 100                               THERMO  209
                      IF(KARD.EQ.4HPLOT)GO TO 110                               THERMO  210
  210                 IF(KARD.EQ.4HPRIN)GO TO 120                               THERMO  211
                      IF(KARD.EQ.4HTAPE)GO TO 130                               THERMO  212
                      IF(KARD.EQ.4HTIME)GO TO 140                               THERMO  213
                      IF(KARD.EQ.4HDELE)GO TO 141                               THERMO  214
                      IF(KARD.EQ.4HLINI)GO TO 150                               THERMO  215
  215                  IF(KARD.EQ.4HCLAS)GO TO 160                              THERMO  216
                     IF(KARD.EQ.4HVALI)GO TO 170                                THERMO  217
                     IF(KARD.EQ.4HCAL  )GO TO 180                               THERMO  218
                      IF(KARD.EQ.4HCONV)GO TO 190                               THERMO  219
                     IF(KARD.EQ.4HCENT)GO TO 192                                THERMO  220
  220                 IF(KARD.EQ.4HTRAC)GO TO 194                               THERMO  221
                      IF(KARD.EQ.4HMIN  )GO TO 196                              THERMO  222
                      IF(KARD.EQ.4HMATF )GO TO 1940                             THERMO  223
                      IF(KARD.EQ.4HTAIL )GO TO 198                              THERMO  224
                     IF(KARD.EQ.4HEDIT)GO TO 1988                               THERMO  225
  225                 IF(KARD.EQ.4HGO   )GO TO 200                              THERMO  226
                      PRINT 2004,KRD                                            THERMO  227
                2004   FORMAT(1H0,* THE PROGRAM DID NOT RECOGNIZE THE FOLLOWING CARD*/  THERMO  228
                     ,  1X,8A10)                                                THERMO  229
```

```
                      GO TO 12                                                  THERMO  230
230             100   CONTINUE                                                  THERMO  231
                C****TITLE CAR  READ INPUT TITLE                                THERMO  232
                      READ(4,1001)TITLE                                         THERMO  233
                     IF(EOF(4))200,101,200                                      THERMO  234
                  101 CONTINUE                                                  THERMO  235
235             1001  FORMAT(6A10)                                              THERMO  236
                      GO TO 12                                                  THERMO  237
                110   CONTINUE                                                  THERMO  238
                C**** PLOT OPTION CARD                                          THERMO  239
                     IPLOT=IOPT(1)                                              THERMO  240
240                   IJSUM=IOPT(10)                                            THERMO  241
                     IF(IPLOT.EQ.3.AND.X1.GT.0.0)WTOP=X1                        THERMO  242
                     IPL3D=.TRUE.                                               THERMO  243
                      IF(IOPT(2).NE.0)IP3DL1=IOPT(2)                            THERMO  244
                      IF(IOPT(3).NE.0)IP3DL2=IOPT(3)                            THERMO  245
245                   IF(IOPT(4).NE.0)IP3DW1=IOPT(4)                            THERMO  246
                      IF(IOPT(5).NE.0)IP3DW2=IOPT(5)                            THERMO  247
                      IF(IOPT(6).NE.0)NPL3D=IOPT(6)                             THERMO  248
                       IVIEW=IOPT(7)                                            THERMO  249
                      IPASS=-1                                                  THERMO  250
250                   IF(IVIEW.LT.1.OR.IVIEW.GT.4)IVIEW=1                       THERMO  251
                      GO TO (1101,1102,1103,1104),IVIEW                         THERMO  252
                1101  IFOR=IP3DL2                                              THERMO  253
                     IBACK=IP3DL1                                               THERMO  254
                     ILEFT=IP3DW1                                               THERMO  255
255                  IRIGHT=IP3DW2                                              THERMO  256
                      GO TO 1105                                                THERMO  257
                1102  IFOR=IP3DW2                                               THERMO  258
                     IBACK=IP3DW1                                               THERMO  259
                     ILEFT=IP3DL2                                               THERMO  260
260                   IRIGHT=IP3DL1                                             THERMO  261
                      GO TO 1105                                                THERMO  262
                1103  IFOR=IP3DL1                                               THERMO  263
                     IBACK=IP3DL2                                               THERMO  264
                     ILEFT=IP3DW2                                               THERMO  265
265                  IRIGHT=IP3DW1                                              THERMO  266
                      GO TO 1105                                                THERMO  267
                1104  IFOR=IP3DW1                                               THERMO  268
                     IBACK=IP3DW2                                               THERMO  269
                     ILEFT=IP3DL1                                               THERMO  270
270                  IRIGHT=IP3DL2                                              THERMO  271
                1105  CONTINUE                                                  THERMO  272
                     UFOR=IFOR                                                  THERMO  273
                      UBACK=IBACK                                               THERMO  274
                      VLEFT=ILEFT                                               THERMO  275
275                  VRIGHT=IRIGHT                                              THERMO  276
                     UAXIS=VLEFT                                                THERMO  277
                     VAXIS=UBACK                                                THERMO  278
                     GO TO 12                                                   THERMO  279
                112   CONTINUE                                                  THERMO  280
280                   GO TO 12                                                  THERMO  281
                120    CONTINUE                                                 THERMO  282
                C**** PRINT OPTION CARD                                         THERMO  283
                      IPRINT=IOPT(1)                                            THERMO  284
                      IF(IOPT(7).NE.0)IPVL=IOPT(7)                              THERMO  285
285                   IF(IOPT(8).NE.0)IPVW=IOPT(8)                              THERMO  286
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                      IF(IOPT(9).NE.0)IPVL2=IOPT(9)                              THERMO  287
                     IF(IOPT(10).NE.0)IPVH2=IOPT(10)                             THERMO  288
                      IF(IPRINT.EQ.1)GO TO 12                                    THERMO  289
                      IF(IOPT(2).NE.0)IFRL1=IOPT(2)+1                            THERMO  290
290                   IF(IOPT(3).NE.0)IPRL2=IOPT(3)                              THERMO  291
                      IF(IOPT(4).NE.0)IFRH1=IOPT(4)+1                            THERMO  292
                      IF(IOPT(5).NE.0)IPRH2=IOPT(5)                              THERMO  293
                       IF(IOPT(6).NE.0)NPRINT=IOPT(6)                            THERMO  294
                       GO TO 12                                                  THERMO  295
295             130    CONTINUE                                                   THERMO  296
                C**** TAPE OPTION CARD                                           THERMO  297
                       ITAPE=IOPT(1)                                             THERMO  298
                       IF(IOPT(2).NE.0)NSR=IOPT(2)                               THERMO  299
                       ITSEND=IOPT(3)                                            THERMO  300
300                     IF(X1.GT..01)ONE=X1                                      THERMO  301
                       GO TO 12                                                  THERMO  302
                150    CONTINUE                                                  THERMO  303
                C**** TIME CARD                                                  THERMO  304
                      START=IOPT(1)*3600000.+IOPT(2)*60000.+IOPT(3)*1000.+IOPT(4)*10.  THERMO  305
305                  .  +IOPT(5)/10.                                             THERMO  306
                      STOP= IOPT(6)*3600000.+IOPT(7)*60000.+IOPT(8)*1000.+IOPT(9)*10.  THERMO  307
                     .  +IOPT(10)/10.                                            THERMO  308
                       ICKSTR=1                                                  THERMO  309
                       ICKSTP=0                                                  THERMO  310
310                    IF(STOP.GT.START)ICKSTP=1                                 THERMO  311
                       IF(STOP.LT..01)STOP=999999999.                            THERMO  312
                         IF(X1.GT..1)NFRM=X1                                     THERMO  313
                       GO TO 12                                                  THERMO  314
                141    CONTINUE                                                  THERMO  315
315             C***   DELETE CARD                                               THERMO  316
                      IF(IDEL.GE.25)GO TO 12                                     THERMO  317
                      IDEL=IDEL+1                                                THERMO  318
                      IDELE(1,IDEL)=IOPT(1)*3600000.+IOPT(2)*60000.+IOPT(3)*1000.  THERMO  319
                     . +IOPT(4)*10.+IOPT(5)/10.                                  THERMO  320
320                   IDELE(2,IDEL)=IOPT(6)*3600000.+IOPT(7)*60000.+IOPT(8)*1000.  THERMO  321
                     . +IOPT(9)*10.+IOPT(10)/10.                                 THERMO  322
                      GO TO 12                                                   THERMO  323
                160    CONTINUE                                                  THERMO  324
                C**** TOP CARD.  THIS CARD SETS THE LINE TO BE TOP OF PICTURE.   THERMO  325
325                    ITOP=IOPT(1)                                              THERMO  326
                       GO TO 12                                                  THERMO  327
                C**** CLASSIFICATION CARD.  1=CONFIDENTIAL, 2=SECRET.            THERMO  328
                170    CONTINUE                                                  THERMO  329
                       ICLASS=IOPT(1)                                            THERMO  330
330                    CALL SECURE(KRD,G)                                        THERMO  331
                       ICLFRM=1                                                  THERMO  332
                      GO TO 12                                                   THERMO  333
                C**** VALID DATA SWITCH CARD                                     THERMO  334
                176    CONTINUE                                                  THERMO  335
335                   IVALID=IOPT(1)                                             THERMO  336
                      GO TO 12                                                   THERMO  337
                                                                                 THERMO  338
                C**** THIS CARD SELECTS CALIBRATION FRAMES ONLY                  THERMO  339
                180    CONTINUE                                                  THERMO  340
340                    ICAL=IOPT(1)                                              THERMO  341
                       GO TO 12                                                  THERMO  342
                C**** CONVERSION CARD. THIS CARD CONTAINS PROPER CONVERSION FACTOR THERMO  343
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                C     (CALIBRATION) TO CONVERT FROM COUNTS TO IRRADIANCE FOR A GIVEN      THERMO   344
                C     FILTER,APERATURE,GAIN SETTING.                                     THERMO   345
      345                                                                                  THERMO   346
                190     CONTINUE                                                           THERMO   347
                      IF=IOPT(1)+1                                                       THERMO   348
                      IA=IOPT(2)+1                                                       THERMO   349
                       IG=IOPT(3)                                                        THERMO   350
      350             IF(IA.GT.8.OR.IF.GT.8.OR.IG.GT.4)GO TO 12                          THERMO   351
                       CONV(IF,IA,IG)=X1                                                 THERMO   352
                       GO TO 12                                                          THERMO   353
                                                                                         THERMO   354
                C**** CENTER CARD.  THIS CARD SPECIFIES CENTER LINE, WORD AND ANGULAR     THERMO   355
      355       C     RESOLUTION OF PICTURE CELL.                                        THERMO   356
                192    CONTINUE                                                          THERMO   357
                       ILCENT=IOPT(1)                                                    THERMO   358
                      IWCENT=IOPT(2)                                                     THERMO   359
                       RESLIN=X1                                                         THERMO   360
      360              RESWD=X2                                                         THERMO   361
                      GO TO 12                                                           THERMO   362
                                                                                         THERMO   363
                C**** TRACK POINT CARD.  THIS CARD SPECIFIES TAPE CONTAINING TRACK POINT THERMO   364
                C     TO BE READ. (TAPE 10)                                              THERMO   365
      365       194   CONTINUE                                                           THERMO   366
                       ITRK=IOPT(1)                                                      THERMO   367
                      ITPT = IOPT(2)                                                     THERMO   368
                      IF(ITPT.EQ.1) IT10 =24                                             THERMO   369
                       ABIAS=X1                                                          THERMO   370
      370              EBIAS=X2                                                         THERMO   371
                       GO TO 12                                                          THERMO   372
                                                                                         THERMO   373
                1940   CONTINUE                                                         THERMO   374
                C**** MATRIX CARD. THIS CARD SPECIFIES MATRIX TO BE OUTPUT              THERMO   375
      375                                                                                THERMO   376
                      IMTX=IOPT(1)                                                       THERMO   377
                      DLEFT=X1                                                           THERMO   378
                       DRIGHT=X2                                                         THERMO   379
                       NFRMTX=X3                                                         THERMO   380
      380              IF(ABS(X1).LT..000001)DLEFT=-.7                                  THERMO   381
                       IF(ABS(X2).LT..000001)DRIGHT=10.0                                THERMO   382
                       IFIND=IOPT(4)                                                     THERMO   383
                        IF(NFRMTX.EQ.0)NFRMTX=4                                          THERMO   384
                      RBCELL=IOPT(3)                                                     THERMO   385
      385              IFCLT=IOPT(2)                                                    THERMO   386
                       IFRMTX=IOPT(5)                                                    THERMO   387
                      .GO TO 12                                                          THERMO   388
                                                                                         THERMO   389
                C**** THIS CARD CHANGES THE MINIMUM VALUE FOR WHICH TO EDIT THE         THERMO   390
      390       C     PICTURE.  IF THE MAXIMUM VALUE IN THE PICTURE IS LESS THAN THIS    THERMO   391
                C     VALUE, THEN THE PICTURE WILL NOT BE PLOTTED. (DEFAULT MINIMUM=20)  THERMO   392
                196    CONTINUE                                                          THERMO   393
                       MNVAL=X1                                                          THERMO   394
                       GO TO 12                                                          THERMO   395
      395       C**** EDIT CARD. THIS CARD SETS COUNT VALUES FOR EDITING NOISE SPIKES    THERMO   396
                C     OR TURNS OFF EDIT IF REQUESTED.                                    THERMO   397
                                                                                         THERMO   398
                1988   CONTINUE                                                          THERMO   399
                       IEDT=IOPT(1)                                                      THERMO   400
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                      IF(X1.GT.1.0)IEDUP=X1                                    THERMO   401
                      IF(X2.GT.1.0)IEDOWN=X2                                   THERMO   402
                      IF(ABS(X4).GT..0001)PCT=X4                               THERMO   403
                      IBK=X3                                                   THERMO   404
                      GO TO 12                                                 THERMO   405
  405         198     CONTINUE                                                 THERMO   406
              C**** THIS CARD SPECIFIES A2, EL OF TAIL PIPE AND TRACK POINT. ( ASSUME THERMO   407
              C     NOT READ TAPE 10)                                          THERMO   408
                      ITRK=-1                                                  THERMO   409
                      ATP=X1                                                   THERMO   410
  410                 ETP=X2                                                   THERMO   411
                      ATRK=X3                                                  THERMO   412
                      ETRK=X4                                                  THERMO   413
                      GO TO 12                                                 THERMO   414
              200     CONTINUE                                                 THERMO   415
  415                 IHOVER=10HVER DEG                                        THERMO   416
                      IHOHOR=10HHOR DEG                                        THERMO   417
                      IF(IFEET.EQ.0)GO TO 201                                  THERMO   418
                      IHOVER=10HVER FT                                         THERMO   419
                      IHOHOR=10HHOR FT                                         THERMO   420
  420         201     CONTINUE                                                 THERMO   421
                      IF(ITAPE.NE.2)GO TO 202                                  THERMO   422
                      CALL PACKED                                              THERMO   423
                      GO TO 203                                                THERMO   424
              202     CONTINUE                                                 THERMO   425
  425                 CALL GETPIC                                              THERMO   426
              203     CONTINUE                                                 THERMO   427
                      IF(IEND.GT.0)GO TO 999                                   THERMO   428
                      NFR=NFR+1                                                THERMO   429
                      IF(NFR.GT.NFRM)GO TO 11                                  THERMO   430
  430                 IF(JSTOP.GT.0)GO TO 11                                   THERMO   431
                      IF(IDEL.EQ.0)GO TO 2044                                  THERMO   432
                      DO 264 I=1,IDEL                                          THERMO   433
                      IF(T1.LT.TDELE(1,I).OR. T1.GT.TDELE(2,I)) GO TO 204      THERMO   434
                      ICNT3D=ICNT3D+1                                          THERMO   435
  435                 GO TO 201                                                THERMO   436
              204     CONTINUE                                                 THERMO   437
              2044    CONTINUE                                                 THERMO   438
                      DIFF=(T2-T1)/100.                                        THERMO   439
                      TIDIFF=(T1-T1SAVE)/1000.                                 THERMO   440
  440                 T1SAVE=T2                                                THERMO   441
              C**** FIND PROPER CONVERSION FACTOR                              THERMO   442
                      IF=IBEFOR(2)+1                                           THERMO   443
                      IA=IBEFOR(3)+1                                           THERMO   444
                      IG=IBEFOR(4)                                             THERMO   445
  445                 IC=IBEFOR(5)                                             THERMO   446
                      CONVF=CONV(IF,IA,IG)                                     THERMO   447
                      IF(ICLASS.EQ.0)GO TO 2045                                THERMO   448
                      LABEL(2,5)=IFILT(IF)                                     THERMO   449
              2045    CONTINUE                                                 THERMO   450
  450                                                                          THERMO   451
                      CALL IHMS(T1,IH1,IM1,SEC1)                               THERMO   452
                      CALL IHMS(T2,IH2,IM2,SEC2)                               THERMO   453
                      IF(IG.EQ.1)GO TO 2046                                    THERMO   454
                      LABEL(1,14)=10H                                          THERMO   455
  455                 LABEL(2,14)=10H                                          THERMO   456
                      IF(IG.EQ.2)LABEL(1,14)=10HGAIN = X1                      THERMO   457
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                IF(IG.EQ.3)LABEL(1,14)=10HGAIN = X10                                THERMO   458
             2046  CONTINUE                                                         THERMO   459
                IF(IC.EQ.0)NPICT=NPICT+1                                            THERMO   460
      460       ENCODE (40,2005,LABEL1(1,1))IH1,IM1,SEC1,NPICT                      THERMO   461
             2005  FORMAT(*TIME*,I3,I2,F7.3,4X,*FRAME NO.*,I6,5X)                   THERMO   462
             C**** PRINT AS PER I/P OPTION                                          THERMO   463
                IF(IPRINT.EQ.0)GO TO250                                             THERMO   464
                ICARIG=1H                                                           THERMO   465
      465       IF(NEWPAS.EQ.1)ICARIG=1H0                                           THERMO   466
                IF(NEWPAS.EQ.1)PRINT 1998, ICARIG,TITLE                             THERMO   467
                NEWPAS=0                                                            THERMO   468
             1998  FORMAT(A1,20X,8A10//                                            THERMO   469
            .9X,*FRAME*,9X,*TIME    TIME    TIME  P  A  G  C  V  LT+  LTH*,3X,     THERMO   470
      470   .*C1  C1  C1   C2  C2  C2  MAX MAX MAX AVG   AZ OF   EL OF*/ 8X,       THERMO   471
            . *NUMBER*,7X*BEFORE    DIFF     BET  I  P  N  A  A  BEF  AFT*,2X,     THERMO   472
            .*CNT  LN  WD  CNT  LN  WD  CNT  LN  WD CNT    MAX     MAX*/10X,       THERMO   473
            .  13X,*PICT*,12X,*PICT  L        L  L*,57X,*CELL    CELL*)           THERMO   474
                IF(IPRINT.NE.1)PRINT 1999                                           THERMO   475
      475   1999  FORMAT(1X)                                                        THERMO   476
                IPC=1H                                                              THERMO   477
                 IF(.NOT.IPL3D)GO TO 205                                            THERMO   478
                IF(MOD((ICNT3D+1),NPL3D).EQ.0)IPC=1H*                               THERMO   479
             205   CONTINUE                                                         THERMO   480
      480    C**** DETERMINE BACKGROUND LEVEL FOR EDITING                           THERMO   481
                DO 2059 I=10001,10060                                               THERMO   482
             2059    IPICT(I)=0                                                     THERMO   483
                DO 2060 I=2,100                                                     THERMO   484
                DO 2060 J=1,100                                                     THERMO   485
      485       IF(IPIC(I,J).LE.0)GO TO 2060                                        THERMO   486
                IF(IPIC(I,J).GE.200)GO TO 2060                                      THERMO   487
                IF(IPIC(I,J).LT.IPIC(I-1,J))GO TO 2060                              THERMO   488
                 INDX=IPIC(I,J)/10+10001                                            THERMO   489
                IPICT(INDX)=IPICT(INDX)+IPIC(I,J)                                   THERMO   490
      490       IPICT(INDX+20)=IPICT(INDX+20)+1                                     THERMO   491
             2060   CONTINUE                                                        THERMO   492
             C**** SCAN FREQUENCY IN CELLS TO DETERMINE CELL WITH GREATEST OCCURRENCE THERMO   493
                NUMVAL=0                                                            THERMO   494
                ISUM=10                                                             THERMO   495
      495       DO 2065 I=10001,10020                                               THERMO   496
                IF(IPICT(I+20).EQ.0)GO TO 2065                                      THERMO   497
                IPICT(I+40)=IPICT(I)/IPICT(I+20)                                    THERMO   498
                IF(NUMVAL.GT.IPICT(I+20))GO TO 2065                                 THERMO   499
                NUMVAL=IPICT(I+20)                                                  THERMO   500
      500       ISUM=IPICT(I+40)                                                    THERMO   501
             2065   CONTINUE                                                        THERMO   502
                DO 2066 I=10001,10060                                               THERMO   503
                IPICT(I)=-1                                                         THERMO   504
             2066    CONTINUE                                                       THERMO   505
      505       IEDCNT=MAX0(4*ISUM,30)                                              THERMO   506
                IADD=PCT*ISUM                                                       THERMO   507
                MINEDT=ISUM+MAX0(IADD,3)                                            THERMO   508
                IF(IEDUP.NE.0)IEDCNT=IEDUP                                          THERMO   509
                IF(IEDOWN.NE.0)MINEDT=IEDOWN                                        THERMO   510
      510       MAXCNT=0                                                            THERMO   511
                 MXCNT1=0                                                           THERMO   512
                MXCNT2=0                                                            THERMO   513
                 ISUM=0                                                             THERMO   514
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                      NSUM=0                                                    THERMO   514
  515                 DO 206 I=1,100                                            THERMO   515
                      I1=MAX0(I-1,1)                                            THERMO   516
                      I2=MIN0(I+1,100)                                          THERMO   517
                      DO 206 J=1,100                                            THERMO   518
                C**** EDIT NOISE SPIKES IF REQUESTED                            THERMO   519
  520                 IF(IEDT.EQ.0)GO TO 2094                                   THERMO   520
                      MAXADJ=0                                                  THERMO   521
                      J1=MAX0(J-1,1)                                            THERMO   522
                      J2=MIN0(J+1,100)                                          THERMO   523
                      MAXADJ=MAX0(IPIC(I1,J),IPIC(I2,J),IPIC(I,J1),IPIC(I,J2))  THERMO   524
  525                 IF(IPIC(I,J).LT.3*MAXADJ)GO TO 2047                       THERMO   525
                      IPIC(I,J)=MAXADJ                                          THERMO   526
                      GO TO 2053                                                THERMO   527
                2047   CONTINUE                                                 THERMO   528
                      IF(IPIC(I,J).LT.(MINEDT+IEDCNT))GO TO 2053                THERMO   529
  530                  IF(J.EQ.100)GO TO 2048                                   THERMO   530
                       IF(IPIC(I,J+1).GT.MINEDT)GO TO 2053                      THERMO   531
                      IF(J.NE.1)GO TO 2048                                      THERMO   532
                      IPIC(I,J)=IPIC(I,J+1)                                     THERMO   533
                      GO TO 2093                                                THERMO   534
  535           2048   IF(IPIC(I,J-1).GT.MINEDT)GO TO 2053.                     THERMO   535
                      IF(J.NE.100)GO TO 2050                                    THERMO   536
                      IPIC(I,J)=IPIC(I,J-1)                                     THERMO   537
                      GO TO 2093                                                THERMO   538
                2050  IPIC(I,J)=(IPIC(I,J-1)+IPIC(I,J+1))/2.                   THERMO   539
  540           2053   CONTINUE                                                 THERMO   540
                2054   CONTINUE                                                 THERMO   541
                      NVALUE=IPIC(I,J)                                          THERMO   542
                       IF(NVALUE.LE.0)GO TO  206                                THERMO   543
                      ILX=J+ITOP                                                THERMO   544
  545                 IF(ILX.LT.40.OR.ILX.GT.70)GO TO 2056                      THERMO   545
                      IF(I.GT.49)GO TO 2055                                     THERMO   546
                       MXCNT1=MAX0(MXCNT1,NVALUE)                               THERMO   547
                       IF(MXCNT1.NE.NVALUE)GO TO 2056                           THERMO   548
                       MXW1=I                                                   THERMO   549
  550                   MXL1=J+ITOP                                            THERMO   550
                        GO TO 2056                                              THERMO   551
                2055    MXCNT2=MAX0(MXCNT2,NVALUE)                              THERMO   552
                       IF(MXCNT2.NE.NVALUE)GO TO 2056                           THERMO   553
                       MXW2=I                                                   THERMO   554
  555                  MXL2=J+ITOP                                             THERMO   555
                2056    CONTINUE                                                THERMO   556
                      IF(I.EQ.1.OR.I.EQ.100)GO TO 2057                          THERMO   557
                      IF(NVALUE.GT.150)GO TO 2057                               THERMO   558
                      IF(IPIC(I,J).LE.IPIC(I-1,J).OR.IPIC(I,J).LE.IPIC(I+1,J))GO TO 2057 THERMO   559
  560                  ISUM=ISUM+IPIC(I,J)                                      THERMO   560
                       NSUM=NSUM+1                                              THERMO   561
                2057   CONTINUE                                                 THERMO   562
                      MAXCNT=MAX0(MAXCNT,NVALUE)                                THERMO   563
                       IF(MAXCNT.NE.NVALUE)GO TO 206                            THERMO   564
  565                 IMXL=ILX                                                  THERMO   565
                      IMXW=I                                                    THERMO   566
                 206   CONTINUE                                                 THERMO   567
                      LV1=IPVL-ITOP+1                                           THERMO   568
                       IF(LV1.LT.1)LV1 =1                                       THERMO   569
  570                 LV2=IPVL2-ITOP+1                                          THERMO   570
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                      GO TO 207                                                  THERMO   572
                      IF(ICAL.EQ.1.OR.IC.EQ.1)GO TO 207                          THERMO   573
                                                                                 THERMO   574
                       MXW1=IPVW                                                 THERMO   575
      575              MXW2=IPVW2                                                THERMO   576
                      MXL1=LV1                                                   THERMO   577
                      MXL2=LV2                                                   THERMO   578
                      MXCNT1=IPIC(IPVW,LV1)                                      THERMO   579
                       MXCNT2=IPIC(IPVW2,LV2)                                    THERMO   580
      580       207   CONTINUE                                                   THERMO   581
                       IF(NSUM.NE.0)ISUM=ISUM/NSUM                               THERMO   582
                      IADD=PCT*ISUM                                              THERMO   583
                       IBKGR=ISUM+MAX0(1ADD,3)                                   THERMO   584
                      IF(IBK.GT.0)IBKGR=IBK                                      THERMO   585
      585             MINVAL=4*ISUM                                              THERMO   586
                      IF(MINVAL.LE.0)MINVAL=1                                    THERMO   587
                      IF( MNVAL.NE.0)MINVAL=MNVAL                                THERMO   588
                       ISUM1=0                                                   THERMO   589
                      ISUMN=10HSUM =                                             THERMO   590
      590              IF(MAXCNT.LT.MINVAL)IPC=1H                                THERMO   591
                      AZMAX=(IMXW-IWCENT)*RESWD                                  THERMO   592
                      ELMAX=(ILCENT-IMXL)*RESLIN                                 THERMO   593
                      PRINT 2000,NPICT,IH1,IM1,SEC1,DIFF,TTDIFF,                 THERMO   594
                     .(IBEFOR(I),I=2,7),IAFTER(7),MXCNT1,MXL1,MXW1,MXCNT2,MXL2,MXW2,
      595            .MAXCNT,IMXL,IMXW,ISUM,AZMAX,ELMAX,INPT,IPC                 THERMO   596
            2000      FORMAT(I10,4X,2I3,F7.3,2F8.3,5I3,2I5,I5,2I4,I5,2I4,I5,3I4,2F8.3,
                     . 14,1X,A1)                                                 THERMO   597
                      ILINE=ILINE+1                                              THERMO   598
                      IF(IPRINT.LT.2)GO TO 240                                   THERMO   599
      600             IPCNT=IPCNT+1                                              THERMO   600
                      IF(MOD(IPCNT,NPRINT).NE.0) GO TO 240                       THERMO   601
                      IPPR2=IPRL2-ITCP+1                                         THERMO   602
                      IPPR1=IPRL1-ITOP+1                                         THERMO   603
                      IF(IPPR1.LT.1)IPPR1=1                                      THERMO   604
      605             IF(IPPR2.LT.IPPR1)IPPR2=IPPR1                              THERMO   605
                      DO 230 I=IPPR1,IPPR2                                       THERMO   606
                      KK=I-1+ITOP                                                THERMO   607
                      PRINT 2002,KK                                              THERMO   608
                      IF(IPRINT.NE.3)GO TO 215                                   THERMO   609
      610              DO 210 JJ=IPRW1,IPRW2                                     THERMO   610
                      XPICT(JJ)=IPIC (JJ,I)*CONVF                                THERMO   611
            210       CONTINUE                                                   THERMO   612
                      PRINT 2003,(XPICT(JJ),JJ=IPRW1,IPRW2)                      THERMO   613
            2003       FORMAT(1X,10E12.4)                                        THERMO   614
      615             GO TO 230                                                  THERMO   615
            215       CONTINUE                                                   THERMO   616
                       PRINT 2001,(IPIC(JJ,I),JJ=IPRW1,IPRW2)                    THERMO   617
            2002       FORMAT(' LINE=',I5)                                       THERMO   618
            2001       FORMAT(25I5)                                              THERMO   619
      620             ILINE=ILINE+(IPRW2-IPRW1)/25+2                             THERMO   620
                      IF(ILINE.LT.72)GO TO 225                                   THERMO   621
                      ILINE=0                                                    THERMO   622
                      IF(I.NE.IPRL2)PRINT 1990,TITLE                             THERMO   623
            225        CONTINUE                                                  THERMO   624
      625   230       CONTINUE                                                   THERMO   625
            240       CONTINUE                                                   THERMO   626
                       RESLFT=RESLIN                                             THERMO   627
                                                                                 THERMO   628
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                      RESWFT=RESWO                                                  THERMO  629
                     ITR=0                                                          THERMO  630
  630                SR=0                                                          THERMO  631
                     IF(ITRK.LE.0)GO TO 3005                                       THERMO  632
                      ATP=0.0                                                      THERMO  633
                      ETP=0.0                                                      THERMO  634
                3001   READ(10)(TAP10(I),I=1,IT10)                                THERMO  635
  635                IF(EOF(10))3045,3669,3045                                     THERMO  636
                3669 IF(IOCHEC(10))3001,3569,3001                                  THERMO  637
                3569 CONTINUE                                                      THERMO  638
                     IF(TAP10(1).LT.T1)GO TO 3001                                  THERMO  639
                     IF(TAP10(1).GT.T2)GO TO 3017                                  THERMO  640
  640                ATP=TAP10(13)+ABIAS                                           THERMO  641
                      ETP=TAP10(14)+EBIAS                                          THERMO  642
                      IF(ATP.GT.-90.)GO TO 3014                                    THERMO  643
                      ATP=0.0                                                      THERMO  644
                      ETP=0.0                                                      THERMO  645
  645           3014    CONTINUE                                                   THERMO  646
                     ATRK=TAP10(16)+ABIAS                                          THERMO  647
                     ETRK=TAP10(17)+EBIAS                                          THERMO  648
                      ITR=1                                                        THERMO  649
                     LIN9=LIN9+1                                                   THERMO  650
  650                CALL IHMS(TAP10(1),IHVCO,IHVCO,SECVCO)                        THERMO  651
                     RB=TAP10(18)                                                  THERMO  652
                     DA=-TAP10(14)                                                 THERMO  653
                     SR=TAP10(15)                                                  THERMO  654
                2006 FORMAT(*RANGE =*,F9.0,* FT.*,*ASPECT ANG=*,F5.0,* DEG*,       THERMO  655
  655               . *DEP ANGLE=*,F6.2,* DEG*)                                   THERMO  656
                     IF(SR.LT.10.0)GO TO 3015                                      THERMO  657
                3005   CONTINUE                                                    THERMO  658
                      IF(IFCCT.EQ.0)GO TO 3006                                     THERMO  659
                      RESLFT=SR*SIN(RESLIN*.017453293)                             THERMO  660
  660                 RESWFT=SR*SIN(RESWO*.017453293)                             THERMO  661
                3006    CONTINUE                                                   THERMO  662
                      ILTP=-ETP/RESLIN+ILCENT-ITOP+SIGN(.5,-ETP)                   THERMO  663
                      IWTP=ATP/RESWO+IWCENT+SIGN(.5,ATP)                           THERMO  664
                C**** IF ITRK.EQ.2 USE MAX AGA TO FIND TAIL PIPE LOCATION.         THERMO  665
  665                 IF(IABS(ITRK).NE.2)GO TO 3003                               THERMO  666
                3015   CONTINUE                                                    THERMO  667
                     IF(ITRK.LT.0)GO TO 3017                                       THERMO  668
                     ATRK=TAP10(3)                                                 THERMO  669
                     ETRK=TAP10(4)                                                 THERMO  670
  670           3017   CONTINUE                                                    THERMO  671
                      LEVEL=.25*(MAXCNT-ISUM)+ISUM                                 THERMO  672
                      ILMXTP=IMXL-ITOP                                             THERMO  673
                     IWMXTP=IMXW                                                   THERMO  674
                      DO 3002 I=1,100                                              THERMO  675
  675                 IF(IPIC(IWMXTP,ILMXTP).LT.LEVEL)GO TO 3004                   THERMO  676
                     IWMXTP=IWMXTP-1                                               THERMO  677
                      IF(IWMXTP.LE.2)GO TO 3003                                    THERMO  678
                3002  CONTINUE                                                     THERMO  679
                        GO TO 3003                                                 THERMO  680
  680           3004  CONTINUE                                                     THERMO  681
                      ILTP=ILMXTP                                                  THERMO  682
                     IWTP=IWMXTP                                                   THERMO  683
                     ATP=(IWTP-IWCENT)*RESWO                                       THERMO  684
                     ETP=ELMAX                                                     THERMO  685
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                      IF(ITRK.LT.3)GO TO 3003                                   THERMO   686
                      DA=-ETP                                                   THERMO   687
                3003    CONTINUE                                                THERMO   688
                      RADTP=-9.99999                                            THERMO   689
                C**** FIND MATRIX SIZE IF REQUESTED                             THERMO   690
                      ENCODE (60,2006,LABEL1(1,3))SR,RB,DA                      THERMO   691
                      JEND=100                                                  THERMO   692
                      IF(SR.LT.10.)LABEL1(2,3)=10HNOT AVAIL.                    THERMO   693
                       IF(TAPIC (1).GE.T1.AND.TAPIC (1).LE.T2)GO TO 3013        THERMO   694
                      DO 3020 I=3,6                                             THERMO   695
                      LABEL1(1,I)=10H                                           THERMO   696
                      LABEL1(2,I)=10H                                           THERMO   697
                3020   CONTINUE                                                 THERMO   698
                3013  CONTINUE                                                  THERMO   699
                       IPR=11111                                                THERMO   700
                C***   PRINT 9876,IFIND,ILTP,IWTP,IBKGR,IPR                     THERMO   701
                      IF(IFIND.EQ.0)GO TO 3042                                  THERMO   702
                       ILTPM2=ILTP-2                                            THERMO   703
                      ILTPP2=ILTP+2                                             THERMO   704
                       IF(ILTP.LT.3)ILTPM2=ILTP                                 THERMO   705
                       IF(ILTP.GT.98)ILTPP2=ILTP                                THERMO   706
                       NLEFT=IWTP+DLEFT/RESWFT                                  THERMO   707
                      IXCEL=MAX0(NLEFT,1)                                       THERMO   708
                       IXCEL2=IXCEL+24                                          THERMO   709
                       IPR=22222                                                THERMO   710
                C***   PRINT 9876,IXCEL,IXCEL2,ILTPP2,ILTPM2,IBKGR,IPR          THERMO   711
                       DO 3041 I=1,4                                            THERMO   712
                      ICNT=0                                                    THERMO   713
                       NFRMTX=I                                                 THERMO   714
                      IF(IXCEL2.GT.100)GO TO 3042                               THERMO   715
                       JJJ=0                                                    THERMO   716
                       DO 3040 J=IXCEL,IXCEL2                                   THERMO   717
                       JJJ=JJJ+1                                                THERMO   718
                      IF(J.LT.IWTP)GO TO 3039                                   THERMO   719
                      DO 3038 MMM=ILTPM2,ILTPP2                                 THERMO   720
                      IF(IPIC(J,MMM).GT.IBKGR)GO TO 3039                        THERMO   721
                3038   CONTINUE                                                 THERMO   722
                      ICNT=ICNT+1                                               THERMO   723
                      IF(ICNT.GE.5)JEND=J                                       THERMO   724
                       IPR=33333                                                THERMO   725
                C***  PRINT 9876,ILTP,IWTP,ICNT,JEND,IBKGR,IPR                  THERMO   726
                9876    FORMAT(1X,10I7)                                         THERMO   727
                      IF(ICNT.GT.5)GO TO 3042                                   THERMO   728
                      GO TO 3040                                                THERMO   729
                3039    CONTINUE                                                THERMO   730
                      ICNT=0                                                    THERMO   731
                3040    CONTINUE                                                THERMO   732
                      IXCEL=IXCEL2+1                                            THERMO   733
                      IXCEL2=IXCEL+26                                           THERMO   734
                3041    CONTINUE                                                THERMO   735
                3042    CONTINUE                                                THERMO   736
                       IF(ICNT.GT.5.AND.JJJ.LT.7)NFRMTX=NFRMTX-1                THERMO   737
                       IF(ILTP.LT.1.OR.ILTP.GT.100)GO TO 3007                   THERMO   738
                       IF(IWTP.LT.1.OR.IWTP.GT.100)GO TO 3007                   THERMO   739
                       RADTP=IPIC (IWTP,ILTP)*CONVF                             THERMO   740
                3007  CONTINUE                                                  THERMO   741
                      IF(ITPT.NE.1) GO TO 3006                                  THERMO   742
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                IF(SR.LT.10.0)GO TO 3008                                        THERMO   743
               ATRK=ATP+TAP10(23)                                               THERMO   744
               ETRK=ETP+TAP10(24)                                               THERMO   745
      745      XTRK=SR*ATAN(TAP10(23)*.0174533292)                              THERMO   746
               YTRK=SR*ATAN(TAP10(24)*.0174533292)                              THERMO   747
                MOVHOR=TAP10(23)/RESWD+SIGN(.5,TAP10(23))                       THERMO   748
               MOVVER=TAP10(24)/RESLIN+SIGN(.5,TAP10(24))                       THERMO   749
               ILTRK=ILTP-MOVVER                                                THERMO   750
      750      IWTRK=IWTP+MOVHOR                                                THERMO   751
                GO TO 3000                                                      THERMO   752
            3008 CONTINUE                                                       THERMO   753
                ILTRK=-ETRK/RESLIN+ILCENT-ITOP+SIGN(.5,-ETRK)                   THERMO   754
               IWTRK=ATRK/RESWD+IWCENT+SIGN(.5,ATRK)                            THERMO   755
      755   3000  CONTINUE                                                      THERMO   756
               RADTRK=-9.99999                                                  THERMO   757
               IF(ILTRK.LT.1.OR.ILTRK.GT.100)GO TO 3009                         THERMO   758
               IF(IWTRK.LT.1.OR.IWTRK.GT.100)GO TO 3009                         THERMO   759
                RADTRK=IPIC(IWTRK,ILTRK)*CONVF                                  THERMO   760
      760   3009  CONTINUE                                                      THERMO   761
               AZAG=AZMAX                                                       THERMO   762
               ELAG=ELMAX                                                       THERMO   763
                RADAG=IPIC(IMXW,IMXL-ITOP)*CONVF                                THERMO   764
            3010 FORMAT(1H1,6X,*TIME*,7X,*TIME    REL    DEP   SLANT*,8X,*TAIL PIPE THERMO   765
      765     . *,15X,*TRACK POINT*,12X,*MAX AGA POINT*/                        THERMO   766
               .8X,*AGA*,8X,*VCO*,9X,*BR    ANG   RANGE*,31*    AZIM    ELEV    IR THERMO   767
               .RAD*)/ 48X,3(*(BS)    (BS)    *,9X))                           THERMO   768
            3011  FORMAT(1X,I2,I3,F9.1,2I3,F9.1,2F7.1,F8.0,3(2F8.2,F9.5))      THERMO   769
                                                                                THERMO   770
      770                                                                       THERMO   771
            C**** PLOT MATRIX CONTAINING TRACK POINT IF REQUESTED.              THERMO   772
               ISUM2=0                                                          THERMO   773
               NLEFT=IWTP+OLEFT/RESWFT                                          THERMO   774
                IF(NLEFT.LT.1)NLEFT=1                                           THERMO   775
      775      NRIGHT=IWTP+ORIGHT/RESWFT                                        THERMO   776
               NABOVE=(OABOVE/(OABOVE+OBELOW))*30.                              THERMO   777
               IPMTX=0                                                          THERMO   778
               ISLEFT=NLEFT                                                     THERMO   779
               ISRITE=NLEFT+NFRMTX*27-2                                         THERMO   780
      780      IBOVE=ILTP-NABOVE                                                THERMO   781
               IBELOW=IBOVE+29                                                  THERMO   782
                IF(IMTX.EQ.0)GO TO 4016                                         THERMO   783
                IMXCT=IMXCT+1                                                   THERMO   784
                IF(MOD(IMXCT,IMTX).NE.0)GO TO 4016                              THERMO   785
      785      RBDIFF= ABS(RB-RBSAV)                                            THERMO   786
                IF(RBDIFF.LT.RBCELL)GO TO 4016                                  THERMO   787
                IF (IPC.NE.1H*)GC TO 4016                                       THERMO   788
               IF(ATP.LT.-10.0)GC TO 3046                                       THERMO   789
               RBSAV=RB                                                         THERMO   790
      790       IF(IPRMTX.EQ.0)GC TO 3012                                       THERMO   791
                IPR=44444                                                       THERMO   792
            C***  PRINT 9876,ILTP,IWTP,IBKGR,JEND,NLEFT,IPR                     THERMO   793
               CALL PRTMTX                                                      THERMO   794
                IPMTX=1                                                         THERMO   795
      795       GO TO 4016                                                      THERMO   796
            3012   CONTINUE                                                     THERMO   797
               IPMTX=1                                                          THERMO   798
                IGELLX=NLEFT-1                                                  THERMO   799
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                      CALL BIGV                                                  THERMO   800
      800             IXLEFT=74                                                  THERMO   801
                      IYTOP=962                                                  THERMO   802
                      IYBOT=62                                                   THERMO   803
                       IFRMTX=1                                                  THERMO   804
                      CALL FRAMEV(3)                                             THERMO   805
      805              CALL CLASS(1)                                             THERMO   806
                       XX=IBKGR*CONVF                                            THERMO   807
                      CALL PRINTV(-32,32HNOTE-SLASHED CELLS ARE LESS THAN    ,28,28)  THERMO   808
                      CALL APRNTV(0,-15,10,IHOVER,4,587)                         THERMO   809
                       CALL PRINTV(10,IHOHOR,480,38)                             THERMO   810
      810              IF(CONVF.NE.1.0)                                          THERMO   811
                     . CALL PRINTV(-24,24HIR UNITS = W/(CM3Q*SR)    ,400,960)    THERMO   812
                       CALL LABLV(XX,284,20,-5,1,5)                              THERMO   813
                       XX=IM1*100.+IM1                                           THERMO   814
                       CALL PRINTV(-5,5HTIME= ,700,20)                           THERMO   815
      815              CALL LABLV(XX,756,20,4,1,4)                               THERMO   816
                       CALL LABLV(SEC1,782,20,6,1,2)                             THERMO   817
                      CALL LINEV(IXLEFT,IYBOT,IXLEFT,IYTOP)                      THERMO   818
                    C**** LABEL LEFT SIDE OF MATRIX                              THERMO   819
                       IY=IYTOP                                                  THERMO   820
      820              ICELY=NABOVE                                              THERMO   821
                      IX=20                                                      THERMO   822
                       DO 3050 I=1,30                                            THERMO   823
                         XX=ICELY*RESLFT                                         THERMO   824
                       ICELY=ICELY-1                                             THERMO   825
      825              CALL LABLV(XX,IX,IY-15,5,1,2)                             THERMO   826
                      IF=IY-30                                                   THERMO   827
                 3050  CONTINUE                                                  THERMO   828
                 3060  CONTINUE                                                  THERMO   829
                      IX=IXLEFT                                                  THERMO   830
      830              N=3                                                       THERMO   831
                 3061  CONTINUE                                                  THERMO   832
                      ILNEXT=0                                                   THERMO   833
                      DO 3090 I=N,27                                             THERMO   834
                      IF(ICELLX.GT.NRIGHT)GO TO 4000                             THERMO   835
      835             IY=IYTOP-12                                                THERMO   836
                    C**** PUT IRRADIANCE VALUES IN VERTICAL CELLS IF IN PICTURE  THERMO   837
                       ICELLY=ILTP-NABOVE                                        THERMO   838
                      DO 3065 J=1,30                                             THERMO   839
                       IF(ITPT.EQ.0)GO TO 3063                                   THERMO   840
      840              IF(ITPT.EQ.1.AND.TAP10(24).LT.-99.0)GO TO 3063            THERMO   841
                    C**** CHECK IF CELL IS TRACK POINT                           THERMO   842
                       IF(ICELLX.NE.IWTRK.OR.ICELLY.NE.ILTRK)GO TO 3063          THERMO   843
                       CALL POINTV(IX+37,IY+9,6,IDUM)                            THERMO   844
                       CALL POINTV(IX+37,IY+9,6,IDUM)                            THERMO   845
      845              CALL POINTV(IX+32,IY+9,6,IDUM)                            THERMO   846
                       CALL POINTV(IX+32,IY+9,6,IDUM)                            THERMO   847
                       CALL POINTV(IX+27,IY+9,6,IDUM)                            THERMO   848
                       CALL POINTV(IX+27,IY+9,6,IDUM)                            THERMO   849
                       CALL POINTV(IX+22,IY+9,6,IDUM)                            THERMO   850
      850              CALL POINTV(IX+22,IY+9,6,IDUM)                            THERMO   851
                       CALL POINTV(IX+37,IY+3,6,IDUM)                            THERMO   852
                       CALL POINTV(IX+37,IY+3,6,IDUM)                            THERMO   853
                       CALL POINTV(IX+37,IY-2,6,IDUM)                            THERMO   854
                       CALL POINTV(IX+37,IY-2,6,IDUM)                            THERMO   855
      855              CALL POINTV(IX+37,IY-7,6,IDUM)                            THERMO   856
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                      CALL POINTV(IX+37,IY-7,0,IDUM)                                THERMO  857
                3063  CONTINUE                                                      THERMO  858
                      IF(ICELLX.LT.1.OR.ICELLX.GT.100)GO TO 3068                    THERMO  859
                      IF(ICELLY.LT.1.OR.ICELLY.GT.100)GO TO 3068                    THERMO  860
 860                  IPX=IPIC(ICELLX,ICELLY)                                       THERMO  861
                      XX=IPX*CONVF                                                  THERMO  862
                      IF(IPX.GT.1023)GO TO 3064                                     THERMO  863
                      IXX=IX+38                                                     THERMO  864
                      IF(IXX.GT.1023)IXX=1022                                       THERMO  865
 865                   CALL LINEV(IX,IY-18,IXX  ,IY+12)                             THERMO  866
                      IF(IPX.GE.0)GO TO 3068                                        THERMO  867
                      CALL LINEV(IXX,IY-18,IX,IY+12)                                THERMO  868
                      GO TO 3068                                                    THERMO  869
                3064   CONTINUE                                                     THERMO  870
 870                  ISUM2=ISUM2+IPX                                               THERMO  871
                      IF(IPX.GE.1023)ISUMM=10HSUM GT                                THERMO  872
                      IE=ALOG10(XX)                                                 THERMO  873
                      NL=1                                                          THERMO  874
                      IF(IE.LT.1)GO TO 3066                                         THERMO  875
 875                   IE=0                                                         THERMO  876
                       NL=4                                                         THERMO  877
                       GO TO 3067                                                   THERMO  878
                3066   CONTINUE                                                     THERMO  879
                       IEE=IABS(IE)                                                 THERMO  880
 880                   IE=IE-1                                                      THERMO  881
                       XX=XX*10.**(IEE+1)                                           THERMO  882
                3067   CONTINUE                                                     THERMO  883
                       IF(IPX.LT.1023)GO TO 3077                                    THERMO  884
                      CALL PRINTV(-4,4HXXXX ,IX+6,IY)                               THERMO  885
 885                   GO TO 3068                                                   THERMO  886
                3077   CONTINUE                                                     THERMO  887
                      XE=IE                                                         THERMO  888
                      CALL LABLV(XX,IX+6,IY,4,1,NL)                                 THERMO  889
                       CALL PRINTV(-1,1HE,IX+6,IY-12)                               THERMO  890
 890                  CALL LABLV(XE,IX+14,IY-12,2,1,2)                              THERMO  891
                3068   CONTINUE                                                     THERMO  892
                      IY=IY-38                                                      THERMO  893
                       ICELLY=ICELLY+1                                              THERMO  894
                3065   CONTINUE                                                     THERMO  895
 895                  ICELLX=ICELLX+1                                               THERMO  896
                      IF(IX.NE.1)GO TO 3088                                         THERMO  897
                      IX=IX+35                                                      THERMO  898
                      GO TO 3090                                                    THERMO  899
                3088   CONTINUE                                                     THERMO  900
 900                   IX=IX+38                                                     THERMO  901
                       IF(I.EQ.27)IX=1023                                           THERMO  902
                      CALL LINEV(IX,IYBOT,IX,IYTOP)                                 THERMO  903
                       XX=(ICELLX-IWTP)*RESWFT                                      THERMO  904
                       IF(MOD(IABS(ICELLX-IWTP),2).NE.0)GO TO 3090                  THERMO  905
 905                   IF(I.NE.27)GO TO 3089                                        THERMO  906
                       ILNEXT=1                                                     THERMO  907
                       GO TO 3090                                                   THERMO  908
                3089   CONTINUE                                                     THERMO  909
                       CALL LABLV(XX,IX-10,IYBOT-12,6,1,3)                          THERMO  910
 910            3090   CONTINUE                                                     THERMO  911
                4000   CONTINUE                                                     THERMO  912
                      IY=IYBOT                                                      THERMO  913
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                      DO 4010 I=1,31                                                THERMO  914
                      CALL LINEV(IXLEFT,IY,IX,IY)                                   THERMO  915
      915             IY=IY+30                                                      THERMO  916
             4010      CONTINUE                                                     THERMO  917
                      IF(ICELLX.GT.NRIGHT)GO TO 4015                                THERMO  918
                      IX=1                                                          THERMO  919
                      IF(IFRMTX.GE.NFRMTX)GO TO 4015                                THERMO  920
      920             IFRMTX=IFRMTX+1                                               THERMO  921
                       IXLEFT=2                                                     THERMO  922
                      CALL FRAMEV(3)                                                THERMO  923
                       CALL LINEV(36,IYBOT,36,IYTOP)                                THERMO  924
                       IXX=3                                                        THERMO  925
      925              IF(ILNEXT.EQ.1)GO TO 4008                                   THERMO  926
                       IF(MOD(IABS(ICELLX+1-IWTP),2).NE.0)GO TO 4011               THERMO  927
                        XX=(ICELLX+1-IWTP)*RESHFT                                  THERMO  928
                       IXX=34                                                       THERMO  929
             4008      CONTINUE                                                     THERMO  930
      930              CALL LABLV(XX,IXX,IYBOT-12,5,1,2)                           THERMO  931
             4011      CONTINUE                                                     THERMO  932
                       CALL CLASS(1)                                               THERMO  933
                       N=1                                                         THERMO  934
                      GO TO 3061                                                    THERMO  935
      935              3045  CONTINUE                                             THERMO  936
                      ITRK=0                                                        THERMO  937
             3046      CONTINUE                                                     THERMO  938
                       ATP=0.0                                                     THERMO  939
                       ETP=0.0                                                     THERMO  940
      940     4015     CONTINUE                                                    THERMO  941
                       IF(ISUM2.EQ.0)GO TO 4115                                    THERMO  942
                      XSUM=ISUM2*CONVF                                              THERMO  943
                      CALL PRINTV(-6,6HMATRIX,612,966)                              THERMO  944
                       CALL PRINTV(10,ISUMM,668,966)                              THERMO  945
      945              CALL LABLV (XSUM,748,966,-5,1,5)                           THERMO  946
                        IF(IJSUM.EQ.0)GO TO 4115                                   THERMO  947
                      IF(TAP10(1).LT.T1.OR.TAP10(1).GT.T2)GO TO 4115                THERMO  948
                      IF(SR.LT.10.0)GO TO 4115                                      THERMO  949
                      CALL PRINTV(-14,14H =        W/SR  ,848,966)                  THERMO  950
      950             XSUMJ=XSUM*RESRAD*(SR*30.48)**2                               THERMO  951
                      CALL LABLV(XSUMJ,662,966,6,1,6)                               THERMO  952
             4115      CONTINUE                                                     THERMO  953
                       CALL SMALLV                                                 THERMO  954
             4016      CONTINUE                                                     THERMO  955
      955    250      CONTINUE                                                     THERMO  956
                       IF(ILINE.GT.72)ILINE=0                                      THERMO  957
                     C**** PLOT AS PER I/P OPTION                                  THERMO  958
                      IF(IPLOT.EQ.0)GO TO 400                                       THERMO  959
                       IF(.NOT.IPL3D)GO TO 300                                     THERMO  960
      960             ICNT3D=ICNT3D+1                                               THERMO  961
                      IF(MOD(ICNT3D,NPL3D).NE.0)GO TO 300                           THERMO  962
                     C**** PLOT 3-D IMAGE OF PICTURE                               THERMO  963
                     C                                                             THERMO  964
                     C**** IF MAXIMUM COUNT IS LESS THAN EDIT COUNT (MINVAL), DO NOT PLOT.  THERMO  965
      965             IF(MAXCNT.LT.MINVAL)GO TO 300                               THERMO  966
                      IF(IPLOT.EQ.2)WTOF=MAXCNT+100-MOD(MAXCNT,100)                THERMO  967
                      IPASS=-1                                                    THERMO  968
                       CALL PLT3D                                                 THERMO  969
                     C**** LABEL VERTICAL AXIS                                    THERMO  970
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                      IX1=IW(1,1)                                                THERMO   971
                      IY1=IW(2,1)                                                THERMO   972
                      IY2=IW(2,2)                                                THERMO   973
                      IDELY=(IY2-IY1)/10                                         THERMO   974
                      WT=WTOP*CONVF                                              THERMO   975
                      WB=WBOT*CONVF                                              THERMO   976
                      DELX=WT/10.                                                THERMO   977
                      IX=IX1-32                                                  THERMO   978
                      IY=IY1                                                     THERMO   979
                      NC=4                                                       THERMO   980
                      LABVER=10HCOUNTS                                           THERMO   981
                      NL=4                                                       THERMO   982
                      IF(WT.GT.10)GO TO 251                                      THERMO   983
                      NC=6                                                       THERMO   984
                      LABVER=10HW/(CM2*SR)                                       THERMO   985
                      NL=1                                                       THERMO   986
                      IX=IX-16                                                   THERMO   987
                  251 CONTINUE                                                   THERMO   988
                      XX=WB                                                      THERMO   989
                      DO 255 I=1,11                                              THERMO   990
                      CALL LABLV(XX,IX,IY,NC,1,NL)                               THERMO   991
                      CALL LABLV(XX,IX,IY,NC,1,NL)                               THERMO   992
                      IY=IY+IDELY                                                THERMO   993
                      XX=XX+DELX                                                 THERMO   994
                  255 CONTINUE                                                   THERMO   995
                C**** LABEL PLOT                                                 THERMO   996
                      IYY=(IY1+IY2)/2-6                                          THERMO   997
                      CALL RITE2V(IX-20,IYY,1023,180,2,10,1,LABVER,NLAST)        THERMO   998
                C**** PUT CLASSIFICATION ON PICTURE                              THERMO   999
                      CALL CLASS(1)                                              THERMO  1000
                      XTIM1=IH1*100+IM1                                          THERMO  1001
                      XTIM2=IH2*100+IM2                                          THERMO  1002
                      CALL LABLV(XTIM1, 20,950,4,1,4)                            THERMO  1003
                      CALL PRINTV(20,LABEL1(1,2),20,932)                         THERMO  1004
                      CALL LABLV(SEC1, 52,950,6,1,2)                             THERMO  1005
                      CALL PRINTV(-23,23HTIME          F A G C V  ,20,962)       THERMO  1006
                      IF(ITRK.LE.0)GO TO 256                                     THERMO  1007
                      IY=914                                                     THERMO  1008
                      DO 2551 I=3,5                                              THERMO  1009
                      CALL PRINTV(20,LABEL1(1,I),20,IY)                          THERMO  1010
                      IY=IY-18                                                   THERMO  1011
                 2551  CONTINUE                                                 THERMO  1012
                  256 CONTINUE                                                   THERMO  1013
                      IY=860                                                     THERMO  1014
                      DO 258 I=1,25                                              THERMO  1015
                      CALL PRINTV(20,LABEL(1,I),20,IY)                           THERMO  1016
                      IY=IY-18                                                   THERMO  1017
                  258 CONTINUE                                                   THERMO  1018
                      CALL PRINTV(10,ISUMM,20,IY)                                THERMO  1019
                      ISUM1=0                                                    THERMO  1020
                      DO 3016 I=1,100                                            THERMO  1021
                      IF(I.LT.ISLEFT.OR.I.GT.ISRITE)GO TO 3016                   THERMO  1022
                      DO 3016 J=1,100                                            THERMO  1023
                      IF(J.LT.IBOVE.OR.J.GT.IBELOW)GO TO 3016                    THERMO  1024
                      IF(IPIC(I,J).GT.IBKGR)ISUM1=ISUM1+IPIC(I,J)                THERMO  1025
                      IF(IPIC(I,J).GE.1023)ISUMM=10HSUM GT                       THERMO  1026
                 3016  CONTINUE                                                 THERMO  1027
```

```
                3010   CONTINUE                                                THERMO  1028
                       XXSUM=ISUM1*CONVF                                       THERMO  1029
                       IF(IPHTX.EQ.1)XXSUM=XSUM                                THERMO  1030
1030                    IF(IJSUM.EQ.0)GO TO 2588                               THERMO  1031
                       IF(TAP10(1).LT.T1.OR.TAP10(1).GT.T2)GO TO 2588          THERMO  1032
                       IF(SR.LT.10.0)GO TO 2588                                THERMO  1033
                       XSUMJ=XXSUM*RESRAL*(SR*30.48)**2                        THERMO  1034
                        CALL LABLV(XSUMJ,100,IY-12,6,1,6)                      THERMO  1035
1035                   CALL PRINTV(-14,14H =          W/SR   ,84,IY-12)        THERMO  1036
                2588   CONTINUE                                                THERMO  1037
                       CALL LABLV(XXSUM,100,IY,-5,1,9)                         THERMO  1038
                       IX=130                                                  THERMO  1039
                        DO 260 I=2,6                                           THERMO  1040
1040                   XX=IBEFOR(I)                                            THERMO  1041
                       CALL LABLV(XX,IX,950,1,1,1)                             THERMO  1042
                       IX=IX+16                                                THERMO  1043
                260    CONTINUE                                                THERMO  1044
                                                                               THERMO  1045
1045                    IUX3AV=IU(1,1)                                         THERMO  1046
                        UXSAV=UAXIS                                            THERMO  1047
                       UAXIS=VRIGHT                                            THERMO  1048
                        IPASS=-5                                               THERMO  1049
                       CALL PLT3D                                              THERMO  1050
1050                   UAXIS=UXSAV                                             THERMO  1051
                0*****LABEL BOTTOM OF 3-D PLOT                                 THERMO  1052
                        IF(IVIEW.EQ.2.OR.IVIEW.EQ.4)GO TO 2611                 THERMO  1053
                       ITPV=ILTP                                               THERMO  1054
                       ITPH=IWTP                                               THERMO  1055
1055                   RESV=RESLFT                                             THERMO  1056
                       RESH=RESWFT                                             THERMO  1057
                       ISIGNV=-1                                               THERMO  1058
                       ISIGNH=1                                                THERMO  1059
                       IVERT=IHOVER                                            THERMO  1060
1060                   IHOR=IHOHOR                                             THERMO  1061
                       GO TO 2612                                              THERMO  1062
                2611   CONTINUE                                                THERMO  1063
                       ITPV=IWTP                                               THERMO  1064
                       ITPH=ILTP                                               THERMO  1065
1065                   RESV=RESWFT                                             THERMO  1066
                       RESH=RESLFT                                             THERMO  1067
                       ISIGNV=1                                                THERMO  1068
                       ISIGNH=-1                                               THERMO  1069
                       IVERT=IHOHOR                                            THERMO  1070
1070                   IHOR=IHOVER                                             THERMO  1071
                2612   CONTINUE                                                THERMO  1072
                       XLIN=ITPV                                               THERMO  1073
                      ADD=10.                                                  THERMO  1074
                      X1=IU(1,1)                                               THERMO  1075
1075                  Y1=IU(2,1)                                               THERMO  1076
                      X2=IU(1,2)                                               THERMO  1077
                      Y2=IU(2,2)                                               THERMO  1078
                261    CONTINUE                                                THERMO  1079
                        IF(XLIN.GT.100.)XLIN=100                               THERMO  1080
1080                   IF(XLIN.LT.1.)XLIN=1.                                   THERMO  1081
                       XX=(XLIN      -ITPV)*RESV*ISIGNV                        THERMO  1082
                        IX =F(XLIN,UFOR,UBACK,X1,X2)                           THERMO  1083
                        IY =F(XLIN,UFOR,UBACK,Y1,Y2)                           THERMO  1084
```

```
                      CALL POINTV(IX ,IY ,3,IDUM)                                THERMO  1085
 1085                 CALL LABLV(XX,IX+10,IY ,4,1,2)                             THERMO  1086
                      XLIN=XLIN+ADD                                              THERMO  1087
                     IF(XLIN.GT.100.)GO TO 262                                   THERMO  1088
                      IF(XLIN.LT.1)GO TO 263                                     THERMO  1089
                      GO TO 261                                                  THERMO  1090
 1090          262    ADD=-10.                                                   THERMO  1091
                      XLIN=ITPV                                                  THERMO  1092
                      IXV=(X1+X2)/2.                                             THERMO  1093
                     IYV=(Y1+Y2)/2.-60.                                          THERMO  1094
                      CALL APRNTV (12,12,10,IVERT,IXV,IYV)                       THERMO  1095
 1095                 GO TO 261                                                  THERMO  1096
                263   CONTINUE                                                   THERMO  1097
                      ADD=10.                                                    THERMO  1098
                     XWD=ITPH                                                    THERMO  1099
                       X1=IUXSAV                                                THERMO  1100
 1100                  X2=IU(1,1)                                                THERMO  1101
                      IY =IU(2,1)                                                THERMO  1102
                264   CONTINUE                                                   THERMO  1103
                      IF(XWD.GT.100.)XWD=100                                     THERMO  1104
                      IF(XWD.LT.1.)XWD=1.                                        THERMO  1105
 1105                 XX=(XWD      -ITPH)*RESH*ISIGNH                            THERMO  1106
                     IX =F(XWD,VLEFT,VRIGHT,X1,X2)                               THERMO  1107
                       CALL POINTV(IX ,IY ,5,IDUM)                              THERMO  1108
                      CALL LABLV(XX,IX -8,IY -8,4,1,2)                           THERMO  1109
                      XWD=XWD+ADD                                                THERMO  1110
 1110                 IF(XWD.GT.100.)GO TO 2641                                  THERMO  1111
                      IF(XWD.LT.1.)GO TO 2642                                    THERMO  1112
                      GO TO 264                                                  THERMO  1113
                2641   ADD=-10.                                                  THERMO  1114
                     XWD=ITPH                                                    THERMO  1115
 1115                 IXH=(X1+X2)/2.-40.                                         THERMO  1116
                      CALL PRINTV(10,IHOR,IXH,IY-20)                             THERMO  1117
                      GO TO 264                                                  THERMO  1118
                2642   CONTINUE                                                  THERMO  1119
                C*** LABEL VERTICAL AXIS AND DRAW HORIZONTAL LINES               THERMO  1120
 1120                 IX2=IW(1,1)                                                THERMO  1121
                      IY=IY1                                                     THERMO  1122
                      DO 265 I=1,10                                              THERMO  1123
                      CALL LINEV(IX1,IY,IX2,IY)                                  THERMO  1124
                     IY=IY+IDELY                                                 THERMO  1125
 1125           265   CONTINUE                                                   THERMO  1126
                      CALL LINEV(IX1,IY2,IX2,IY2)                                THERMO  1127
                                                                                 THERMO  1128
                300   CONTINUE                                                   THERMO  1129
                      IF(.NOT.IPL2D)GO TO 400                                    THERMO  1130
 1130           C**** PLOT 2D IMAGE OF PICTURE                                   THERMO  1131
                                                                                 THERMO  1132
                                                                                 THERMO  1133
                400    CONTINUE                                                  THERMO  1134
                C**** CHECK IF PACKED TAPE O/P                                   THERMO  1135
 1135                 IF(ITSEND.EQ.1)GO TO 401                                   THERMO  1136
                      IF(ITAPE.NE.1)GO TO 200                                    THERMO  1137
                401   CONTINUE                                                   THERMO  1138
                      J=1                                                        THERMO  1139
                      DO 420 I=1,2000                                            THERMO  1140
 1140                 IPICT(I)=SHIFT(IPICT(J),48).OR.                            THERMO  1141
```

```
                     .          SHIFT(IPICT(J+1),36).OR.                                    THERMO  1142
                     .          SHIFT(IPICT(J+2),24).OR.                                    THERMO  1143
                     .          SHIFT(IPICT(J+3),12).OR.IPICT(J+4)                          THERMO  1144
                       J=J+5                                                               THERMO  1145
1145            420  CONTINUE                                                            THERMO  1146
                     IF(ITSEND.EQ.1)GO TO 425                                            THERMO  1147
                     WRITE(12,ISEPOR,ISAPTER,INPT,(IPICT(K),K=1,20000)                   THERMO  1148
                       GO TO 200                                                         THERMO  1149
                425  CONTINUE                                                            THERMO  1150
1150                 IPICT(10001)=T1/100.                                                THERMO  1151
                     IPICT(10002)=SR                                                     THERMO  1152
                     IPICT(10003)=R8                                                     THERMO  1153
                     IPICT(10004)=CONVF*10.E10                                           THERMO  1154
                     IPICT(10005)=IF                                                     THERMO  1155
1155                 IPICT(10006)=IA                                                     THERMO  1156
                     IPICT(10007)=IG                                                     THERMO  1157
                     IPICT(10008)=IWTP                                                   THERMO  1158
                     IPICT(10009)=ILTP                                                   THERMO  1159
                     IPICT(10010)=0                                                      THERMO  1160
1160                 L=10011                                                             THERMO  1161
                      DO 429 J=1,25                                                      THERMO  1162
                      DO 429 K=1,2                                                       THERMO  1163
                     IPICT(L)=LABEL(K,J)                                                 THERMO  1164
                      L=L+1                                                              THERMO  1165
1165            429   CONTINUE                                                           THERMO  1166
                     DO 430 J=10061,10100                                                THERMO  1167
                430   IPICT(J)=0                                                         THERMO  1168
                     WRITE(12)(IPICT(J),J=10001,10100)                                   THERMO  1169
                     J=1                                                                 THERMO  1170
1170                 DO 435 K=1,4                                                        THERMO  1171
                      L=J+499                                                            THERMO  1172
                      WRITE(12)(IPICT(LL),LL=J,L)                                        THERMO  1173
                435  J=L+1                                                              THERMO  1174
                     GO TO 200                                                           THERMO  1175
1175            999  CONTINUE                                                           THERMO  1176
                     IF(ICLFRM.NE.0)CALL SECURE(KRD,1)                                   THERMO  1177
                     STOP                                                                THERMO  1178
                     END                                                                 THERMO  1179
```


CARD NR.	SEVERITY	DETAILS	DIAGNOSIS OF PROBLEM
524	I	)	THE NUMBER OF ARGUMENTS IN THE ARGUMENT LIST OF A NON-BASIC EXTERNAL FUNCTION IS INCONSISTENT.
572	I		THERE IS NO PATH TO THIS STATEMENT.
1129	I	400	THIS IF DEGENERATES INTO A SIMPLE TRANSFER TO THE LABEL INDICATED.

SYMBOLIC REFERENCE MAP (R=1)

ENTRY POINTS
16363 P2171

VARIABLES	SN	TYPE	RELOCATION						
23447	ABIAS	REAL			23722	ADD	REAL		
23441	ATP	REAL			23445	ATRK	REAL		
23636	AZAG	REAL			23605	AZMAX	REAL		
23735	CONV	REAL	ARRAY		5	CONVF	REAL		IPMTX
23444	DA	REAL			23434	DABOVE	REAL		
23435	DBELOW	REAL			23677	DELX	REAL		
23950	DIFF	REAL			23432	DLEFT	REAL		
23433	DRIGHT	REAL			23450	EBIAS	REAL		
23637	ELAG	REAL			23606	ELMAX	REAL		
23442	ETP	REAL			23446	ETRK	REAL		
23411	I	INTEGER			23543	IA	INTEGER		
23567	IADD	INTEGER			7	IAFTER	INTEGER	ARRAY	/ /
1	IBACK	INTEGER		PLIP	0	IBEFOR	INTEGER	ARRAY	/ /
23433	IBELOW	INTEGER			23455	IBK	INTEGER		
4	IBKGR	INTEGER		IPMTX	23427	IBOVE	INTEGER		
23552	IC	INTEGER			12	ICAL	INTEGER		PDPFT
23561	ICARIG	INTEGER			23645	ICELLX	INTEGER		
23660	ICELLY	INTEGER			23654	ICELY	INTEGER		
10	ICK3TP	INTEGER		PDPFT	7	ICK3TR	INTEGER		PDPFT
0	ICLASS	INTEGER		CLASF	23465	ICLFRM	INTEGER		
23630	ICNT	INTEGER			23527	ICNT3D	INTEGER		
23437	IDEL	INTEGER			23674	IDELY	INTEGER		
23661	IDUM	INTEGER			23664	IE	INTEGER		
23460	IEDCNT	INTEGER			23464	IEDOWN	INTEGER		
23462	IEDT	INTEGER			23463	IEDUP	INTEGER		
23666	IEE	INTEGER			3	IEND	INTEGER		PDPFT
23542	IF	INTEGER			23436	IFEET	INTEGER		
24477	IFILT	INTEGER	ARRAY		23424	IFIND	INTEGER		
0	IFOR	INTEGER		PLIP	23691	IFRMTX	INTEGER		
23453	IFSEND	INTEGER			23544	IG	INTEGER		
23547	IHOHOR	INTEGER			23720	IHOR	INTEGER		
23546	IHOVER	INTEGER			23614	IHVCO	INTEGER		
23553	IH1	INTEGER			23556	IH2	INTEGER		
23431	IJSUM	INTEGER			23533	ILAB	INTEGER		
23416	ILCENT	INTEGER			2	ILEFT	INTEGER		PLIM
23526	ILINE	INTEGER			23620	ILMXTP	INTEGER		
23657	ILNEXT	INTEGER			3	ILTP	INTEGER		IPMTX
23624	ILTPM2	INTEGER			23625	ILTPP2	INTEGER		
115	ILTRK	INTEGER		IPMTX	23601	ILX	INTEGER		
23474	IMTX	INTEGER			23615	IMVCO	INTEGER		
23451	IMXCT	INTEGER			23467	IMXL	INTEGER		
23470	IMXW	INTEGER			23554	IM1	INTEGER		
23557	IM2	INTEGER			23564	INDX	INTEGER		
13	INPT	INTEGER		PDPFT	24403	IOPT	INTEGER	ARRAY	
5	IPASS	INTEGER		PLIP	23562	IPC	INTEGER		
23503	IPCNT	INTEGER			17	IPIC	INTEGER	ARRAY	/ /
17	IPICT	INTEGER	ARRAY	/ /	23501	IPLOT	INTEGER		
23410	IPL2D	LOGICAL			23407	IPL3D	LOGICAL		
23643	IPMTX	INTEGER			23610	IPPR1	INTEGER		
23607	IPPR2	INTEGER			23623	IPR	INTEGER		
23476	IPRINT	INTEGER			23514	IPRL1	INTEGER		

VARIABLES	SN	TYPE		RELOCATION						
23515	IPRL2	INTEGER				121	IPRMTX	INTEGER		IPMTX
23516	IPRW1	INTEGER				23517	IPRW2	INTEGER		
23520	IPVL	INTEGER				23521	IPVL2	INTEGER		
23522	IPVW	INTEGER				23523	IPVW2	INTEGER		
23662	IPX	INTEGER				23510	IP2DL1	INTEGER		
23511	IP2DL2	INTEGER				23512	IP2DW1	INTEGER		
23513	IP2DW2	INTEGER				23504	IP3DL1	INTEGER		
23505	IP3DL2	INTEGER				23506	IP3DW1	INTEGER		
23507	IP3DW2	INTEGER				3	IRIGHT	INTEGER		PLIM
23716	ISIGNH	INTEGER				23715	ISIGNV	INTEGER		
23425	ISLEFT	INTEGER				23426	ISRITE	INTEGER		
23500	ISUM	INTEGER				122	ISUMM	INTEGER		IPMTX
23604	ISUM1	INTEGER				23641	ISUM2	INTEGER		
23530	ITAP	INTEGER				23502	ITAPE	INTEGER		
16	ITOP	INTEGER			/ /	23712	ITPH	INTEGER		
120	ITPT	INTEGER			IPMTX	23711	ITPV	INTEGER		
23613	ITR	INTEGER				23413	ITRK	INTEGER		
23452	ITSEND	INTEGER				23415	IT10	INTEGER		
12	IU	INTEGER	ARRAY		MAXVAL	23707	IUXSAV	INTEGER		
16	IV	INTEGER	ARRAY		MAXVAL	11	IVALID	INTEGER		PDPFT
23717	IVERT	INTEGER				4	IVIEW	INTEGER		PLIM
22	IW	INTEGER	ARRAY		MAXVAL	23417	IWCENT	INTEGER		
23621	IWMXTP	INTEGER				2	IWTP	INTEGER		IPMTX
114	IWTRK	INTEGER			IPMTX	23655	IX	INTEGER		
23626	IXCEL	INTEGER				23627	IXCEL2	INTEGER		
23730	IXH	INTEGER				23646	IXLEFT	INTEGER		
23725	IXV	INTEGER				23663	IXX	INTEGER		
23671	IX1	INTEGER				23731	IX2	INTEGER		
23653	IY	INTEGER				23650	IYBOT	INTEGER		
23647	IYTOP	INTEGER				23726	IYV	INTEGER		
23702	IYY	INTEGER				23672	IY1	INTEGER		
23673	IY2	INTEGER				23573	I1	INTEGER		
23574	I2	INTEGER				23563	J	INTEGER		
7	JEND	INTEGER			IPMTX	23612	JJ	INTEGER		
23631	JJJ	INTEGER				4	JSTOP	INTEGER		PDPFT
23576	J1	INTEGER				23577	J2	INTEGER		
23732	K	INTEGER				23534	KARD	INTEGER		
23611	KK	INTEGER				24373	KRD	INTEGER	ARRAY	
23733	L	INTEGER				13	LABEL	INTEGER	ARRAY	IPMTX
75	LABEL1	INTEGER	ARRAY		IPMTX	23701	LABVER	INTEGER		
23617	LEVEL	INTEGER				23414	LIN9	INTEGER		
23734	LL	INTEGER				23602	LV1	INTEGER		
23603	LV2	INTEGER				23575	MAXADJ	INTEGER		
6	MAXCNT	INTEGER			IPMTX	23461	MINEDT	INTEGER		
23456	MINVAL	INTEGER				23632	MMM	INTEGER		
23457	MNVAL	INTEGER				23633	MOVHOR	INTEGER		
23634	MOVVER	INTEGER				23570	MXCNT1	INTEGER		
23571	MXCNT2	INTEGER				23466	MXL1	INTEGER		
23472	MXL2	INTEGER				23471	MXW1	INTEGER		
23473	MXW2	INTEGER				23656	N	INTEGER		
23642	NABOVE	INTEGER				23700	NC	INTEGER		
23532	NEWPAS	INTEGER				10	NFR	INTEGER		IPMTX
23475	NFRM	INTEGER				23440	NFRMTX	INTEGER		
23665	NL	INTEGER				23703	NLAST	INTEGER		
0	NLEFT	INTEGER			IPMTX	23412	NPICT	INTEGER		
23525	NPL2D	INTEGER				23524	NPL3D	INTEGER		
23541	NPRINT	INTEGER				1	NRIGHT	INTEGER		IPMTX

VARIABLES	SN	TYPE	RELOCATION						
1	NSR	INTEGER		PDPFT	23572	NSUM	INTEGER		
23565	NUMVAL	INTEGER			23600	NVALUE	INTEGER		
0	NWS	INTEGER		PDPFT	2	ONE	REAL		PDPFT
23500	PCT	REAL			23640	RADAG	REAL		
23422	RADLIN	REAL			23622	RADTP	REAL		
23635	RADTRK	REAL			23423	RADWD	REAL		
23443	RB	REAL			23545	RBCELL	REAL		
23644	RBDIFF	REAL			23531	RBSAV	REAL		
23714	RESM	REAL			11	RESLFT	REAL		IPMTX
23420	RESLIN	REAL			112	RESRAD	REAL		IPMTX
23713	RESV	REAL			23421	RESWD	REAL		
12	RESWFT	REAL		IPMTX	23616	SECVCO	REAL		
23555	SEC1	REAL			23560	SEC2	REAL		
113	SR	REAL		IPMTX	5	START	REAL		PDPFT
0	STOP	REAL		PDPFT	24335	TAP10	REAL	ARRAY	
24415	TDELE	REAL	ARRAY		6	THETA	REAL		MAXVAL
1	TITLE	REAL	ARRAY	CLASF	23454	TTDIF	REAL		
23551	TTDIFF	REAL			0	T1	REAL		/ /
23477	T1SAVE	REAL			7	T2	REAL		/ /
7	UAXIS	REAL		MAXVAL	1	UBACK	REAL		MAXVAL
0	UFOR	REAL		MAXVAL	11	UVPLNE	REAL		MAXVAL
23710	UXSAV	REAL			10	VAXIS	REAL		MAXVAL
2	VLEFT	REAL		MAXVAL	3	VRIGHT	REAL		MAXVAL
23676	WB	REAL			4	WBOT	REAL		MAXVAL
23675	WT	REAL			5	WTOP	REAL		MAXVAL
23667	XE	REAL			23721	XLIN	REAL		
23437	XPICT	REAL	ARRAY	/ /	111	XSUM	REAL		IPMTX
23670	XSUMJ	REAL			23704	XTIM1	REAL		
23705	XTIM2	REAL			116	XTRK	REAL		IPMTX
23727	XWD	REAL			23652	XX	REAL		
23706	XXSUM	REAL			23535	X1	REAL		
23536	X2	REAL			23537	X3	REAL		
23540	X4	REAL			117	YTRK	REAL		IPMTX
23723	Y1	REAL			23724	Y2	REAL		

FILE NAMES	MODE								
0	INPUT		2041	OUTPUT	FMT	10204	TAPE10	UNFMT	6102 TAPE11
12245	TAPE12	UNFMT	14306	TAPE14		0	TAPE4	FMT	0 TAPE5
2041	TAPE6		6143	TAPE9					

EXTERNALS	TYPE	ARGS			
ABS	REAL	1	ALOG10	REAL	1
APRNTV		6	ATAN	REAL	1
BIGV		0	CLASS		1
EOF	REAL	1	FRAMEV		1
GETPIC		0	IABS	INTEGER	1
IHMS		4	IOCHEC	INTEGER	1
LABLV		6	LINEV		4
MAX0	INTEGER	2	MIN0	INTEGER	2
MOD	INTEGER	2	PACKED		0
PLT3D		8	POINTV		4
PRINTV		4	PRTMTX		0
REPRNT		0	RITE2V		9
SECURE		2	SHIFT	NO TYPE	2
SIGN	REAL	2	SIN	REAL	1
SMALLV		0			

INLINE FUNCTIONS TYPE ARGS
F REAL S SF

STATEMENT LABELS

0	2			0	10	INACTIVE		16532	11		
16546	12			16576	13			16564	14		
16556	15			16561	16			16637	100		
0	101	INACTIVE		16644	110			0	112	INACTIVE	
16746	120			16775	130			17007	140		
17052	141			17102	150			17104	160		
17111	170			17113	180			17115	190		
17132	192			17140	194			17201	196		
17222	198			17231	200			17237	201		
17243	202			17244	203			17264	204		
17362	205			17624	206			17656	207		
0	210			17770	215			20019	225		
20015	230			20020	240			21210	250		
21263	251			0	255			21342	256		
0	258			0	260			21525	261		
21573	262			21610	263			21620	264		
0	265			21707	300			21710	400		
21714	401			0	420			21791	425		
0	429			0	430			0	435		
22027	999			22677	1000	FMT		22723	1001	FMT	
22650	1002	FMT		22662	1003	FMT		16705	1101		
16713	1102			16721	1103			16727	1104		
16734	1105			17150	1940			17203	1988		
22750	1998	FMT		23015	1999	FMT		23050	2000	FMT	
23102	2001	FMT		23077	2002	FMT		23070	2003	FMT	
22706	2004	FMT		22735	2005	FMT		23114	2006	FMT	
17266	2044			17307	2045			17326	2046		
17310	2047			17331	2048			17340	2050		
17546	2053			17546	2054			17570	2055		
17577	2056			17615	2057			0	2059		
17404	2060			17423	2065			0	2066		
0	2551			21437	2588			21502	2611		
21514	2612			21657	2641			21673	2642		
20401	3000			20026	3001			0	3002		
20172	3003			20161	3004			20072	3005		
20106	3006			20322	3007			20361	3008		
20414	3009			23137	3010	FMT NO REFS		23165	3011	FMT NO REFS	
20477	3012			20212	3013			20054	3014		
20131	3015			21402	3016			20135	3017		
21404	3018			0	3020			0	3030		
20272	3039			20273	3040			0	3041		
20303	3042			21153	3045			21154	3046		
0	3050			0	3060	INACTIVE		20574	3061		
20726	3063			20761	3064			0	3065		
20775	3066			21004	3067			21034	3068		
21014	3077			21046	3088			21071	3089		
21076	3090			0	3569	INACTIVE		0	3669	INACTIVE	
21101	4000			21143	4008			0	4010		
21147	4011			21156	4015			21210	4016		
21207	4115			23135	9876	FMT NO REFS					

COMMON BLOCKS LENGTH

/ /	10115
IPMTX	83

```
          PROGRAM P2171      74/74   OPT=1   TRACE                FTN 4.2+74355    09/29/76  12.58.08.      PAGE    27

COMMON BLOCKS    LENGTH
       POPPT        12
       MAXVAL       22
       PLIM          6
       CLASF         9

STATISTICS
  PROGRAM LENGTH              81738    3199
  BUFFER LENGTH              163478    7399
  CM LABELED COMMON LENGTH     2048     132
  CM BLANK COMMON LENGTH     236038   10115



       SUBROUTINE IHMS       74/74   OPT=1   TRACE                FTN 4.2+74355    09/29/76  12.58.27.      PAGE    1

                      SUBROUTINE IHMS(TMS,IH,IM,SEC)                          MAY75     2
                      IH=TMS/3.6E6                                            MAY75     3
                      IM=(TMS-IH*3.6E6)/60000.                                MAY75     4
                      SEC=(TMS-IH*3.6E6-IM*60000)/1000.                       MAY75     5
      5               RETURN                                                  MAY75     6
                      END                                                     MAY75     7



       SUBROUTINE IHMS       74/74   OPT=1   TRACE                FTN 4.2+74355    09/29/76  12.58.27.      PAGE    2

       SYMBOLIC REFERENCE MAP (R=1)

ENTRY POINTS
    3  IHMS

VARIABLES     SN  TYPE            RELOCATION
    0  IH         INTEGER              P.P.          0  IM        INTEGER          P.P.
    0  SEC        REAL                 F.P.          0  TMS       REAL             F.P.

STATISTICS
  PROGRAM LENGTH                 248      20
```

```
      SUBROUTINE REPRNT     74/74   OPT=1   TRACE                FTN 4.2+74355      09/29/76  12.58.30.      PAGE     1

                            SUBROUTINE REPRNT                                                    MAY75      8
                            DIMENSION X(8)                                                       MAY75      9
                            I=0                                                                  MAY75     10
                            WRITE(6,600)                                                         MAY75     11
     5                    1 READ(4,500) X                                                        MAY75     12
                            I=I+1                                                                MAY75     13
                          500 FORMAT(8A10)                                                       MAY75     14
                            IF(EOF(4).NE. 0.0) GO TO 2                                           MAY75     15
                            WRITE(6,601) X                                                       MAY75     16
    10                      GO TO 1                                                              MAY75     17
                          2 IM1=I-1                                                              MAY75     18
                            DO 10 J=1,IM1                                                        MAY75     19
                            BACKSPACE 4                                                          MAY75     20
                         10 CONTINUE                                                             MAY75     21
    15                      WRITE(6,602)                                                         MAY75     22
                         600 FORMAT(1H1,*   BEGINNING OF INPUT DATA *//)                         MAY75     23
                         601 FORMAT(1X,8A10)                                                     MAY75     24
                         602 FORMAT(*   END OF INPUT DATA  *//)                                 MAY75     25
                            END                                                                  MAY75     26

      SUBROUTINE REPRNT     74/74   OPT=1   TRACE                FTN 4.2+74355      09/29/76  12.58.30.      PAGE     2

      SYMBOLIC REFERENCE MAP (R=1)

ENTRY POINTS
    1  REPRNT

VARIABLES     SN  TYPE            RELOCATION
    67  I         INTEGER                                  70  IM1       INTEGER
    71  J         INTEGER                                  72  X         REAL       ARRAY

FILE NAMES        MODE
      TAPE4       FMT                 TAPE6       FMT

EXTERNALS         TYPE    ARGS
      EOF         REAL      1

STATEMENT LABELS
    5   1                                    15   2                                    0   10
   41   500       FMT                       53   600       FMT                       60   601       FMT
   62   602       FMT

STATISTICS
  PROGRAM LENGTH              1028      66
```

```
      SUBROUTINE RDMODE     74/74   OPT=1   TRACE                FTN 4.2+74355      09/29/76  12.58.31.      PAGE     1

                            SUBROUTINE RDMODE(IT,IN,NCHAR,ICODE,ICS)                                MAY75     27
                            DIMENSION IN(256)                                                       MAY75     28
                          1 BUFFER IN(IT,1) (IN(1),IN(256))                                         MAY75     29
                            IF(UNIT(IT))3,10,5                                                      MAY75     30
        5                 C     ICODE=0 INDICATES A GOOD RECORD                                     MAY75     31
                          C     ICODE=1 INDICATES PARITY ERROR                                      MAY75     32
                          C     ICODE=4 INDICATESA PARITY ERROR WITH A LONG RECORD                  MAY75     33
                          C     ICODE=2 INDICATESASHORT RECORD                                      MAY75     34
                          C     ICODE=888 INDICATES A ZERO LENGTH RECORD                            MAY75     35
       10                 C     ICODE=999 INDICATES AN EOF WAS ENCOUNTERED ON IT                    MAY75     36
                          3 ICODE=0                                                                 MAY75     37
                            ICS=LENGTH(IT)                                                          MAY75     38
                            ICS=ICS*10                                                              SEPT12     1
                            IF(ICS.EQ.0) ICODE=888                                                  MAY75     39
       15                   IF(ICS.GT.NCHAR) ICODE=4                                              MAY75     40
                            IF(ICS.LT.NCHAR) ICODE=2                                              MAY75     41
                            RETURN                                                                  MAY75     42
                          5 ICODE=1                                                                 MAY75     43
                            ICS=LENGTH(IT)                                                          MAY75     44
       20                   ICS=ICS*10                                                            SEPT12     2
                            IF(ICS.GT.NCHAR) ICODE=5                                              MAY75     45
                            IF(ICS.EQ.0) ICODE=888                                                MAY75     46
                            RETURN                                                                  MAY75     47
                         10 ICODE=999                                                               MAY75     48
       25                   ICS=LENGTH(IT)                                                        MAY75     49
                            ICS=ICS*10                                                            SEPT12     3
                            RETURN                                                                  MAY75     50
                            END                                                                     MAY75     51

      SUBROUTINE RDMODE     74/74   OPT=1   TRACE                FTN 4.2+74355      09/29/76  12.58.31.      PAGE     2

      SYMBOLIC REFERENCE MAP (R=1)

ENTRY POINTS
    3  RDMODE

VARIABLES     SN  TYPE              RELOCATION
    0  ICODE     INTEGER                 P.P.          0  ICS       INTEGER             P.P.
    0  IN        INTEGER    ARRAY        F.P.          0  IT        INTEGER             F.P.
    0  NCHAR     INTEGER                 F.P.

EXTERNALS          TYPE   ARGS
      LENGTH      INTEGER   1                          UNIT      REAL      1

STATEMENT LABELS
    0  1          INACTIVE                 0  3          INACTIVE              36  5
   53  10

STATISTICS
  PROGRAM LENGTH                 708      56
```

```
                      SUBROUTINE PRTMTX                                                 THERMO   1180
                       COMMON/IPMTX/NLEFT,NRIGHT,IWTP,ILTP,IBKGR,CONVF,MAXCNT,JEND,NFR, THERMO   1181
                     .   RESLFT,RESWFT,LABEL1(2,25),LABEL1(2,6),XSUM,RESRAD,SR          THERMO   1182
                     .,IWTRK,ILTRK,XTRK,YTRK,ITPT                                       THERMO   1183
                     .,  IPRMTX,ISUMM                                                   THERMO   1184
                      DIMENSION IBLANK(26)                                              THERMO   1185
                      COMMON IBEFOR( 7),IAFTER( 7),ITOP,IPIC(100,101)                   THERMO   1186
                       COMMON/CLASF/ICLASS,TITLE(8)                                     THERMO   1187
                       DIMENSION IOUT(27),XOUT(27)                                      THERMO   1188
                      EQUIVALENCE (T1,IBEFOR(1))                                        THERMO   1189
                      EQUIVALENCE(IOUT(1),XOUT(1))                                      THERMO   1190
                      DATA IBLANK/26*10H         /                                      THERMO   1191
                      DATA NUSED,LTOTAL/69,1020/                                        THERMO   1192
                      ISUMM=10HSUM =                                                    THERMO   1193
                      IF(IPRMTX.NE.2)GO TO 95                                           THERMO   1194
                      NLINES = (MIN0(JEND,NRIGHT)-NLEFT)*2  + 24                        THERMO   1195
                       IF((LTOTAL-NUSED).GE.NLINES)GO TO 90                             THERMO   1196
                      NSKIP=(LTOTAL-NUSED-1)/68+1                                       THERMO   1197
                      DO 85 I=1,NSKIP                                                   THERMO   1198
                   85 WRITE(9,1000)                                                     THERMO   1199
                      NUSED=0                                                           THERMO   1200
                   90  NUSED=NUSED+NLINES                                              THERMO   1201
                      WRITE(9,1010)TITLE                                                THERMO   1202
                 1010  FORMAT(////////1X,28X,8A10)                                     THERMO   1203
                       GO TO 96                                                         THERMO   1204
                   95 CONTINUE                                                          THERMO   1205
                      WRITE(9,1000)TITLE                                                THERMO   1206
                   96 CONTINUE                                                          THERMO   1207
                 1000  FORMAT(1H1,28X,8A10)                                           THERMO   1208
                       WRITE(9,1005)((LABEL1(I,J),I=1,2),J=1,5)                         THERMO   1209
                       WRITE(9,1005)((LABEL1(I,J),I=1,2),J=1,25)                        THERMO   1210
                 1005  FORMAT(5(1X,A10,    A10))                                      THERMO   1211
                       IPR=55555                                                        THERMO   1212
                      C***  PRINT 9876,ILTP,IWTP,NLEFT,JEND,IBKGR,IPR                  THERMO   1213
                    9876   FORMAT(1X,10I7)                                            THERMO   1214
                      XMAX=MAXCNT*CONVF                                                 THERMO   1215
                       IE=ALOG10(XMAX)                                                  THERMO   1216
                      IEE=IABS(IE)                                                      THERMO   1217
                       XMULT=CONVF*(10**(IEE+4))                                        THERMO   1218
                      IF(CONVF.EQ.1.0)XMULT=1.0                                         THERMO   1219
                       ISUM2=0                                                          THERMO   1220
                      DO 30 I=2,27                                                      THERMO   1221
                      XOUT(I)=(I-13)*RESLFT                                             THERMO   1222
                      IF(MOD(I,2).EQ.0)XOUT(I)=4H                                       THERMO   1223
                   30  CONTINUE                                                        THERMO   1224
                      WRITE(9,1001)(XOUT(I),I=2,27)                                     THERMO   1225
                 1001  FORMAT(1H0,5X,13(A5,F5.2)/6X,26(5H      ))                     THERMO   1226
                      IXCELL=NLEFT                                                      THERMO   1227
                   40  CONTINUE                                                        THERMO   1228
                      IF(IXCELL.LT.1)GO TO 65                                           THERMO   1229
                      DO 60 I=2,27                                                      THERMO   1230
                      IYCELL=ILTP+13-I                                                  THERMO   1231
                       IBLANK(I-1)=4H                                                   THERMO   1232
                      IF(IPRMTX.EQ.3)IBLANK(I-1)=1H.                                    THERMO   1233
                      IF(IPT.EQ.0)GO TO 63                                              THERMO   1234
                       IF(ITPT.EQ.1.AND.XTRK.LT.-99.99)GO TO 63                         THERMO   1235
                      IF(IPRMTX.NE.3)GO TO 62                                           THERMO   1236
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                      IF(IXCELL.NE.IWTRK)GO TO 63                                  THERMO  1237
                      IF(IYCELL.EQ.ILTRK)IBLANK(I-1)=1H(                           THERMO  1238
   60                 IF(IYCELL.EQ.ILTRK+1)IBLANK(I-1)=1H)                         THERMO  1239
                      GO TO 63                                                     THERMO  1240
                62    CONTINUE                                                     THERMO  1241
                      IF(IYCELL.NE.ILTRK)GO TO 63                                  THERMO  1242
                      IF(IXCELL.NE.IWTRK.AND.(IXCELL+1).NE.IWTRK)GO TO 63          THERMO  1243
   65                  IBLANK(I-1)=4H****                                         THERMO  1244
                63    CONTINUE                                                     THERMO  1245
                      IF(IYCELL.LT.1.OR.IYCELL.GT.100)GO TO 45                     THERMO  1246
                      IPX=IPIC(IXCELL,IYCELL)                                      THERMO  1247
                      IF(IPX.LE.IBKGR)GO TO 45                                     THERMO  1248
   70                   ISUM2=ISUM2+IPX                                           THERMO  1249
                      IVAL=IPX*XMULT                                               THERMO  1250
                      ENCODE(4,1003,IOUT(I))IVAL                                   THERMO  1251
                1003   FORMAT(I4)                                                  THERMO  1252
                       IF(IPX.LT.1023)GO TO 60                                     THERMO  1253
   75                 IOUT(I)=10HXXXX                                             THERMO  1254
                      ISUMM=10HSUM GT                                              THERMO  1255
                      GO TO 60                                                     THERMO  1256
                45    CONTINUE                                                     THERMO  1257
                      IOUT(I)=4H                                                   THERMO  1258
   80           60    CONTINUE                                                     THERMO  1259
                      XOUT(1)=(IXCELL-IWTP)*RESWFT                                 THERMO  1260
                      IF(IPRMTX.NE.3)GO TO 64                                      THERMO  1261
                       WRITE(9,1008)IOUT(1),((IBLANK(J),IOUT(J+1)),J=1,26)         THERMO  1262
                      GO TO 65                                                     THERMO  1263
   85           1008   FORMAT(1X,F5.2,26(A1,A4))                                   THERMO  1264
                64    CONTINUE                                                     THERMO  1265
                       WRITE(9,1004)IOUT,IBLANK                                    THERMO  1266
                1004   FORMAT(1X,F5.2,26(1H,,A4)/6X,26(1H,,A4))                    THERMO  1267
                65     IXCELL=IXCELL+1                                             THERMO  1268
   90                  IF(IXCELL.GT.100.OR.IXCELL.GT.JEND.OR.IXCELL.GT.NRIGHT)GO TO 900  THERMO  1269
                       GO TO 40                                                    THERMO  1270
                900 , CONTINUE                                                     THERMO  1271
                      IF(CONVF.NE.1.0)GO TO 910                                    THERMO  1272
                      WRITE(9,1009)IBKGR,ISUMM,ISUM2                               THERMO  1273
   95           1009   FORMAT(1H0,*NOTE- ALL MATRIX VALUES ARE IN COUNTS*/,        THERMO  1274
                     .7X,*BLANK CELLS ARE LESS THAN*,I5,* COUNTS*/,                THERMO  1275
                     . 7X,A6,I8  )                                                 THERMO  1276
                       GO TO 999                                                   THERMO  1277
                910    CONTINUE                                                    THERMO  1278
  100                  XPOWR=1./(10.**(IEE+4))                                     THERMO  1279
                        BKGR=IBKGR*CONVF                                           THERMO  1280
                       XSUM=ISUM2*CONVF                                            THERMO  1281
                       WRITE(9,1006)XPOWF,BKGR,ISUMM,XSUM                          THERMO  1282
                1006   FORMAT(1H0,*NOTE- ALL MATRIX VALUES ARE TO BE MULTIPLIED BY*,  THERMO  1283
  105              . F10.9,16H WATT/(CMSQ*STR)    /                              THERMO  1284
                   . 7X,*BLANK CELLS ARE LESS THAN*,F10.9,16H WATT/(CMSQ*STR)     /  THERMO  1285
                   . 7X,A6,F15.10,16H WATT/(CMSQ*STR)            )                THERMO  1286
                       IF(SR.LE.10.0)GO TO 999                                     THERMO  1287
                        WSTR=XSUM*RESRAD*(SR*30.48)**2                             THERMO  1288
  110                   WRITE(9,1007)WSTR                                        THERMO  1289
                1007   FORMAT(11X*=*,F10.3,*WATT/STR*)                             THERMO  1290
                999    CONTINUE                                                    THERMO  1291
                        IPR=66666                                                  THERMO  1292
               C***    PRINT 9876,ILTP,IWTP,NLEFT,JEND,IBKGR,IPR                   THERMO  1293
```

```
 119                RETURN                                                    THERMO  1294
                    END                                                       THERMO  1295
```



```
CARD NR. SEVERITY  DETAILS    DIAGNOSIS OF PROBLEM

     104    I      12CO 105  FIELD WIDTH OF A CONVERSION DESCRIPTOR SHOULD BE AS LARGE AS THE MINIMUM SPECIFIED FOR THAT DESCRIPTOR.
     104    I      43CO 106  FIELD WIDTH OF A CONVERSION DESCRIPTOR SHOULD BE AS LARGE AS THE MINIMUM SPECIFIED FOR THAT DESCRIPTOR.
```

SYMBOLIC REFERENCE MAP (R=17)

ENTRY POINTS
1 PRTMTX

VARIABLES	SN	TYPE		RELOCATION						
532	BKGR	REAL			9	CONVF	REAL		IPMTX	
515	I	INTEGER			7	IAFTER	INTEGER	ARRAY	/ /	
0	IBEFOR	INTEGER	ARRAY	/ /	4	IBKGR	INTEGER		IPMTX	
567	IBLANK	INTEGER	ARRAY		0	ICLASS	INTEGER		CLASF	
521	IE	INTEGER			522	IEE	INTEGER			
3	ILTP	INTEGER		IPMTX	115	ILTRK	INTEGER		IPMTX	
534	IOUT	INTEGER	ARRAY		17	IPIC	INTEGER	ARRAY	/ /	
517	IPR	INTEGER			121	IPRMTX	INTEGER		IPMTX	
527	IPX	INTEGER			122	ISUMM	INTEGER		IPMTX	
524	ISUM2	INTEGER			16	ITOP	INTEGER		/ /	
120	ITPT	INTEGER		IPMTX	530	IVAL	INTEGER			
2	IWTP	INTEGER		IPMTX	114	IWTRK	INTEGER		IPMTX	
525	IXCELL	INTEGER			526	IYCELL	INTEGER			
516	J	INTEGER			7	JEND	INTEGER		IPMTX	
13	LABEL	INTEGER	ARRAY	IPMTX	75	LABEL1	INTEGER	ARRAY	IPMTX	
307	LTOTAL	INTEGER			6	MAXCNT	INTEGER		IPMTX	
10	NFR	INTEGER		IPMTX	0	NLEFT	INTEGER		IPMTX	
513	NLINES	INTEGER			1	NRIGHT	INTEGER		IPMTX	
514	NSKIP	INTEGER			306	NUSED	INTEGER			
11	RESLFT	REAL		IPMTX	112	RESRAD	REAL		IPMTX	
12	RESWFT	REAL		IPMTX	113	SR	REAL		IPMTX	
1	TITLE	REAL	ARRAY	CLASF	0	T1	REAL		/ /	
533	WSTR	REAL			520	XMAX	REAL			
523	XMULT	REAL			534	XOUT	REAL	ARRAY		
531	XPOWR	REAL			111	XSUM	REAL		IPMTX	
116	XTRK	REAL		IPMTX	117	YTRK	REAL		IPMTX	

FILE NAMES	MODE
TAPE9	FMT

EXTERNALS	TYPE	ARGS			
ALOG10	REAL	1	IABS	INTEGER	1
MIN0	INTEGER	2	MOD	INTEGER	2

STATEMENT LABELS

0	30		102	40		175	45				
177	60		140	62		151	63				
223	64		225	65		0	85				
26	90		32	95		34	96				
233	900		240	910		262	999				
326	1000	FMT	352	1001	FMT	364	1003	FMT			
406	1004	FMT	341	1005	FMT	442	1006	FMT			
470	1007	FMT	376	1008	FMT	420	1009	FMT			
317	1010	FMT	344	9876	FMT	NO REFS					

COMMON BLOCKS	LENGTH
IPMTX	83
/ /	10115
CLASF	9

STATISTICS

PROGRAM LENGTH	6218	401
CM LABELED COMMON LENGTH	1348	92
CM BLANK COMMON LENGTH	236038	10115

```
      SUBROUTINE SECURE(K,IFLAG)                                        THERMO  1296
      DIMENSION K(8),IAUTHR(6),IRITE(8,9),IA(34)                        THERMO  1297
      EXTERNAL TABLIV                                                   THERMO  1298
      DATA IRITE,   IA/72*(10H          ),10HCLASSIFIED,10H BY          , THERMO  1299
     5 110HEXEMPT   F,10HROM GENERA,10HL DECLASIF,10HICATION SC,        THERMO  1300
     210HHEDULE    ,10HEXCLUDED F,10HSUBJECT  T,10HO   GENERA,         THERMO  1301
     310HOF EXECUTI,10HVE ORDER  ,10H 11652   ,10HEXEMPTION ,          THERMO  1302
     410HCATEGORY  ,10HAUTOMATICA,10HLLY DOWNGR,10HADE AT TWO,         THERMO  1303
     510H YEAR INTE,10HVALS      ,10HDECLASSIFY,10H ON      ,          THERMO  1304
    10 610H UPON NOTI,10HFICATION B,10HY THE ORIG,10HINATOR    ,       THERMO  1305
     710H NOT AUTOM,10HATICALLY D,10HECLASSIFIE,10HD          ,       THERMO  1306
     810H          ,10H          ,10H          ,10H          /       THERMO  1307
      IF(IFLAG.EQ.1) GO TO 300                                          THERMO  1308
      DECODE(12,1000,K(2))IC,IR,ID,IE,IW,IN                             THERMO  1309
    15 1000 FORMAT(6I2)                                                 THERMO  1310
      IF(IR.LT.1.OR.IR.GT.19) RETURN                                    THERMO  1311
      READ(4,900) IJOB,IPROJ,IMSN,IDATE,IRUN,IDAY                       THERMO  1312
  900 FORMAT(A4,6X,5A10)                                                THERMO  1313
      CALL FRAMEV(3)                                                    THERMO  1314
    20 IF(IC.LT.1) GO TO 10                                             THERMO  1315
      IF(IR.GT.9) GO TO 19                                              THERMO  1316
      READ(4,901) IAUTHR,IDCLAS,M                                       THERMO  1317
  901 FORMAT(5A10,A9,10X,A10,A1)                                        THERMO  1318
   19 CONTINUE                                                          THERMO  1319
    25 CALL CLASSG(IC)                                                  THERMO  1320
      ENCODE(10,1002,ICAT) ID                                           THERMO  1321
 1002 FORMAT(I10)                                                       THERMO  1322
   10 CALL CHSIZV(5,5)                                                  THERMO  1323
      CALL RITSTV(25,35,TABLIV)                                         THERMO  1324
    30 CALL RITE2V(430,800,1023,90,2,5,-1,5HSTART,N)                    THERMO  1325
      CALL RITE2V(430,600,1023,90,2,4,1,IJOB,N)                         THERMO  1326
      IF(IC.LT.1) GO TO 20                                              THERMO  1327
      CALL FRAMEV(3)                                                    THERMO  1328
      CALL CLASSG(IC)                                                   THERMO  1329
    35 KK=0                                                             THERMO  1330
      IF(IR.LT.10) GO TO 11                                             THERMO  1331
      NN=1                                                              THERMO  1332
      MM=IR-10                                                          THERMO  1333
      GO TO 12                                                          THERMO  1334
    40 11 IF(IR.EQ.1) GO TO 18                                          THERMO  1335
      IF(ID.EQ.6) KK=-2                                                 THERMO  1336
      MM=IR+3+KK                                                        THERMO  1337
      NN=5+KK                                                           THERMO  1338
   12 DO 13 I=NN,MM                                                     THERMO  1339
    45 13 READ(4,902) (IRITE(L,I),L=1,8)                                THERMO  1340
  902 FORMAT(8A10)                                                      THERMO  1341
   18 IF(ID.LT.7) GO TO 20                                              THERMO  1342
      ID=1                                                              THERMO  1343
      ICAT=2H                                                           THERMO  1344
    50 20 CALL CHSIZV(2,2)                                              THERMO  1345
      CALL RITSTV(12,18,TABLIV)                                         THERMO  1346
      CALL RITE2V(450,420,1023,90,1,11,-1,11HPREPARED BY,N)             THERMO  1347
      CALL RITE2V(350,400,1023,90,1,31,-1,31HFREEMAN MATHEMATICAL LABORA THERMO  1348
     1TORY,N)                                                           THERMO  1349
    55 CALL RITE2V(350,360,1023,90,1,28,-1,28HTSK, EGLIN A, F, 8,, FLORID THERMO  1350
     1A,N)                                                              THERMO  1351
      CALL RITE2V(460,360,1023,90,1,10,1,IDAY,N)                        THERMO  1352
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                      CALL CHSIZV(3,3)                                          THERMO  1353
                      CALL RITSTV(18,26,TABL1V)                                 THERMO  1354
   60                 CALL RITE2V(420,280,1023,90,1,10,1,IPROJ,N)               THERMO  1355
                      CALL RITE2V(420,240,1023,90,1,10,1,IMSN,N)                THERMO  1356
                      CALL RITE2V(420,200,1023,90,1,10,1,IDATE,N)               THERMO  1357
                      CALL RITE2V(420,160,1023,90,1,10,1,IRUN,N)                THERMO  1358
                      IF(IC.LT.1) RETURN                                        THERMO  1359
   65                 CALL CHSIZV(2,2)                                          THERMO  1360
                      CALL RITSTV(12,18,TABL1V)                                 THERMO  1361
                      IF(IE.LT.1) GO TO 160                                     THERMO  1362
                      IF(IE-2)130,140,150                                       THERMO  1363
                C**** FROM DOD 5200.1-R PARA 4-601                              THERMO  1364
   70           130   CALL RITE2V(420,960,1023,90,1,19,-1,19HRESTRICTED DATA,N)  THERMO  1365
                      GO TO 160                                                 THERMO  1366
                C**** FROM DOD 5200.1-R PARA 4-602                              THERMO  1367
                140   CALL RITE2V(380,900,1023,90,1,24,-1,24HFORMERLY RESTRICTED DATA,N) THERMO  1368
                      GO TO 160                                                 THERMO  1369
   75           C**** FROM DOD 5200.1-R PARA 4-603                              THERMO  1370
                150   CALL RITE2V(330,960,1023,90,1,29,-1,29HNATIONAL SECURITY INFORMATI THERMO  1371
                     1ON,N)                                                     THERMO  1372
                160   IF(IN.LT.1) GO TO 170                                     THERMO  1373
                C**** FROM DOD 5200.1-R PARA 4-605                              THERMO  1374
   80                 CALL RITE2V(400,840,1023,90,1,17,-1,17HNO FOREIGN DISSEM,N) THERMO  1375
                170   IF(IW.LT.1) GO TO 180                                     THERMO  1376
                C**** FROM DOD 5200.1-R PARA 4-606                              THERMO  1377
                      CALL RITE2V(420,780,1023,90,1,14,-1,14HWARNING NOTICE,N)  THERMO  1378
                      CALL RITE2V(370,760,1023,90,1,22,-1,22HSENSITIVE INTELLIGENCE,N) THERMO  1379
   85                 CALL RITE2V(340,740,1023,90,1,28,-1,28HSOURCES AND METHODS INVOLVE THERMO  1380
                     1D,N)                                                      THERMO  1381
                180   IF(IR.GT.10) GO TO 100                                    THERMO  1382
                      ENCODE(80,902,IRITE(1,1)) IA(1),IA(2),IAUTHR              THERMO  1383
                      GO TO (30,30,30,30,31,32) ID                              THERMO  1384
   90           30    ENCODE(80,902,IRITE(1,2)) (IA(L),L=3,7)                   THERMO  1385
                      GO TO 33                                                  THERMO  1386
                31    ENCODE(80,902,IRITE(1,2)) IA(9),IA(10),(IA(L),L=5,7)      THERMO  1387
                33    ENCODE(80,902,IRITE(1,3)) (IA(L),L=11,13)                 THERMO  1388
                      GO TO (40,40,40,40,41,32) ID                              THERMO  1389
   95           32    ENCODE(80,902,IRITE(1,2)) IA(8),(IA(L),L=4,7)             THERMO  1390
                      KKK=3                                                     THERMO  1391
                      GO TO 60                                                  THERMO  1392
                40    ENCODE(80,902,IRITE(1,4)) IA(14),IA(15),ICAT              THERMO  1393
                      GO TO 50                                                  THERMO  1394
  100           41    ENCODE(80,902,IRITE(1,4)) (IA(L),L=16,28)                 THERMO  1395
                50    KKK=5                                                     THERMO  1396
                60    IF(IR.GT.1) GO TO 100                                     THERMO  1397
                      IF(M.EQ.1HU)ENCODE(80,902,IRITE(1,KKK)) (IA(L),L=21,26)   THERMO  1398
                      IF(M.EQ.1HN)ENCODE(80,902,IRITE(1,KKK)) (IA(L),L=27,30)   THERMO  1399
  105                 IF(M.EQ.1H )ENCODE(80,902,IRITE(1,KKK)) IA(21),IA(22),IDCLAS THERMO  1400
                100   NY=700                                                    THERMO  1401
                      IF(IR.EQ.1) MM=KKK                                        THERMO  1402
                      DO 80 L=1,MM                                              THERMO  1403
                      CALL RITE2V(80,NY,1023,90,1,80,1,IRITE(1,L),N)            THERMO  1404
  110           80    NY=NY-20                                                  THERMO  1405
                200   RETURN                                                    THERMO  1406
                300   IF(IR.LT.1.OR.IR.GT.19) RETURN                            THERMO  1407
                      CALL FRAMEV(3)                                            THERMO  1408
                      IF(IC.LT.1) GO TO 310                                     THERMO  1409
```

```
      119          CALL CLASSG(IC)                                          THERMO  1410
                 310 CALL CHSIZV(5,5)                                       THERMO  1411
                     CALL RITSTV(29,39,TABLIV)                              THERMO  1412
                     CALL RITE2V(430,600,1023,90,2,3,-1,3HEND,N)            THERMO  1413
                     CALL RITE2V(430,400,1023,90,2,4,1,IJOB,N)              THERMO  1414
      120            CALL FRAMEV(3)                                         THERMO  1415
                     RETURN                                                 THERMO  1416
                     END                                                    THERMO  1417
```

SYMBOLIC REFERENCE MAP (R=1)

ENTRY POINTS
3 SECURE

VARIABLES	SN	TYPE	RELOCATION						
1165	I	INTEGER		1307	IA	INTEGER	ARRAY		
1171	IAUTHF	INTEGER	ARRAY	1142	IC	INTEGER			
1160	ICAT	INTEGER		1144	ID	INTEGER			
1153	IDATE	INTEGER		1155	IDAY	INTEGER			
1156	IDCLAS	INTEGER		1145	IE	INTEGER			
0	IFLAG	INTEGER	F.P.	1150	IJOB	INTEGER			
1192	IMSN	INTEGER		1147	IN	INTEGER			
1151	IPROJ	INTEGER		1143	IR	INTEGER			
1177	IRITE	INTEGER	ARRAY	1154	IRUN	INTEGER			
1146	IW	INTEGER		0	K	INTEGER	ARRAY	F.P.	
1162	KK	INTEGER		1167	KKK	INTEGER			
1166	L	INTEGER		1157	M	INTEGER			
1164	MM	INTEGER		1161	N	INTEGER			
1163	NN	INTEGER		1170	NY	INTEGER			

FILE NAMES	MODE
TAPE4	FMT

EXTERNALS	TYPE	ARGS			
CHSIZV		2	CLASSG		1
FRAMEV		1	RITE2V		9
RITSTV		3	TABL1V		0

STATEMENT LABELS

32	10		56	11		67	12		
0	13		102	18		26	19		
107	20		223	30		226	31		
244	32		230	33		250	40		
293	41		255	50		256	60		
0	80		302	100		0	130		INACTIVE
160	140		164	150		167	160		
173	170		205	180		0	200		INACTIVE
321	300		332	310		734	900	FMT	
746	901	FMT	765	902	FMT	720	1000	FMT	
756	1002	FMT							

STATISTICS
PROGRAM LENGTH 14228 786

```
                      SUBROUTINE CLASSG(I)                                          THERMO  1418
                      DIMENSION IC(2)                                               THERMO  1419
                      EXTERNAL TABL1V                                               THERMO  1420
                      DATA ITS,IS,IC/10HTOP SECRET ,7H SECRET ,10HCONFIDENTI ,3HAL  /THERMO  1421
            5         CALL CHSIZV(5,5)                                              THERMO  1422
                      CALL RITSTV(25,35,TABL1V)                                     THERMO  1423
                      IF(I-2)30,20,10                                               THERMO  1424
                   10 CALL RITE2V(400,990,1023,90,2,10,1,ITS,N)                     THERMO  1425
                      CALL RITE2V(400,040,1023,90,2,10,1,ITS,N)                     THERMO  1426
           10         RETURN                                                        THERMO  1427
                   20 CALL RITE2V(430,040,1023,90,2,7,1,IS,N)                       THERMO  1428
                      CALL RITE2V(430,990,1023,90,2,7,1,IS,N)                       THERMO  1429
                      RETURN                                                        THERMO  1430
                   30 CALL RITE2V(370,990,1023,90,2,13,1,IC,N)                      THERMO  1431
           15         CALL RITE2V(370,040,1023,90,2,13,1,IC,N)                      THERMO  1432
                      RETURN                                                        THERMO  1433
                      END                                                           THERMO  1434
```


SYMBOLIC REFERENCE MAP (R=1)

ENTRY POINTS
3 CLASSG

VARIABLES	SN	TYPE	RELOCATION					
0	I	INTEGER	P.F.	137	IC	INTEGER	ARRAY	
136	IS	INTEGER		135	ITS	INTEGER		
156	N	INTEGER						

EXTERNALS	TYPE	ARGS			
CHSIZV		2	RITE2V		9
RITSTV		3	TABL1V		0

STATEMENT LABELS
0 10 INACTIVE 20 20 25 30

STATISTICS
PROGRAM LENGTH 1618 113

```
                      SUBROUTINE GETPIC                                          THERMO  1435
                C**** THIS SUBROUTINE READS AND FINDS NEXT THERMOVISION PICTURE. THERMO  1436
                C     THE PICTURE IS RE-ORDERED AS PER LINE NUMBER.              THERMO  1437
                      COMMON IBEFOR(7),IAFTER(7),ITOP,IPICT(10100)               THERMO  1438
              5       COMMON/PDPFT/NWS,NSR,ONE,IEND,JSTOP,START,STOP,ICKSTR,ICKSTP THERMO  1440
                     . ,IVALID,ICALIB,INPT                                       THERMO  1441
                      DIMENSION IN(256),MTAB(15),ITIM(15),TIME(5),IGCODE(4)      THERMO  1442
                      EQUIVALENCE (IT1,T1),(IT2,T2)                              THERMO  1443
             10       DATA MTAB/14*18,0/,IFIRST/1/                               THERMO  1444
                      DATA IGCODE/1,4,3,2/                                       THERMO  1445
                                                                                 THERMO  1446
                      IF(IFIRST.NE.1)GO TO 25                                    THERMO  1447
                      TLAST=0.0                                                  THERMO  1448
             15       IFIRST=0                                                   THERMO  1449
                 10    LNUM=NWS*NSR                                              THERMO  1450
                      KNUM=LNUM/10                                               THERMO  1451
                      IF(MOD(LNUM,10).EQ.0)GO TO 15                              THERMO  1452
                      KNUM=KNUM+1                                                THERMO  1453
             20       LNUM=KNUM*10                                               THERMO  1454
                 15    CONTINUE                                                  THERMO  1455
                      NCHAR=3*LNUM+9*NSR                                         THERMO  1456
                       IF(MOD(NCHAR,6).NE.0)NCHAR=NCHAR+3                        THERMO  1457
                      NT=(LNUM*18)/60+1                                          THERMO  1458
             25       ICH=MOD(NCHAR,30)                                          THERMO  1459
                      IF(NCHAR.NE.0)NCHAR=NCHAR+30-ICH                           THERMO  1460
                      ILWD=NCHAR/10+1                                            THERMO  1461
                       IBAD=0                                                    THERMO  1462
                                                                                 THERMO  1463
             30       CONTINUE                                                   THERMO  1464
                CCC     IBAD=0                                                  THERMO  1465
                CCC     ICOUNT=0                                                THERMO  1466
                        IOTYP=0                                                 THERMO  1467
                      JEND=0                                                     THERMO  1468
             35       LINCNT=0                                                   THERMO  1469
                      IDUM=2                                                     THERMO  1470
                       IREC=NSR                                                  THERMO  1471
                      DO 80 I=1,10100                                            THERMO  1472
                 80     IPICT(I)=-1                                             THERMO  1473
             40       INPT=0                                                     THERMO  1474
                 100   CONTINUE                                                  THERMO  1475
                       LINSAV=LINCNT                                             THERMO  1476
                       IOSAV=IOTYP                                               THERMO  1477
                      IF(IREC.LT.NSR)GO TO 150                                   THERMO  1478
             45       101    CALL RDMODE(11,IN,NCHAR,ICODE,ICS)                 THERMO  1479
                      IF(ICODE.EQ.2.AND.ICS.EQ.2150)GO TO 110                    THERMO  1480
                       IF(ICODE.NE.0)IBAD=IBAD+1                                 THERMO  1481
                       IF(ICODE.NE.0.AND.IBAD.LT.200)PRINT 10111,NCHAR,ICODE,ICS,IBAD THERMO  1482
                10111  FORMAT(' I/P TAPE ERROR, NCHAR=',I5,' ICODE=',I5,' ICS=',I9,I9) THERMO  1483
             50       IF(ICODE)105,110,108                                       THERMO  1484
                 105    IF(ICODE.EQ.-888)GO TO 101                              THERMO  1485
                      GO TO 999                                                  THERMO  1486
                 108  CONTINUE                                                   THERMO  1487
                      IF(ICODE.EQ.4.AND.IN(ILWD).EQ.10H*END*TAPE*)               THERMO  1488
             55      1CALL DONE(11)                                             THERMO  1489
                      IF(MOD(ICODE,2).EQ.0)GO TO 110                             THERMO  1490
                      GO TO 101                                                  THERMO  1491
```

```
                  110   CONTINUE                                                  THERMO  1492
                         JEND=0                                                   THERMO  1493
        60               IREC=0                                                   THERMO  1494
                  C**** CHECK TO SEE IF THIS RECORD CONTAINS SAMPLES WITHIN START/STOP.  THERMO  1495
                  C     IF SO, THEN BREAK OUT NSR TIME WORDS.                    THERMO  1496
                                                                                 THERMO  1497
                        ITSEC=SHIFT(IN(NT),-42).AND.7777778                      THERMO  1498
        65              ITMSEC=SHIFT(IN(NT),-24).AND.7777778                     THERMO  1499
                         TIME(1)=ITSEC*1000+ITMSEC                               THERMO  1500
                        TT1=TIME(1)-START                                        THERMO  1501
                        TT2=ABS(TIME(1)-STOP)                                    THERMO  1502
                        IF(TT1.GT.0)ICKSTR=0                                     THERMO  1503
        70               IF(TT2.LT.10000.)ICKSTP=1                               THERMO  1504
                        IF(ICKSTP)112,112,111                                    THERMO  1505
                  111   CONTINUE                                                 THERMO  1506
                        TT3=TIME(1)-TLAST                                        THERMO  1507
                         IF(TLAST.NE.0.0.AND.TT3.GT.10000.)GO TO 112             THERMO  1508
        75              IF(TIME(1).GT.STOP)GO TO 990                             THERMO  1509
                  112    CONTINUE                                                THERMO  1510
                        JSTOP=0                                                  THERMO  1511
                         TIM2=TIME(1)+NSR*ONE                                    THERMO  1512
                  CCC    ICOUNT=ICOUNT+1                                         THERMO  1513
        80        CCC    IF(MOD(ICOUNT,100).EQ.0)PRINT 10112,IN(NT),ITSEC,ITMSEC,TIME(1)  THERMO  1514
                  CC10112  FORMAT(1X,O21,2I10,3F10.0)                            THERMO  1515
                         IF(ICKSTR)114,114,113                                   THERMO  1516
                  113    CONTINUE                                                THERMO  1517
                        IF(TIM2.LT.START)GO TO 101                               THERMO  1518
        85        114    CONTINUE                                                THERMO  1519
                         TLAST=TIME(1)                                           THERMO  1520
                  C*** THIS RECORD CONTAINS SAMPLES BETWEEN START AND STOP. BUILD TIME ARR  THERMO  1521
                        DO 115 I=1,NSR                                           THERMO  1522
                        TIME(I)=(I-1)*ONE+TIME(1)                                THERMO  1523
        90              CONTINUE                                                 THERMO  1524
                         IFRM =SHIFT(IN(NT),-6).AND.7777778                      THERMO  1525
                        IF(IFRM.GE.NSR)GO TO 150                                 THERMO  1526
                        CALL UNPACK(IN(NT),MTAB,ITIM)                            THERMO  1527
                        II=4                                                     THERMO  1528
        95              DO130 I=2,NSR                                            THERMO  1529
                         IF(IFRM.GE.I)GO TO 130                                  THERMO  1530
                         TIME(I)=ITIM(II)*1000.+ITIM(II+1)                       THERMO  1531
                        IFRM=ITIM(II+2)                                          THERMO  1532
                        II=II+3                                                  THERMO  1533
       100              L=0                                                      THERMO  1534
                        IF(IFRM.LT.I.OR.IFRM.GT.NSR)GO TO 130                    THERMO  1535
                         DO 125 J=I,IFRM                                         THERMO  1536
                        L=L+1                                                    THERMO  1537
                        TIME(J)=(L-1)*ONE+TIME(I)                                THERMO  1538
       105        125    CONTINUE                                                THERMO  1539
                  130    CONTINUE                                                THERMO  1540
                                                                                 THERMO  1541
                  150    CONTINUE                                                THERMO  1542
                        IREC=IREC+1                                              THERMO  1543
       110              INDX=IREC*42                                             THERMO  1544
                  C**** GET LINE COUNT AND DATA TYPE                             THERMO  1545
                                                                                 THERMO  1546
                         IDTYP=SHIFT(IN(INDX),-18).AND.3B                        THERMO  1547
                        LINCNT=SHIFT(IN(INDX),-20).AND.3778                      THERMO  1548
```

```
                      IF(IDTYP.EQ.0)GO TO 200                                   THERMO  1549
                      IF(IOSAV.EQ.0)GO TO 190                                   THERMO  1550
                C**** THIS IS A LINE OF PICTURE.  LINE NUMBER=LAST LINE COUNT   THERMO  1551
                155   CONTINUE                                                  THERMO  1552
                C**** IF VALID DATA BIT NOT ON, DO NOT PROCESS                  THERMO  1553
           120  IF(IVAL.NE.IVALID.AND.IVALID.NE.2)GO TO 100                     THERMO  1554
                      INPT=INPT+1                                               THERMO  1555
                      IF(LINSAV.LT.ITOP)GO TO 100                               THERMO  1556
                      I=(LINSAV-ITOP)*100+1                                     THERMO  1557
                      IF(I.GT.9901)I=9901                                       THERMO  1558
           125        IND=INDX-41                                               THERMO  1559
                      IND2=IND+29                                               THERMO  1560
                      DO 160 J=IND ,IND2,3                                      THERMO  1561
                      IWD1=IN(J)                                                THERMO  1562
                      IWD2=IN(J+1)                                              THERMO  1563
           130        IWD3=IN(J+2)                                              THERMO  1564
                      IPICT(I)=SHIFT(IWD1,-42).AND.1777B                        THERMO  1565
                      IPICT(I+1)=SHIFT(IWD1,-24).AND.1777B                      THERMO  1566
                      IPICT(I+2)=SHIFT(IWD1,-6).AND.1777B                       THERMO  1567
                      IPICT(I+3)=SHIFT(IWD2,-48).AND.1777B                      THERMO  1568
           135        IPICT(I+4)=SHIFT(IWD2,-30).AND.1777B                      THERMO  1569
                      IPICT(I+5)=SHIFT(IWD2,-12).AND.1777B                      THERMO  1570
                      IPICT(I+6)=(SHIFT(IWD2,6).AND.1700B) .OR.(SHIFT(IWD3,-54).AND.77B) THERMO  1571
                      IPICT(I+7)=SHIFT(IWD3,-36).AND.1777B                      THERMO  1572
                      IPICT(I+8)=SHIFT(IWD3,-18).AND.1777B                      THERMO  1573
           140        IPICT(I+9)=IWD3.AND.1777B                                 THERMO  1574
                      I=I+10                                                    THERMO  1575
                160   CONTINUE                                                  THERMO  1576
                C**** CHECK THIS LINE FOR CONSTANT VALUES.  IF 30 OR MORE WORDS THERMO  1577
                C     CONSECUTIVELY HAVE THE SAME VALUE, THEN SET THOSE VALUES TO ZERO THERMO  1578
           145        IXX1=I-100                                                THERMO  1579
                      IXX2=I-1                                                  THERMO  1580
                      ICOUNT=IPICT(IXX1)                                        THERMO  1581
                      IW=0                                                      THERMO  1582
                      DO 165 JJ=IXX1,IXX2                                       THERMO  1583
           150        IW=IW+1                                                   THERMO  1584
                      IF(IPICT(JJ).EQ.ICOUNT.AND.IPICT(JJ).GT.128)GO TO 165     THERMO  1585
                      GO TO 167                                                 THERMO  1586
                165   CONTINUE                                                  THERMO  1587
                167    CONTINUE                                                 THERMO  1588
           155        IF(IW.LT.30)GO TO 100                                     THERMO  1589
                      IXX2=IXX1+IW-1                                            THERMO  1590
                      DO 168 JJ=IXX1,IXX2                                       THERMO  1591
                      IPICT(JJ)=-1                                              THERMO  1592
                168    CONTINUE                                                 THERMO  1593
           100         GO TO 100                                                THERMO  1594
                      GO TO 100                                                 THERMO  1595
                190   CONTINUE                                                  THERMO  1596
                C*** THIS IS FIRST DUMMY RECORD BEFORE PICTURE, GET TIME AND SETTINGS. THERMO  1597
                      T1=TIME(IREC)                                             THERMO  1598
           105        IND=INDX-41                                               THERMO  1599
                      IFIL=SHIFT(IN(IND),-49).AND.7B                            THERMO  1600
                      IAP =SHIFT(IN(IND),-46).AND.7B                            THERMO  1601
                      IVID=SHIFT(IN(IND),-44).AND.3B                            THERMO  1602
                      ICAL=SHIFT(IN(IND),-43).AND.1B                            THERMO  1603
           170        IVAL=SHIFT(IN(IND),-42).AND.1B                            THERMO  1604
                      IBEFOR(2)=7-IFIL                                          THERMO  1605
```

```
                      IBEFOR(3)=7-IAP                                    THERMO  1606
                      IBEFOR(4)=IGCODE(IVID+1)                           THERMO  1607
                      IBEFOR(5)=ICAL                                     THERMO  1608
  175                 IBEFOR(6)=IVAL                                     THERMO  1609
                      GO TO 100                                          THERMO  1610
                200    CONTINUE                                          THERMO  1611
                      IACL1=IACL2                                        THERMO  1612
                      IACL2=LINCNT                                       THERMO  1613
  180                 IF(IDSAV.EQ.0)GO TO 250                            THERMO  1614
                      IDUM=0                                             THERMO  1615
                       GO TO 195                                         THERMO  1616
                250   CONTINUE                                           THERMO  1617
                      IDUM=IDUM+1                                        THERMO  1618
  185                 IF(IDUM.GT.1)GO TO 100                             THERMO  1619
                C**** THIS IS FIRST DUMMY RECORD AFTRF PICTURE. STORE SETTINGS   THERMO  1620
                       T2=TIME(IREC)                                     THERMO  1621
                      IND=INDX-41                                        THERMO  1622
                      IFIL=SHIFT(IN(IND),-49).AND.7B                     THERMO  1623
  190                 IAP =SHIFT(IN(IND),-46).AND.7B                     THERMO  1624
                      IVID=SHIFT(IN(IND),-44).AND.3B                     THERMO  1625
                      ICAL=SHIFT(IN(IND),-43).AND.1B                     THERMO  1626
                      IVAL=SHIFT(IN(IND),-42).AND.1B                     THERMO  1627
                      IAFTER(2)=7-IFIL                                   THERMO  1628
  195                 IAFTER(3)=7-IAP                                    THERMO  1629
                      IAFTER(4)=IGCODE(IVID+1)                           THERMO  1630
                      IAFTER(5)=ICAL                                     THERMO  1631
                      IAFTER(6)=IVAL                                     THERMO  1632
                       GO TO 700                                         THERMO  1633
  200                                                                    THERMO  1634
                700   CONTINUE                                           THERMO  1635
                C**** CHECK TO SEE IF PICTURE IS VALID                   THERMO  1636
                      IF(IBEFOR(6).NE.IVALID.AND.IVALID.NE.2)GO TO 100   THERMO  1637
                       IF(ICALIB.EQ.1.AND.ICAL.EQ.0)GO TO 100            THERMO  1638
  205                 DO 710 I=2,6                                       THERMO  1639
                      IF(IBEFOR(I).NE.IAFTER(I))GO TO 100                THERMO  1640
                710   CONTINUE                                           THERMO  1641
                      IBEFOR(7)=IACL1                                    THERMO  1642
                      IAFTER(7)=IACL2                                    THERMO  1643
  210                 IBEFOR(1)=IT1                                      THERMO  1644
                      IAFTER(1)=IT2                                      THERMO  1645
                800   RETURN                                             THERMO  1646
                990    CONTINUE                                          THERMO  1647
                       JSTOP=1                                           THERMO  1648
  215                 GO TO 800                                          THERMO  1649
                999   CONTINUE                                           THERMO  1650
                      JEND=JEND+1                                        THERMO  1651
                      IF(JEND.LT.2)GO TO 101                             THERMO  1652
                      IEND=IEND+1                                        THERMO  1653
  220                 GO TO 800                                          THERMO  1654
                      END                                                THERMO  1655
```

CARD NR.	SEVERITY	DETAILS	DIAGNOSIS OF PROBLEM
101	I		THERE IS NO PATH TO THIS STATEMENT.

SYMBOLIC REFERENCE MAP (R=1)

ENTRY POINTS
1 GETPIC

VARIABLES	SN	TYPE		RELOCATION						
736	I	INTEGER			779	IACL1	INTEGER			
776	IACL2	INTEGER			7	IAFTER	INTEGER	ARRAY	/ /	
772	IAP	INTEGER			730	IBAD	INTEGER			
0	IBEFOR	INTEGER	ARRAY	/ /	774	ICAL	INTEGER			
12	ICALIB	INTEGER		PDPFT	726	ICH	INTEGER			
10	ICKSTP	INTEGER		PDPFT	7	ICKSTR	INTEGER		PDPFT	
741	ICODE	INTEGER			700	ICOUNT	INTEGER			
742	ICS	INTEGER			740	IDSAV	INTEGER			
731	IDTYP	INTEGER			734	IDUM	INTEGER			
3	IEND	INTEGER		PDPFT	771	IFIL	INTEGER			
671	IFIRST	INTEGER			751	IFRM	INTEGER			
1444	IGCODE	INTEGER	ARRAY		752	II	INTEGER			
727	ILWD	INTEGER			1001	IN	INTEGER	ARRAY		
757	IND	INTEGER			755	INDX	INTEGER			
760	IND2	INTEGER			13	INPT	INTEGER		PDPFT	
17	IPICT	INTEGER	ARRAY	/ /	735	IREC	INTEGER			
1420	ITIM	INTEGER	ARRAY		744	ITMSEC	INTEGER			
16	ITOP	INTEGER		/ /	743	ITSEC	INTEGER			
777	IT1	INTEGER			1000	IT2	INTEGER			
756	IVAL	INTEGER			11	IVALID	INTEGER		PDPFT	
773	IVID	INTEGER			767	IW	INTEGER			
761	IWD1	INTEGER			762	IWD2	INTEGER			
763	IWD3	INTEGER			764	IXX1	INTEGER			
765	IXX2	INTEGER			754	J	INTEGER			
732	JEND	INTEGER			770	JJ	INTEGER			
4	JSTOP	INTEGER		PDPFT	723	KNUM	INTEGER			
753	L	INTEGER			733	LINCNT	INTEGER			
737	LINSAV	INTEGER			722	LNUM	INTEGER			
1401	MTAB	INTEGER	ARRAY		724	NCHAR	INTEGER			
1	NSR	INTEGER		PDPFT	725	NT	INTEGER			
0	NWS	INTEGER		PDPFT	2	ONE	REAL		PDPFT	
5	START	REAL		PDPFT	6	STOP	REAL		PDPFT	
1437	TIME	REAL	ARRAY		750	TIM2	REAL			
721	TLAST	REAL			745	TT1	REAL			
746	TT2	REAL			747	TT3	REAL			
777	T1	REAL			1000	T2	REAL			

FILE NAMES	MODE
OUTPUT	FMT

EXTERNALS	TYPE	ARGS			
ABS	REAL	1	DONE	1	
MOD	INTEGER	2	FDMODE	5	
SHIFT	NO TYPE	2	UNPACK	3	

STATEMENT LABELS

0	10	INACTIVE	16	15		43	25		
0	80		54	100		61	101		
0	105	INACTIVE	104	100		116	110		
0	111	INACTIVE	161	112		0	113	INACTIVE	
176	114		0	115		0	125		

STATEMENT LABELS

241	130		244	190		264	195
0	160		416	165		420	167
0	168		431	190		502	200
507	250		0	700	INACTIVE	0	710
606	800		607	990		611	999
701	10111	FMT					

COMMON BLOCKS	LENGTH
/ /	10115
PDPFT	12

STATISTICS

PROGRAM LENGTH	14508	608
CM LABELED COMMON LENGTH	148	12
CM BLANK COMMON LENGTH	236038	10115

```
                SUBROUTINE PLT3D                                                THERMO  1656
C                                                                               THERMO  1657
C**** THIS SUBROUTINE WILL MAKE OBLIQUE PLOT OF V VS W FUNCTION FOR             THERMO  1658
C     A GIVEN U.                                                                THERMO  1659
C                                                                               THERMO  1660
C     U= VALUE OF INDEPENDENT VARIABLE U FOR A GIVEN V VS W FUNCTION.           THERMO  1661
C     VA = ONE DIMENSIONAL ARRAY CONTAINING INDEPENDENT VARIABLE V.             THERMO  1662
C     WA=ONE DIMENSIONAL ARRAY CONTAINING DEPENDENT VARIABLE W.                 THERMO  1663
C                                                                               THERMO  1664
C                              WA(I)= F(U,VA(I))                                THERMO  1665
C     IPASS=N INDICATES EVERY NTH POINT ON THIS CURVE TO NTH POINT OF           THERMO  1666
C              PREVIOUS CURVE.                                                  THERMO  1667
C     IPASS=-1 IF THIS IS FIRST CALL FOR NEW FRAME.                             THERMO  1668
C     IPASS=N INDICATES EVERY NTH POINT ON THIS CURVE TO NTH POINT OF           THERMO  1669
C              PREVIOUS CURVE BE CONNECTED.                                     THERMO  1670
C     NPTS= NO. OF PTS IN VA, WA ARRAYS.                                        THERMO  1671
C                                                                               THERMO  1672
C                                                                               THERMO  1673
      COMMON IBEFOR(7),IAFTER(7),ITOP,IPICT(10100)                              THERMO  1674
      COMMON/MAXVAL/UFOR,UBACK,VLEFT,VRIGHT,WBOT,WTOP,THETA,                    THERMO  1675
     . UAXIS,VAXIS,UVPLNE ,IU(2,2),IV(2,2),IW(2,2)                              THERMO  1676
      COMMON/PLIM/IFOR,IBACK,ILEFT,IRIGHT,IVIEW,IPASS                           THERMO  1677
C                                                                               THERMO  1678
C     MAXVAL COMMON IS USED FOR DETERMING SCALES.                               THERMO  1679
C     UFOR=EXTREME VALUE OF U FOR FOREGROUND.                                   THERMO  1680
C     UBACK= EXTREME VALUE OF U FOR BACKGROUND.                                 THERMO  1681
C     VLEFT= LEFT MOST VALUE OF V.                                              THERMO  1682
C     VRIGHT= RIGHT MOST VALUE OF V                                             THERMO  1683
C     WBOT=MIN VALUE OF W.                                                      THERMO  1684
C     WTOP=MAX VALUE OF W                                                       THERMO  1685
C     THETA=ANGLE OF OBLIQUE AXIS WITH VERTICAL (RADIANS).  NOTE- IF THIS       THERMO  1686
C     IS ZERO. THEN PLOT WILL BE TWO DIMENSIONAL WITH U AND W AXES CO-          THERMO  1687
C     INCIDENT.                                                                 THERMO  1688
C     UAXIS= VALUE OF V AT WHICH UAXIS IS TO BE DRAWN.                          THERMO  1689
C     VAXIS= VALUE OF U AT WHICH V AXIS IS TO BE DRAWN.                         THERMO  1690
C     UVPLNE= VALUE OF W AT WHICH UAXIS AND VAXIS INTERSECT.                    THERMO  1691
C                                                                               THERMO  1692
      DIMENSION IXSAV(120),IYSAV(120)                                           THERMO  1693
      DIMENSION MINY(1024),MAXY(1024)                                           THERMO  1694
      DIMENSION R(10)                                                           THERMO  1695
      EQUIVALENCE (R(3),A),(R(5),B),(R(4),C),(R(6),D)                           THERMO  1696
      LOGICAL IOUT                                                              THERMO  1697
      IF(IPASS.NE.-5)CALL FRAMEV(3)                                             THERMO  1698
C**** IF FIRST PASS, ADVANCE FRAME, SET SCALES, AND INITIALIZE MAX AND          THERMO  1699
C     MIN FUNCTIONS.  THE FIRST CURVE TO BE PLOTTED WILL BE THE FARTHEST        THERMO  1700
C     IN THE FOREGROUND.    SUCCEEDING VALUES OF U MUST BE EITHER               THERMO  1701
C     ASCENDING OF DESCENDING.                                                  THERMO  1702
C                                                                               THERMO  1703
C**** FIND SCALE VALUES TO MAKE VARIABLES PROPORTIONAL                          THERMO  1704
      ULNTH=ABS(UFOR-UBACK)                                                     THERMO  1705
      VLNTH=ABS(VRIGHT-VLEFT)                                                   THERMO  1706
      WLNTH=ABS(WTOP-WBOT)                                                      THERMO  1707
      SCMIN=AMIN1(ULNTH,VLNTH,WLNTH)                                            THERMO  1708
      SCALU=SCMIN/ULNTH                                                         THERMO  1709
      SCALV=SCMIN/VLNTH                                                         THERMO  1710
      SCALW=SCMIN/WLNTH                                                         THERMO  1711
        IF(IPASS.NE.-3)GO TO 19                                                 THERMO  1712
```

```
                      SCALU=1.                                                  THERMO  1713
                      SCALV=1.                                                  THERMO  1714
      60              SCALW=1.                                                  THERMO  1715
                19    CONTINUE                                                  THERMO  1716
                      ULNTH=ULNTH*SCALU                                         THERMO  1717
                       DIFX=ULNTH*SIN(THETA)                                    THERMO  1718
                       IF(VRIGHT.LT.VLEFT)DIFX=-DIFX                            THERMO  1719
      65              IF(THETA.GE.0.0)GO TO 20                                  THERMO  1720
                      XRIGHT=VRIGHT*SCALV                                       THERMO  1721
                      XLEFT=VLEFT*SCALV+DIFX                                    THERMO  1722
                       GO TO 30                                                 THERMO  1723
                20     CONTINUE                                                 THERMO  1724
      70              XLEFT=VLEFT*SCALV                                         THERMO  1725
                      XRIGHT=VRIGHT*SCALV+DIFX                                  THERMO  1726
                30     CONTINUE                                                 THERMO  1727
                      YTOP=(WTOP-WBOT)*SCALW+ULNTH*COS(THETA)+WBOT*SCALW        THERMO  1728
                      YBOT=WBOT*SCALW                                           THERMO  1729
      75              YSCALE=YTOP-YBOT                                          THERMO  1730
                      XSCALE=ABS(XRIGHT-XLEFT)                                  THERMO  1731
                      CALL XSCALV(XLEFT,XRIGHT,50,50)                           THERMO  1732
                      CALL YSCALV(YBOT,YTOP,50,50)                              THERMO  1733
                C**** GET SCALING INFO TO ELIMINATE NXV,NYV CALLS               THERMO  1734
      80                                                                        THERMO  1735
                       CALL SCLSAV(R)                                           THERMO  1736
                C**** CONSTRUCT THE AXES.                                       THERMO  1737
                C                                                               THERMO  1738
                C    (V AXIS)                                                   THERMO  1739
      85              DELU=ABS(VAXIS-UFGR)*SCALU                                THERMO  1740
                      DX=DELU*SIN(THETA)                                        THERMO  1741
                      IDELX=(DX/XSCALE)*924.                                    THERMO  1742
                      DY=DELU*COS(THETA)                                        THERMO  1743
                      IDELY=(DY/YSCALE)*924.                                    THERMO  1744
      90              IX1=NXV(VLEFT*SCALV)+IDELX                                THERMO  1745
                      IY1=NYV(UVPLNE*SCALW)+IDELY                               THERMO  1746
                      IX2=NXV(VRIGHT*SCALV)+IDELX                               THERMO  1747
                      IY2=IY1                                                   THERMO  1748
                      CALL LINEV(IX1,IY1,IX2,IY2)                               THERMO  1749
      95              IV(1,1)=IX1                                               THERMO  1750
                      IV(2,1)=IY1                                               THERMO  1751
                       IV(1,2)=IX2                                              THERMO  1752
                      IV(2,2)=IY2                                               THERMO  1753
                C                                                               THERMO  1754
     100              C    (W AXIS)                                             THERMO  1755
                      IX1=NXV(UAXIS*SCALV)+IDELX                                THERMO  1756
                      IX2=IX1                                                   THERMO  1757
                      IY1=NYV(WBOT*SCALW)+IDELY                                 THERMO  1758
                      IY2=NYV(WTOP*SCALW)+IDELY                                 THERMO  1759
     105              CALL LINEV(IX1,IY1,IX2,IY2)                               THERMO  1760
                       IW(1,1)=IX1                                              THERMO  1761
                       IW(2,1)=IY1                                              THERMO  1762
                       IW(1,2)=IX2                                              THERMO  1763
                       IW(2,2)=IY2                                              THERMO  1764
     110              C                                                         THERMO  1765
                C    (U AXIS)                                                   THERMO  1766
                C                                                               THERMO  1767
                      IX1=NXV(UAXIS*SCALV)                                      THERMO  1768
                      IY1=NYV(UVPLNE*SCALW)                                     THERMO  1769
```

```
      Y2=ULNTH*COS(THETA)+UVPLNE*SCALV                                  THERMO 1770
       X2=DIFX+UAXIS*SCALV                                              THERMO 1771
      IX2=NXV(X2)                                                       THERMO 1772
      IY2=NYV(Y2)                                                       THERMO 1773
      CALL LINEV(IX1,IY1,IX2,IY2)                                       THERMO 1774
  120  IU(1,1)=IX1                                                      THERMO 1775
      IU(2,1)=IY1                                                       THERMO 1776
       IU(1,2)=IX2                                                      THERMO 1777
       IU(2,2)=IY2                                                      THERMO 1778
C                                                                       THERMO 1779
  129 100  CONTINUE                                                     THERMO 1780
       IF(IPASS.EQ.-5)RETURN                                            THERMO 1781
       IPASS=IABS(IPASS)                                                THERMO 1782
C**** INITIALIZE VALUES                                                 THERMO 1783
       DO 60 I=1,1024                                                   THERMO 1784
  130  MINY(I)=1000                                                     THERMO 1785
      MAXY(I)=0                                                         THERMO 1786
       IF(I.GT.120)GO TO 60                                             THERMO 1787
       IXSAV(I)=0                                                       THERMO 1788
       IYSAV(I)=0                                                       THERMO 1789
  135  60  CONTINUE                                                     THERMO 1790
       NCURV=IABS(IFOR-IBACK)+1                                         THERMO 1791
      NPTS=IABS(IRIGHT-ILEFT)                                           THERMO 1792
       INDX1=ISIGN(1,(IFOR-IBACK))                                      THERMO 1793
       INDX2=ISIGN(1,(IRIGHT-ILEFT))                                    THERMO 1794
  140  DO 700 ICU=1,NCURV                                               THERMO 1795
       IF(ICU-NCURV)62,61,61                                            THERMO 1796
      61  U=UBACK                                                       THERMO 1797
      GO TO 63                                                          THERMO 1798
      62   CONTINUE                                                     THERMO 1799
  145  U=IFOR-INDX1*(ICU-1)                                             THERMO 1800
      63  CONTINUE                                                      THERMO 1801
      DELU=ABS(U-UFOR)*SCALU                                            THERMO 1802
      DX=DELU*SIN(THETA)                                                THERMO 1803
      IDELX=(DX/XSCALE)*924.                                            THERMO 1804
  150  DY=DELU*COS(THETA)                                               THERMO 1805
      IDELY=(DY/YSCALE)*924.                                            THERMO 1806
      ICUT=.TRUE.                                                       THERMO 1807
       J=NPTS+1                                                         THERMO 1808
       DO 180 JJ=1,NPTS                                                 THERMO 1809
  155  IF(THETA)110,120,120                                             THERMO 1810
      110   J=JJ                                                        THERMO 1811
      GO TO 125                                                         THERMO 1812
      120   J=J-1                                                       THERMO 1813
      125    CONTINUE                                                   THERMO 1814
  160  IVA=ILEFT+(J-1)*INDX2                                            THERMO 1815
       III=U                                                            THERMO 1816
       JJJ=IVA                                                          THERMO 1817
      IF(IVIEW.EQ.1.OR.IVIEW.EQ.3)GO TO 127                             THERMO 1818
      III=IVA                                                           THERMO 1819
  165  JJJ=U                                                            THERMO 1820
      127  CONTINUE                                                     THERMO 1821
       IWDX=(III-1)*160+JJJ                                             THERMO 1822
      IF(ICU-NCURV)129,128,128                                          THERMO 1823
      128   IWDX=10000+IVA                                              THERMO 1824
  170  GO TO 1291                                                       THERMO 1825
      129   CONTINUE                                                    THERMO 1826
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                      IPICT(IC000+IVA)=MAX0(IPICT(IC000+IVA),IPICT(INDX))                THERMO  1827
                1291  CONTINUE                                                           THERMO  1828
                      IF(JJ.EQ.NPTS)IND1=INDX                                            THERMO  1829
            175       IX2=A*SCALV*IVA+B+IDELX                                            THERMO  1830
                      IY2=C*SCALW*IPICT(INDX)+D+IDELY                                    THERMO  1831
                      IF(ICU.EQ.1.OR.ICU.EQ.NCURV)GO TO 170                              THERMO  1832
                        IF(MOD(J,IPASS).NE.0)GO TO 170                                   THERMO  1833
                      NX=IABS(IX2-IXSAV(J))                                              THERMO  1834
            180       IF(NX.EQ.0)NX=1                                                    THERMO  1835
                      INCX=1                                                             THERMO  1836
                      IF(IXSAV(J).GT.IX2)INCX=-1                                         THERMO  1837
                      DX=NX                                                              THERMO  1838
                      DY=IY2-IYSAV(J)                                                    THERMO  1839
            185       RATIO=DY/DX                                                        THERMO  1840
                      IYST=IYSAV(J)                                                      THERMO  1841
                      IX=IXSAV(J)                                                        THERMO  1842
                      IN=0                                                               THERMO  1843
                      DO 165 I=1,NX                                                      THERMO  1844
            190       IX=IX+INCX                                                         THERMO  1845
                      IY=IYST+I*RATIO                                                    THERMO  1846
                      IF(IY.LE.MAXY(IX).AND.IY.GE.MINY(IX))GO TO 130                     THERMO  1847
                      IN=0                                                               THERMO  1848
                      GO TO 160                                                          THERMO  1849
            195       IF(IN.EQ.1.OR.I.EQ.1)GO TO 135                                     THERMO  1850
                      CALL LINEV(IXSAV(J),IYSAV(J),IX,IY)                                THERMO  1851
                135   IXSAV(J)=IX                                                        THERMO  1852
                      IYSAV(J)=IY                                                        THERMO  1853
                      IN=1                                                               THERMO  1854
            200       GO TO 160                                                          THERMO  1855
                      MAXY(IX)=MAX0(IY,MAXY(IX))                                         THERMO  1856
                      MINY(IX)=MIN0(IY,MINY(IX))                                         THERMO  1857
                165   CONTINUE                                                           THERMO  1858
                      IF(IN.EQ.0)CALL LINEV(IXSAV(J),IYSAV(J),IX2,IY2)                   THERMO  1859
            205       IXSAV(J)=IX2                                                       THERMO  1860
                      IYSAV(J)=IY2                                                       THERMO  1861
                180   CONTINUE                                                           THERMO  1862
                      IX1=A*SCALU*ILEFT+IDELX+B                                          THERMO  1863
                      IY1=C*SCALW*IPICT(IND1)+IDELY+D                                    THERMO  1864
            210       IF(IY1.LT.MAXY(IX1).AND.IY1.GT.MINY(IX1)) IOUT = .FALSE.           THERMO  1865
                      DO 300 J=2,NPTS                                                    THERMO  1866
                        IX2=IXSAV(J)                                                     THERMO  1867
                      IY2=IYSAV(J)                                                       THERMO  1868
                      NX=IABS(IX2-IX1)                                                   THERMO  1869
            215       IF(NX.EQ.0)NX=1                                                    THERMO  1870
                        INCX=1                                                           THERMO  1871
                      IF(IX2.LT.IX1)INCX=-1                                              THERMO  1872
                      DX=NX                                                              THERMO  1873
                      DY=IY2-IY1                                                         THERMO  1874
            220       RATIO=DY/DX                                                        THERMO  1875
                      IX=IX1                                                             THERMO  1876
                        IYST=IY1                                                         THERMO  1877
                      DO 230 K=1,NX                                                      THERMO  1878
                      IX=IX+INCX                                                         THERMO  1879
            225       IY=IYST+K*RATIO                                                    THERMO  1880
                      INDX=IX                                                            THERMO  1881
                      MXY=MAXY(INDX)                                                     THERMO  1882
                      MNY=MINY(INDX)                                                     THERMO  1883
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      IF(IY.LT.MXY.AND.IY.GT.MNY)GO TO 200                              THERMO  1884
230   IOUT=.TRUE.                                                       THERMO  1885
      GO TO 220                                                         THERMO  1886
200    CONTINUE                                                         THERMO  1887
      IF(.NOT.IOUT) GO TO 210                                           THERMO  1888
       CALL LINEV(IX1,IY1,IX,IY)                                        THERMO  1889
239   210   CONTINUE                                                    THERMO  1890
      IOUT=.FALSE.                                                      THERMO  1891
      IX1=IX                                                            THERMO  1892
      IY1=IY                                                            THERMO  1893
      220   CONTINUE                                                    THERMO  1894
240    MAXY(INDX)=MAX0(IY,MXY)                                          THERMO  1895
      MINY(INDX)=MIN0(IY,MNY)                                           THERMO  1896
      230  CONTINUE                                                     THERMO  1897
       IF(.NOT.IOUT)GO TO 234                                           THERMO  1898
      CALL LINEV(IX1,IY1,IX2,IY2)                                       THERMO  1899
245   234  CONTINUE                                                     THERMO  1900
      IND1=IX1                                                          THERMO  1901
       MAXY(IND1)=MAX0(IY1,MAXY(IND1))                                  THERMO  1902
      MINY(IND1)=MIN0(IY1,MINY(IND1))                                   THERMO  1903
      IX1=IX2                                                           THERMO  1904
250   IY1=IY2                                                           THERMO  1905
      300  CONTINUE                                                     THERMO  1906
      700   CONTINUE                                                    THERMO  1907
      RETURN                                                            THERMO  1908
      END                                                               THERMO  1909
```

SYMBOLIC REFERENCE MAP (R=1)

ENTRY POINTS
1 PLT3D

VARIABLES	SN	TYPE		RELOCATION						
1057	A	REAL				1061	B	REAL		
1060	C	REAL				1062	D	REAL		
1010	DELU	REAL				1001	DIFX	REAL		
1011	DX	REAL				1013	DY	REAL		
1023	I	INTEGER				7	IAFTER	INTEGER	ARRAY	/ /
1	IBACK	INTEGER		PLIM		0	IBEFOR	INTEGER	ARRAY	/ /
1030	ICU	INTEGER				1012	IDELX	INTEGER		
1014	IDELY	INTEGER				0	IFOR	INTEGER		PLIM
1035	III	INTEGER				2	ILEFT	INTEGER		PLIM
1046	IN	INTEGER				1042	INCX	INTEGER		
1051	INDX	INTEGER				1026	INDX1	INTEGER		
1027	INDX2	INTEGER				1054	IND1	INTEGER		
771	IOUT	LOGICAL				9	IPASS	INTEGER		PLIM
17	IPICT	INTEGER	ARRAY	/ /		3	IRIGHT	INTEGER		PLIM
16	ITOP	INTEGER		/ /		12	IU	INTEGER	ARRAY	MAXVAL
16	IV	INTEGER	ARRAY	MAXVAL		1034	IVA	INTEGER		
4	IVIEW	INTEGER		PLIM		22	IW	INTEGER	ARRAY	MAXVAL
1037	IWDX	INTEGER				1040	IWD1	INTEGER		
1045	IX	INTEGER				1067	IXSAV	INTEGER	ARRAY	
1015	IX1	INTEGER				1017	IX2	INTEGER		
1047	IY	INTEGER				1257	IYSAV	INTEGER	ARRAY	
1044	IYST	INTEGER				1016	IY1	INTEGER		
1020	IY2	INTEGER				1032	J	INTEGER		
1033	JJ	INTEGER				1036	JJJ	INTEGER		
1050	K	INTEGER				3447	MAXY	INTEGER	ARRAY	
1447	MINY	INTEGER	ARRAY			1053	MNY	INTEGER		
1052	MXY	INTEGER				1024	NCURV	INTEGER		
1025	NPTS	INTEGER				1041	NX	INTEGER		
1055	R	REAL	ARRAY			1043	RATIO	REAL		
776	SCALU	REAL				777	SCALV	REAL		
1000	SCALW	REAL				779	SCMIN	REAL		
6	THETA	REAL		MAXVAL		1031	U	REAL		
7	UAXIS	REAL		MAXVAL		1	UBACK	REAL		MAXVAL
0	UFOR	REAL		MAXVAL		772	ULNTH	REAL		
11	UVPLNE	REAL		MAXVAL		10	VAXIS	REAL		MAXVAL
2	VLEFT	REAL		MAXVAL		773	VLNTH	REAL		
3	VRIGHT	REAL		MAXVAL		4	VBOT	REAL		MAXVAL
774	WLNTH	REAL				5	WTOP	REAL		MAXVAL
1003	XLEFT	REAL				1002	XRIGHT	REAL		
1007	XSCALE	REAL				1022	X2	REAL		
1005	YBOT	REAL				1006	YSCALE	REAL		
1004	YTOP	REAL				1021	Y2	REAL		

EXTERNALS	TYPE	ARGS			
ABS	REAL	1	AMIN1	REAL	3
COS	REAL	1	FRAMEV		1
IABS	INTEGER	1	ISIGN	INTEGER	2
LINEV		4	MAX0	INTEGER	2
MIN0	INTEGER	2	MOD	INTEGER	2
NXV	INTEGER	1	NYV	INTEGER	1
SCLSAV		1	SIN	REAL	1

```
      SUBROUTINE PLT3D       74/74    OPT=1    TRACE                     FTN 4.2+74355       09/29/76  13.01.14.        PAGE    7

   EXTERNALS           TYPE   ARGS
         XSCALV                 4                              YSCALV          4

   STATEMENT LABELS
     35  19                                  53  20                                        60  30
    251  60                                   0  61          INACTIVE                     302  62
    306  63                                   0  100         INACTIVE                       0  110          INACTIVE
    337  120                                341  129                                      399  127
      0  128            INACTIVE            365  129                                      464  130
    475  135                                501  160                                        0  165
    521  170                                  0  180                                      614  200
    617  210                                623  220                                        0  230
    637  234                                  0  300                                        0  700
    379  1291

   COMMON BLOCKS    LENGTH
         / /        10115
         MAXVAL        22
         PLIM           6

   STATISTICS
     PROGRAM LENGTH             54479    2655
     CM LABELED COMMON LENGTH     348      28
     CM BLANK COMMON LENGTH    236039   10115
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      SUBROUTINE CLASS       74/74    OPT=1    TRACE                     FTN 4.2+74355       09/29/76  13.01.24.        PAGE    1

                  SUBROUTINE CLASS(ITITL)                                       THERMO   1910
            C**** THIS SUBROUTINE WRITES CLASSIFICATION AT TOP OF PICTIRE AND TITLE THERMO   1911
            C     IF REQUESTED.                                                 THERMO   1912
                   COMMON/CLASF/ICLASS,TITLE(8)                                 THERMO   1913
                   EXTERNAL TABL1V                                              THERMO   1914
                  CALL CHSIZV(3,3)                                              THERMO   1915
                  CALL RITSTV(18,26,TABL1V)                                     THERMO   1916
                  IF(ICLASS-1)80,20,30                                          THERMO   1917
            20     CALL RITE2V(412,1009,1023,90,2,12,-1,12HCONFIDENTIAL ,NE)    THERMO   1918
                   CALL RITE2V(412,  20,1023,90,2,12,-1,12HCONFIDENTIAL ,NE)    THERMO   1919
                  GO TO 80                                                      THERMO   1920
            30    CALL RITE2V(440,1009,1023,90,2,6,-1,6HSECRET ,NE)             THERMO   1921
                  CALL RITE2V(440,  20,1023,90,2,6,-1,6HSECRET ,NE)             THERMO   1922
            80    CONTINUE                                                      THERMO   1923
                  CALL CHSIZV(2,2)                                              THERMO   1924
                  CALL RITSTV(13,19,TABL1V)                                     THERMO   1925
                   IF(ITITL.EQ.0)GO TO 90                                       THERMO   1926
                   CALL RITE2V(30,987,1023,90,2,70,1,TITLE,NE)                  THERMO   1927
            90     CONTINUE                                                     THERMO   1928
                   RETURN                                                       THERMO   1929
                   END                                                          THERMO   1930
```

SYMBOLIC REFERENCE MAP (R=1)

ENTRY POINTS
3 CLASS

VARIABLES SN TYPE RELOCATION
0 ICLASS INTEGER CLASF 0 ITITL INTEGER P.P.
163 NE INTEGER 1 TITLE REAL ARRAY CLASF

EXTERNALS TYPE ARGS
CMSIZV 2 RITE2V 3
RITSTV 3 TABL1V 0

STATEMENT LABELS
0 20 INACTIVE 22 30 30 60
37 90

COMMON BLOCKS LENGTH
CLASF 9

STATISTICS
PROGRAM LENGTH 1768 126
CM LABELED COMMON LENGTH 113 9

```
                SUBROUTINE PACKED                                          THERMO  1931
C**** THIS SUBROUTINE READS A PACKED TAPE CONTAINING ONLY THE              THERMO  1932
C    VALID DATA DURING PASS TIMES                                          THERMO  1933
      COMMON IBEFOR(7),IAFTER(7),ITOP,IPICT(10100)                         THERMO  1934
     5 COMMON/POPFT/NNS,NSR,ONE,IEND,JSTOP,START,STOP,ICKSTR,ICKSTP,       THERMO  1935
     . IVALID,ICALIB,INPT                                                  THERMO  1936
                                                                           THERMO  1937
      EQUIVALENCE (IBEFOR(1),TIM1),(IAFTER(1),TIM2)                        THERMO  1938
  101 CONTINUE                                                             THERMO  1939
    10 READ(11)IBEFOR,IAFTER,INPT,(IPICT(K),K=1,2000)                      THERMO  1940
      IF(EOF(11))999,998,999                                               THERMO  1941
  998 IF(IOCHEC(11))101,997,101                                            THERMO  1942
  997 CONTINUE                                                             THERMO  1943
      IEND=0                                                               THERMO  1944
    15 TT1=TIM1-START                                                      THERMO  1945
      TT2=ABS(TIM1-STOP)                                                   THERMO  1946
      IF(TT1.GT.0)ICKSTR=0                                                 THERMO  1947
      IF(TT2.LT.10000.)ICKSTP=1                                            THERMO  1948
      IF(ICKSTP)112,112,111                                                THERMO  1949
    20 111 CONTINUE                                                        THERMO  1950
      TT3=ABS(TIM2-TIM1)                                                   THERMO  1951
      IF(TT3.GT.10000.)GO TO 112                                           THERMO  1952
      IF(TIM1.GT.STOP)GO TO 990                                            THERMO  1953
  112 CONTINUE                                                             THERMO  1954
    25 JSTOP=0                                                             THERMO  1955
      IF(ICKSTR)114,114,113                                                THERMO  1956
  113 CONTINUE                                                             THERMO  1957
      IF(TIM1.LT.START)GO   TO 101                                         THERMO  1958
  114 CONTINUE                                                             THERMO  1959
    30 :                                                                   THERMO  1960
C**** THIS PICTURE IS WITHIN START STOP TIMES                              THERMO  1961
C     CHECK IF CALIBRATE ONLY WAS REQUESTED                                THERMO  1962
      ICAL=IBEFOR(5)                                                       THERMO  1963
      IF(ICALIB.EQ.1.AND.ICAL.EQ.0)GO TO 101                               THERMO  1964
    35                                                                     THERMO  1965
      II=10000                                                             THERMO  1966
      JJ=2000                                                              THERMO  1967
      DO 200 J=1,2000                                                      THERMO  1968
      IPICT(II)=IPICT(JJ).AND.77778                                        THERMO  1969
    40 IPICT(II-1)=SHIFT(IPICT(JJ),-12).AND.77778                          THERMO  1970
      IPICT(II-2)=SHIFT(IPICT(JJ),-24).AND.77778                           THERMO  1971
      IPICT(II-3)=SHIFT(IPICT(JJ),-36).AND.77778                           THERMO  1972
      IPICT(II-4)=SHIFT(IPICT(JJ),-48).AND.77778                           THERMO  1973
      II=II-5                                                              THERMO  1974
    45 JJ=JJ-1                                                             THERMO  1975
  200 CONTINUE                                                             THERMO  1976
      DO 205 J=1,10100                                                     THERMO  1977
      IF(J.GT.10000)IPICT(J)=0                                             THERMO  1978
      IF(IPICT(J).GT.1024)IPICT(J)=-1                                      THERMO  1979
    50 205 CONTINUE                                                        THERMO  1980
  800 CONTINUE                                                             THERMO  1981
      RETURN                                                               THERMO  1982
  990 CONTINUE                                                             THERMO  1983
      JSTOP=1                                                              THERMO  1984
    55 ICKSTP=0                                                            THERMO  1985
      BACKSPACE 11                                                         THERMO  1986
      BACKSPACE 11                                                         THERMO  1987
```

```
                      BACKSPACE 11                                                  THERMO  1988
                      BACKSPACE 11                                                  THERMO  1989
      60              GO TO 800                                                     THERMO  1990
                999     IEND=IEND+1                                                 THERMO  1991
                      IF(IEND.GT.2)GO TO 800                                        THERMO  1992
                      GO TO 101                                                     THERMO  1993
                      END                                                           THERMO  1994
```


SYMBOLIC REFERENCE MAP (R=1)

ENTRY POINTS
1 PACKED

VARIABLES	SN	TYPE		RELOCATION					
7	IAFTER	INTEGER	ARRAY	/ /	0	IBEFOR	INTEGER	ARRAY	/ /
173	ICAL	INTEGER			12	ICALIB	INTEGER		PDPFT
10	ICKSTP	INTEGER		PDPFT	7	ICKSTR	INTEGER		PDPFT
3	IEND	INTEGER		PDPFT	174	II	INTEGER		
13	INPT	INTEGER		PDPFT	17	IPICT	INTEGER	ARRAY	/ /
16	ITOP	INTEGER		/ /	11	IVALID	INTEGER		PDPFT
176	J	INTEGER			179	JJ	INTEGER		
4	JSTOP	INTEGER		PDPFT	167	K	INTEGER		
1	NSR	INTEGER		PDPFT	0	NWS	INTEGER		PDPFT
2	ONE	REAL		PDPFT	5	START	REAL		PDPFT
6	STOP	REAL		PDPFT	0	TIM1	REAL		/ /
7	TIM2	REAL		/ /	170	TT1	REAL		
171	TT2	REAL			172	TT3	REAL		

FILE NAMES	MODE
TAPE11	UNFMT

EXTERNALS	TYPE	ARGS				
ABS	REAL	1		EOF	REAL	1
IOCHEC	INTEGER	1		SHIFT	NO TYPE	2

STATEMENT LABELS

2	101		0	111	INACTIVE	36	112
0	113	INACTIVE	42	114		0	200
0	205		129	800		126	990
0	997	INACTIVE	0	998	INACTIVE	141	999

COMMON BLOCKS	LENGTH
/ /	10115
PDPFT	12

STATISTICS

PROGRAM LENGTH	1778	127
CM LABELED COMMON LENGTH	148	12
CM BLANK COMMON LENGTH	236038	10115

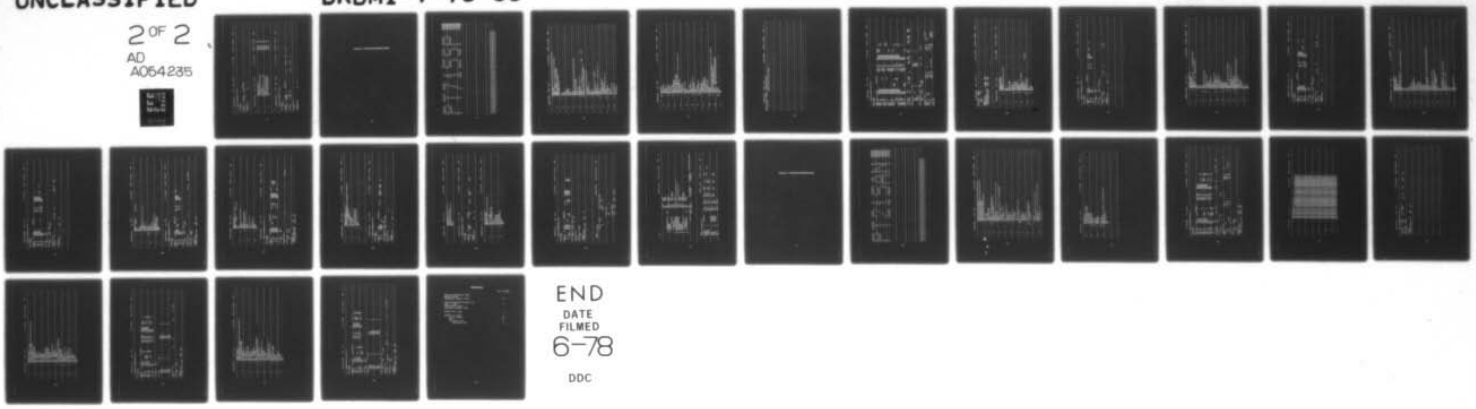
```
                      SUBROUTINE UNPACK(IN,MTAB,MOUT)                                   SEPT12      4
                      DIMENSION IN(1),MTAB(1),MOUT(1),MASK(60)                          SEPT12      5
                      CALL GETMSK(MASK)                                                 SEPT12      6
                      I=0                                                               SEPT12      7
    5                 M=0                                                               SEPT12      8
                      MWORD=1                                                           SEPT12      9
                      MBIT=60                                                           SEPT12     10
                   10 I=I+1                                                             SEPT12     11
                      KTAB=MTAB(I)                                                      SEPT12     12
   10                 IF(KTAB)20,90,40                                                  SEPT12     13
                   20 MBIT=MBIT+KTAB                                                    SEPT12     14
                   25 IF(MBIT)30,70,10                                                  SEPT12     15
                   30 MBIT=60+MBIT                                                      SEPT12     16
                      MWORD=MWORD+1                                                     SEPT12     17
   15                 GO TO 25                                                          SEPT12     18
                   40 M=M+1                                                             SEPT12     19
                      MDIF=MBIT-KTAB                                                    SEPT12     20
                      IF(MDIF)50,60,80                                                  SEPT12     21
                   50 IWORD=SHIFT(AND(IN(MWORD),MASK(MBIT)),-MDIF)                      SEPT12     22
   20                 MWORD=MWORD+1                                                     SEPT12     23
                      MBIT=60+MDIF                                                      SEPT12     24
                      MOUT(M)=OR(IWORD,AND(SHIFT(IN(MWORD),-MBIT),MASK(-MDIF)))         SEPT12     25
                      GO TO 10                                                          SEPT12     26
                   60 MOUT(M)=AND(IN(MWORD),MASK(KTAB))                                 SEPT12     27
   25              70 MBIT=60                                                           SEPT12     28
                      MWORD=MWORD+1                                                     SEPT12     29
                      GO TO 10                                                          SEPT12     30
                   80 MBIT=MDIF                                                         SEPT12     31
                      MOUT(M)=AND(SHIFT(IN(MWORD),-MDIF),MASK(KTAB))                    SEPT12     32
   30                 GO TO 10                                                          SEPT12     33
                   90 RETURN                                                            SEPT12     34
                      END                                                               SEPT12     35
```

```
        SUBROUTINE UNPACK     74/74   OPT=1   TRACE                FTN 4.2+74355      09/29/76  13.07.29.      PAGE     2

        SYMBOLIC REFERENCE MAP (R=1)

ENTRY POINTS
     3  UNPACK

VARIABLES     SN  TYPE            RELOCATION
   140  I        INTEGER                                  0  IN       INTEGER    ARRAY     F.P.
   146  IWORD    INTEGER                                144  KTAB     INTEGER
   141  M        INTEGER                                147  MASK     INTEGER    ARRAY
   143  MBIT     INTEGER                                145  MDIF     INTEGER
     0  MOUT     INTEGER    ARRAY     F.P.              0  MTAB     INTEGER    ARRAY     F.P.
   142  MWORD    INTEGER

EXTERNALS          TYPE    ARGS
        AND        NO TYPE    2                        GETMSK                  1
        OR         NO TYPE    2                        SHIFT      NO TYPE      2

STATEMENT LABELS
    13  10                                         0  20          INACTIVE                21  25
     0  30           INACTIVE                     26  40                                   0  50           INACTIVE
    64  60                                        73  70                                  76  80
   113  90

STATISTICS
  PROGRAM LENGTH                  2438     163

92

        SUBROUTINE DONE       74/74   OPT=1   TRACE                FTN 4.2+74355      09/29/76  13.08.54.      PAGE     1

                      SUBROUTINE DONE(IT)                                                    SEPT12     36
                    C SUBROUTINE TO DISMOUNT TAPE IT, AND MOUNT NEXT TAPE.                   SEPT12     37
                      PAUSE " MOUNT NEXT TAPE "                                              SEPT12     38
                      RETURN                                                                 SEPT12     39
          5           END                                                                    SEPT12     40
```

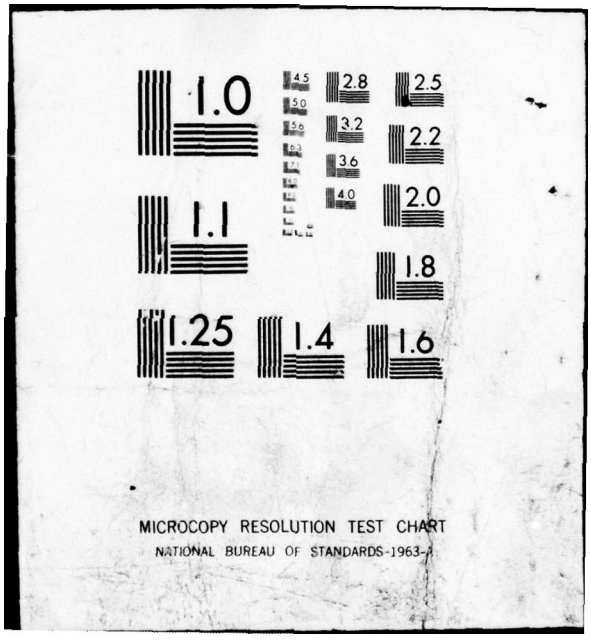
AD-A054 235 ARMY MISSILE RESEARCH AND DEVELOPMENT COMMAND REDSTO--ETC F/G 17/5
COMPUTER SOFTWARE FOR ANALYSIS OF INFRARED TARGETS AND CLUTTER.(U)
JAN 78 G E GOWINS, H T JACKSON

UNCLASSIFIED DRDMI-T-78-33 NL

2 OF 2
AD
A054235



END
DATE
FILMED
6-78
DDC


1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
4.5
5.0
5.6
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

```
      SUBROUTINE DONE       74/74   OPT=1   TRACE                FTN 4.2+74355      09/29/76  13.08.54.      PAGE     2

      SYMBOLIC REFERENCE MAP (R=1)

ENTRY POINTS
    3  DONE

VARIABLES      SN  TYPE           RELOCATION
    0  11          INTEGER   *UNUSED    F.P.

STATISTICS
  PROGRAM LENGTH                138      11
```

```
      SUBROUTINE GETMSK     74/74   OPT=1   TRACE                FTN 4.2+74355      09/29/76  13.08.55.      PAGE     1

                      SUBROUTINE GETMSK(IM)                                          SEPT12     41
                      DIMENSION IM(60)                                               SEPT12     42
                      DATA MASK/000000000000000000018/                               SEPT12     43
                      IM(1)=MASK                                                     SEPT12     44
      5               DO 10 I=2,57                                                   SEPT12     45
                      IM(I)=OR(SHIFT(IM(I-1),1),MASK)                                SEPT12     46
                   10 CONTINUE                                                       SEPT12     47
                      IM(58)=177777777777777777778                                   SEPT12     48
                      IM(59)=377777777777777777778                                   SEPT12     49
     10               IM(60)=777777777777777777778                                   SEPT12     50
                      END                                                            SEPT12     51
```

```
      SUBROUTINE GETMSK     74/74   OPT=1   TRACE                FTN 4.2+74355      09/29/76  13.08.55.      PAGE     2

      SYMBOLIC REFERENCE MAP (R=1)

ENTRY POINTS
    3  GETMSK

VARIABLES      SN  TYPE           RELOCATION
   41  I           INTEGER                              0  IM        INTEGER    ARRAY     F.P.
   35  MASK        INTEGER

EXTERNALS           TYPE   ARGS
       OR        NO TYPE    2                          SHIFT     NO TYPE    2

STATEMENT LABELS
    0  10

STATISTICS
  PROGRAM LENGTH                428      34
```

Appendix B. LISTING FOR PROGRAM GOWEN

PT71SSP

PT71SSP
PT71SSP
PT71SSP
PT71SSP
PT71SSP
PT71SSP
PT71SSP
PT71SSP
PT71SSP
PT71SSP
PT71SSP
PT71SSP

```
      PROGRAM GOWEN(INPUT,OUTPUT,TAPE3=INPUT,TAPE6=OUTPUT,TAPE1,TAPE7,
     1TAPE2,TAPE3)
      DIMENSION X(50),Y(50),VIEW(4),K2(50,4),KC(50,4),KW(50,4)
      COMMON    M(10000),          IA(7),IB(7)
      COMMON/MVAL/MINVAL,MAXVAL,MINV,MAXV,MMOS
      COMMON/BLOCK/ ICL,IZ,IB1,INC,IT,
      EQUIVALENCE(IA,IB(1))
C
      IF=0
      ICL=4
      INC=2
      IZ=100
      IB1=IZ+1
      ITL=10000
      MAXVAL=1200
      MINVAL=1
      KK=0
      T1=0.0
      MDEL=99
    1 READ(5,7) IFIL,IAP,IGN,KH,KM,SECK,RANGE,(VIEW(I),I=1,4)
    7 FORMAT(5I3,2F10.3,4A10)
      IF(IFIL.LT.0) GO TO 1001
      IF=IF+1
      WRITE(6,17)IF
   17 FORMAT(1H1,10X,"FRAME =",I4)
      WRITE(6,18)
   18 FORMAT(   1X"FIL  APER GAIN  H    M    S          RANGE      VIEW")
      WRITE(6,11) IFIL,IAP,IGN,KH,MM,SECK,RANGE,VIEW
   11 FORMAT(1X12,1X4I5,F7.3,2XF10.2,2X4A10)
C
      TM=FLOAT(KH)*3600.+FLOAT(KM)*60.+SECK
      TM=TM*1000.0
      IF(TM.GT.T1) GO TO 3
      REWIND 1
      KK=0
    3 CONTINUE
      KK=KK+1
      READ(1) IB,IA,MM,(M(J),J=1,10000,5)
      IF(EOF(1))4,6
    4 WRITE(6,5)    KK
    5 FORMAT(1X"TIME " I5, "----END-OF-FILE-----")
      STOP01
    6 CONTINUE
      CALL IHMS(T1,IH,IM, SEC)
      IF(IM.NE.KM) GO TO 3
      IF(IM.NE.KM) GO TO 3
      IF(ABS(SECK-SEC).GT.0.05) GO TO 3
   88 CONTINUE
      CALL UNPACK(M)
C     GO TO 999
      CALL MEAN
      IBM=10
      CALL ATTACK(M,IBM)
      N=4
      CALL RADAR2(M,N)
      GO TO 1
      CALL VSCAN(M)
```

```
      CALL RAJAK
  999 CONTINUE
   58 CALL ELIM(M,K)
      REWIND 2
      WRITE(3) DUM
      REWIND 3
      DO 63 I=1,K
   63 WRITE(2) M(I)
      CALL SORTP
      DO 64 I=1,K
   64 READ(3) M(I)
      MAXV=M(1).AND.77773
   70 MINV=M(K).AND.77773
      DELTA=FLOAT(MAXV-MINV)/50.)
      WRITE(6,12) MINV,MAXV,DELTA
   12 FORMAT(/1X*MINV=*I4,* MAXV=*I4,* DELTA=*F5.1,//8X*X*,9X*Y*)
      TEST=FLOAT(MAXV)-DELTA
   75 X(1)=0.5*DELTA
      Y(1)=0.0
      DO 78 I=2,NDEL
      Y(I)=0.0
   78 X(I)=X(I-1)+DELTA
   80 J=NDEL
      KGO=1
      KJ=0
      DO 73 I=1,K
      MI=M(I).AND.77778
   85 VMI=MI
   71 IF(VMI.GE.TEST) GO TO 72
      TEST=TEST-DELTA
      J=J-1
      GO TO 71
   90 72 Y(J)=Y(J)+1.0
      GO TO (91,95),KGO
   91 KJ=KJ+1
      JJ=(KJ-1)/50+1
      II=KJ-50*(JJ-1)
   95 KLT=SHIFT(M(I),-12)
      KG(II,JJ)=KLT.AND.7778
      KR(II,JJ)=SHIFT(KLT,-9)
      KV(II,JJ)=MI
      IF(KJ.EQ.200) KGO=2
  100 99 CONTINUE
   73 CONTINUE
C     WRITE(6,74) ((X(I),Y(I),(KG(I,J),KR(I,J),KV(I,J),J=1,4),I=1,NDEL))
   74 FORMAT(1X2F10.2,4X3I6,4X3I6,4X3I6,4X3I6)
      WRITE(7)   KM,KM,SIGK,(VZERO D,I=1,4)
  105 WRITE(7)    ((X(I),Y(I),I=1,50)),IFIL,IAP,IGN,RANGE
      WRITE(7)   (((KR(I,J),KG(I,J),KV(I,J),I=1,90),J=1,4)
      GO TO 1
 1001 CONTINUE
      STOP
  110 END
```

CARD NR.	SEVERITY	DETAILS	DIAGNOSIS OF PROBLEM
57	I		THERE IS NO PATH TO THIS STATEMENT.

SYMBOLIC REFERENCE MAP (R=1)

ENTRY POINTS
14328 GOWEN

VARIABLES SN TYPE RELOCATION

15072	JELTA	REAL			15071	DUM	REAL	*UNDE*			
15057	I	INTEGER			23421	IA	INTEGER	ARRAY	/ /		
15051	IAP	INTEGER			23427	IB	INTEGER	ARRAY	/ /		
15066	IBN	INTEGER			2	IBI	INTEGER		BLOCK		
0	ICL	INTEGER		BLOCK	15043	IF	INTEGER				
15058	IFIL	INTEGER			15052	IGN	INTEGER				
15063	IH	INTEGER			15101	II	INTEGER				
15064	IM	INTEGER			3	INC	INTEGER		BLOCK		
4	ITL	INTEGER		BLOCK	1	IZ	INTEGER		BLOCK		
15052	J	INTEGER			15103	JJ	INTEGER				
15070	K	INTEGER			15063	KC	INTEGER	ARRAY			
15074	KGO	INTEGER			15053	KH	INTEGER				
15075	KJ	INTEGER			15046	KK	INTEGER				
15102	KLT	INTEGER			15054	KM	INTEGER				
15253	KR	INTEGER	ARRAY		15073	KV	INTEGER	ARRAY			
0	L	INTEGER	ARRAY	/ /	3	MAXV	INTEGER		NVAL		
1	LAXVAL	INTEGER		NVAL	15075	MI	INTEGER				
2	LINV	INTEGER		NVAL	3	MINVAL	INTEGER		NVAL		
15061	LN	INTEGER			15067	N	INTEGER				
15047	LDEL	INTEGER			4	NMDS	INTEGER		NVAL		
15056	LANGS	REAL			15069	SEC	REAL				
15055	LECK	REAL			15073	TEST	REAL				
15060	LN	REAL			23427	TI	REAL		/ /		
15247	LIE4	REAL	ARRAY		15077	VMI	REAL				
15103	L	REAL	ARRAY		15069	Y	REAL	ARRAY			

FILE NAMES MODE

0	INPUT		2041	OUTPUT		4102	TAPE1	UNFMT	10206	TAPE2	UNFMT
12245	TAPE3	UNFMT	0	TAPE4	FMT	2041	TAPE5	FMT	6143	TAPE6	UNFMT

EXTERNALS	TYPE	ARGS			
ATTACK		2	ELIM	2	
EOF	REAL	1	IHMS	4	
LEAN		0	RADAR	0	
LADAR2		2	SORTF	3	
UNPACK		1	VSCAN	1	

INLINE FUNCTIONS	TYPE	ARGS						
IBS	REAL	1	INTRIN	FLOAT	REAL	1	INTRIN	
ISHIFT	NO TYPE	2	INTRIN					

STATEMENT LABELS

14333	1			14381	3			0	4	INACTIVE	
14741	5	FMT		14482	6			14656	7	FMT	
14674	10	FMT		14716	11	FMT		14770	12	FMT	
14665	17	FMT		0	63			0	54		
0	70			14516	71			14523	72		
0	73			15000	74	FMT NO REFS		0	80	INACTIVE	
14533	91			14554	99			0	999	INACTIVE	
14616	1001										

```
      PROGRAM GOMEN      74/74   OPT=1                    FTN 4.2+74355    81/31/77  11.46.08.    PAGE    5

COMMON BLOCKS   LENGTH
      / /       18814
      RVAL          5
      BLOCK         5

STATISTICS
  PROGRAM LENGTH              20778     1887
  BUFFER LENGTH              143360     8362
  CM LABELED COMMON LENGTH      128       10
  CM BLANK COMMON LENGTH     234368    18814
```

```
      SUBROUTINE VSCAN      74/74   OPT=1                    FTN 4.2+74355    81/31/77  11.46.04.    PAGE    1

                            SUBROUTINE VSCAN(N)
                            DIMENSION N(100,100)
                            WRITE(6,5)
                          5 FORMAT(1X,7HAVERAGE,10HSTD DEVIAT)
          5                 I=0
                            J=0
                            TI=0
                            SX=0
                            DO 10 K=1,100
         10                 DO 10 J=1,100
                            I=I+1
                            N(K,J)=N(I)
                         10 CONTINUE
                            DO 20 J=1,100
         15                 DO 30 K=1,100
                            TI=TI+N(K,J)
                            SX=SX+N(K,J)**2
                         30 CONTINUE
                            XB=TI/100
         20                 SVX=(100*SX-TI**2)/(100*99)
                            SDX=SQRT(SVX)
                            WRITE(6,21) J
                         21 FORMAT(1X,'                    COLUMN=',I4)
                            WRITE(6,22) XB,SDX
         25              22 FORMAT(1X,2F10.2)
                            TI=0
                            SX=0
                         20 CONTINUE
                            RETURN
         30                 END
```

SYMBOLIC REFERENCE MAP (R=1)

ENTRY POINTS
3 /SCAN

VARIABLES	SN	TYPE	RELOCATION					
116	L	INTEGER		117	J	INTEGER		
122	K	INTEGER		0	M	INTEGER	ARRAY	F.P.
125	SDX	REAL		124	SVX	REAL		
121	SX	REAL		120	TI	REAL		
123	XB	REAL						

FILE NAMES	MODE
TAPE6	FMT

EXTERNALS	TYPE	ARGS	
SQRT	REAL	1	LIBRARY

STATEMENT LABELS

67	5	FMT		0	10				0	20	
77	21	FMT		112	22	FMT			0	30	

STATISTICS
PROGRAM LENGTH 1343 92

```
      SUBROUTINE ATTACK(IN,IBN)
      DIMENSION M(10000)
      WRITE(6,9) IBN
    5 FORMAT(10X,*FLY IN MODEL     CELL INCREMENTED BY*,I4,/)
  5   WRITE(6,7)
    7 FORMAT(1X,*   MEAN   STANDARD DEVIATION*)
      IN=0
      TI=0
      N=100
 10   K1=1
      SX=0
      I=0
      ICL=0
C     PROCESS FIRST COMPLETE ROW
 15   I=I+1
C     IF(M(I).EQ.0) IN=IN+1
      ICL=ICL+1
      TI=TI+M(I)
      SX=SX+M(I)**2
 20   IF(I.LT.N)GO TO 10
      J2=I+100
      J1=J2-N+1
C     PROCESS FROM ROW(2-100)
 11   DO 30 II=K1,N
 25   IF(II.EQ.1)GO TO 3
      DO 20 J=J1,J2
C     IF(M(J).EQ.0)IN=IN+1
      TI=TI+M(J)
      SX=SX+M(J)**2
 30   ICL=ICL+1
 20   CONTINUE
      J1=J1+100
      J2=J2+100
 30   CONTINUE
 35   XB=MEAN(XB),STANDARD DEVIATION(SDX)
      IN=0
      XB=TI/(ICL-IN)
      SVX=(ICL*SX-TI**2)/(ICL*(ICL-1))
      SDX=SQRT(SVX)
 40   WRITE(6,25) XB,SDX
 25   FORMAT(1X,2F10.2,/)
C     CREATE SMALLER FRAME,COLUME(K1-N) ROW(J1-J2)
      N=N-100
      IF(N.LE.50)RETURN
 45   K1=100-N
      J1=K1*100+K1+1
      J2=K1*100+N
      TI=0
      SX=0
 50   ICL=0
      IN=0
      GO TO 11
      END
```

SYMBOLIC REFERENCE MAP (R=1)

ENTRY POINTS
3 ATTACK

VARIABLES	SN	TYPE	RELOCATION					
131	I	INTEGER			J	I3M	INTEGER	F.P.
152	ICL	INTEGER		155	II	INTEGER		
144	IN	INTEGER		153	J	INTEGER		
154	J1	INTEGER		153	J2	INTEGER		
147	K1	INTEGER			M	INTEGER	ARRAY	F.P.
146	N	INTEGER		161	SDX	REAL		
160	SVX	REAL		153	SX	REAL		
145	TI	REAL		157	XB	REAL		

FILE NAMES MODE
TAPE6 FMT

EXTERNALS	TYPE	ARGS	
SQRT	REAL	1	LIBRARY

STATEMENT LABELS

116	7	FMT		127	7	FMT		26	18
42	11			0	20			141	25 FMT.
62	30								

STATISTICS
PROGRAM LENGTH 1678 119

```
                      SUBROUTINE RADAR2(N,M)
                      DIMENSION M(10000)
                C     PROCESSING FIRST ROW
                      WRITE(6,24)
    5                 WRITE(6,27)
                 24   FORMAT(10X,*RADAR SCAN*,/)
                 27   FORMAT(5X,*RLOTN CHAN GNUM  TOT. DEN  MEAN VAL  STD DEV*,/)
                      NN=100
                      I=0
   11                 TI=0
                      SX=0
                      JJ=0
                      IC=0
                 10   I=I+1
   15                 IC=IC+1
                      TI=TI+M(I)
                      SX=SX+M(I)**2
                      IF(IC.LT.N)GO TO 11
                C     PROCESS OTHER ROWS
   20                 J2=I+100
                      J1=J2-N+1
                      DO 30 II=2,N
                      DO 20 J=J1,J2
                      TI=TI+M(J)
   25                 SX=SX+M(J)**2
                 20   CONTINUE
                      J1=J1+100
                      J2=J2+100
                 30   CONTINUE
   30            C     SCAN NUMBER(JJ),NUMBER CEL. PER SCAN(ICL),TOTAL CELL DENSITY(TI)
                 C     MEAN CELL VALUE(XB)
                      JJ=JJ+1
                      ICL=N**2
                      XB=TI/ICL
   35                 SVX=(ICL*SX-TI**2)/(ICL*(ICL-1))
                      SDX=SQRT(SVX)
                      WRITE(6,25) N,JJ,ICL,TI,XB,SDX
                 25   FORMAT(2X,,3I5,2X,3F10.2)
                C     CONTINUE ON FIRST ROW
   40                 IN=0
                      TI=0
                      SX=0
                      IC=0
                      IF(I.LT.NN)GO TO 11
   45            C     FIRST ROW COMPLETED DETERMINE NEW FIRST ROW
                      WRITE(6,26)
                 26   FORMAT(10X,*PASS  COMPLETED  *)
                      I=J2-100
                      NN=J2
   50                 IC=0
                      IN=0
                      TI=0
                      SX=0
                      IF(NN.LT.10000)GO TO 10
   55                 RETURN
                      END
```

SYMBOLIC REFERENCE MAP (R=1)

ENTRY POINTS
3 RADAR2

VARIABLES	SN	TYPE	RELOCATION						
137	L	INTEGER		163	IC	INTEGER			
170	LCL	INTEGER		165	II	INTEGER			
174	LN	INTEGER		167	J	INTEGER			
162	JJ	INTEGER		165	J1	INTEGER			
154	J2	INTEGER			J M	INTEGER	ARRAY	F.P.	
0	M	INTEGER	F.P.	155	NN	INTEGER			
173	SDX	REAL		172	SVX	REAL			
161	SX	REAL		160	TI	REAL			
171	TB	REAL							

FILE NAMES	MODE
TAPE6	FMT

EXTERNALS	TYPE	ARGS
SQRT	REAL	1 LIBRARY

STATEMENT LABELS

25	10			0	20			121	24	FMT	
144	25	FMT		192	25	FMT		124	27	FMT	
0	30										

STATISTICS
PROGRAM LENGTH 2838 131

```
                      SUBROUTINE MEAN
                      COMMON    M(10888),        IA(7),IB(7)
                      II=0
                      X=0
      3               SX=0
                      N=10888
                      DO 10 I=1,N
                      IF(M(I).GT.1100.OR.M(I).LT.1)GO TO 11
                      X=X+M(I)
     10               SX=SX+M(I)**2
                      GO TO 10
                   11 M(I)=0
                      II=II+1
                   10 CONTINUE
     13               N=N-II
                      IF(N.EQ.0)N=1
                      XB=X/N
                      SVX=(N*SX-X**2)/(N*(N-1))
                      SDX=SQRT(SVX)
     23            C
                   19 FORMAT(1X,3(3X,F10.2))
                      RETURN
                      END
```



```
      SYMBOLIC REFERENCE MAP (R=1)

ENTRY POINTS
   1  MEAN

VARIABLES     SN  TYPE            RELOCATION
   44  I          INTEGER                      23421  IA         INTEGER   ARRAY   / /
23427  IB         INTEGER   ARRAY   / /          43  II         INTEGER
    8  M          INTEGER   ARRAY   / /          42  N          INTEGER
   47  SDX        REAL                         46  SVX        REAL
   52  SX         REAL                         41  X          REAL
   45  XB         REAL

EXTERNALS          TYPE   ARGS
      SQRT         REAL      1 LIBRARY

STATEMENT LABELS
   21  10                                 28  11                                 35  19      *NO NO REFS

COMMON BLOCKS   LENGTH
      / /       10014

STATISTICS
  PROGRAM LENGTH                  508      .8
  ON BLANK COMMON LENGTH       234363   10014
```

```
      SUBROUTINE RADAR      74/74   OPT=1                    FTN 4.2+74355      01/31/77  11.46.11.      PAGE     1

                            SUBROUTINE RADAR
                            COMMON/BLOCK/ ICL,IZ,IB1,INC,IT,
                            COMMON    M(10000),          IA(7),IB(7)
                            J=1
          5                 I=1
                            IS=0
                          9 TI=M(I)*M(I+1)+M(I+2)+M(I+3)
                            XB=TI/ICL
                            IS=IS+1
         10                 WRITE(6,10) ICL,IS,TI,XB
                         10 FORMAT(5X,2I10,2X,2F10.2)
                            J=J+INC
                            I=I+INC
                            JJ=IZ
         15                 IF(J.LT.JJ)GO TO 9
                            J=1
                            I=I+IB1+1
                            IF(I.GT.ITL)11,9
                         11 CONTINUE
         20                 RETURN
                            END


      SUBROUTINE RADAR      74/74   OPT=1                    FTN 4.2+74355      01/31/77  11.46.11.      PAGE     2

      SYMBOLIC REFERENCE MAP (R=1)

ENTRY POINTS
    1  RADAR

VARIABLES     SN  TYPE           RELOCATION
    65  I       INTEGER                        23627  IA      INTEGER   ARRAY  / /
 23627  IB      INTEGER   ARRAY  / /              2  IB1     INTEGER          BLOCK
     8  ICL     INTEGER           BLOCK           3  INC     INTEGER          BLOCK
    66  IS      INTEGER                           4  ITL     INTEGER          BLOCK
     1  IZ      INTEGER           BLOCK          44  J       INTEGER
    51  JJ      INTEGER                           8  M       INTEGER   ARRAY  / /
    67  TI      REAL                             53  XB      REAL

FILE NAMES      MODE
    TAPE6       FMT

STATEMENT LABELS
    5  9                                    21  10       FMT                      8  11          INACTIVE

COMMON BLOCKS   LENGTH
    BLOCK          5
    / /        10014

STATISTICS
  PROGRAM LENGTH                  523      +2
  CM LABELED COMMON LENGTH         98       5
  CM BLANK COMMON LENGTH       234363   10014
```

```
      SUBROUTINE UNPACK     74/74   OPT=1                    FTN 4.2+74355     01/31/77  11.46.14.     PAGE     1

                      SUBROUTINE UNPACK(M)
                      DIMENSION M(5,2000),MSK(5),IS(4)
                      DATA MSK/7777000000000000000000B,7777000000000000B,
                     1        777700000B,7777B/
      5               DATA IS/12,24,36,48/
                      DO 2 J=1,2000
                      M(5,J)=M(1,J)
                      DO 1 I=1,4
                      M(I,J)=M(5,J).AND.MSK(I)
     10           1   M(I,J)=SHIFT(M(I,J),IS(I))
                  2   M(5,J)=M(5,J).AND.MSK(5)
                      RETURN
                      END
```

```
      SUBROUTINE UNPACK     74/74   OPT=1                    FTN 4.2+74355     01/31/77  11.46.14.     PAGE     2

      SYMBOLIC REFERENCE MAP (R=1)

ENTRY POINTS
    3  UNPACK

VARIABLES     SN  TYPE              RELOCATION
   37  I          INTEGER                                  49  IS         INTEGER    ARRAY
   36  J          INTEGER                                   3  M          INTEGER    ARRAY    F.P.
   48  MSK        INTEGER    ARRAY

INLINE FUNCTIONS   TYPE   ARGS
      SHIFT      NO TYPE    2  INTRIN

STATEMENT LABELS
    9  1                                        8  2

STATISTICS
  PROGRAM LENGTH                  578      67
```

```
      SUBROUTINE IHMS       74/74   OPT=1                    FTN 4.2+74355    01/31/77  11.46.16.    PAGE     1

                            SUBROUTINE IHMS(TMS,IH,IM, SEC)
                            IH=TMS/3.6E6
                            IM=(TMS-IH*3.6E6)/10000
                            SEC =(TMS-IH*3.6E6-IM*6 0000) /1 00
          5                 RETURN
                            END
```

```
      SUBROUTINE IHMS       74/74   OPT=1                    FTN 4.2+74355    01/31/77  11.46.16.    PAGE     2

      SYMBOLIC REFERENCE MAP (R=1)

ENTRY POINTS
    3  IHMS

VARIABLES     SN  TYPE            RELOCATION
    8  IH         INTEGER              F.P.          9  IM         INTEGER              F.P.
    8  SEC        REAL                 F.P.          3  TMS        REAL                 F.P.

STATISTICS
  PROGRAM LENGTH                 243      20
```



```
      SUBROUTINE ELIM       74/74   OPT=1                    FTN 4.2+74355    01/31/77  11.46.17.    PAGE     1

                            SUBROUTINE ELIM(M,K)
                            DIMENSION M(10000)
                            COMMON/MVAL/MINVAL,MAXVAL,MINV,MAXV,NNOS
                            K=0
          5                 DO 10 J=1,10000
                            IF(M(J).LT.MINVAL)GO TO 10
                            IF(M(J).GT.MAXVAL)GO TO 10
                            K=K+1
                            M(K)=M(J)
         10                 IR=(J-1)/100+1
                            IC=J-100*(IR-1)
                            IR=SHIFT(IR,21)
                            IC=SHIFT(IC,12)
                            M(K)=IR.OR.IC.OR.M(K)
         15            10   CONTINUE
                            RETURN
                            END
```

SYMBOLIC REFERENCE MAP (R=1)

ENTRY POINTS
3 ELIM

VARIABLES SN TYPE RELOCATION

43	IC	INTEGER			42	IR	INTEGER		
41	J	INTEGER			3	K	INTEGER		F.P.
0	Q	INTEGER	ARRAY	F.P.	3	MAXV	INTEGER		QVAL
1	QAXVAL	INTEGER		QVAL	2	MINV	INTEGER		QVAL
0	QINVAL	INTEGER		QVAL	4	NNJS	INTEGER		QVAL

INLINE FUNCTIONS	TYPE	ARGS	
SHIFT	NO TYPE	2	INTRIN

STATEMENT LABELS
35 10

COMMON BLOCKS	LENGTH
QVAL	5

STATISTICS

PROGRAM LENGTH	518	321
BM LABELED COMMON LENGTH	58	5

STORAGE ALLOCATION.

ADDRESS	LENGTH	BINARY CONTROL CARDS.	
0	70	IDENT	SORTF
70		END	

ENTRY POINTS.

SORTF 71

EXTERNAL SYMBOLS.

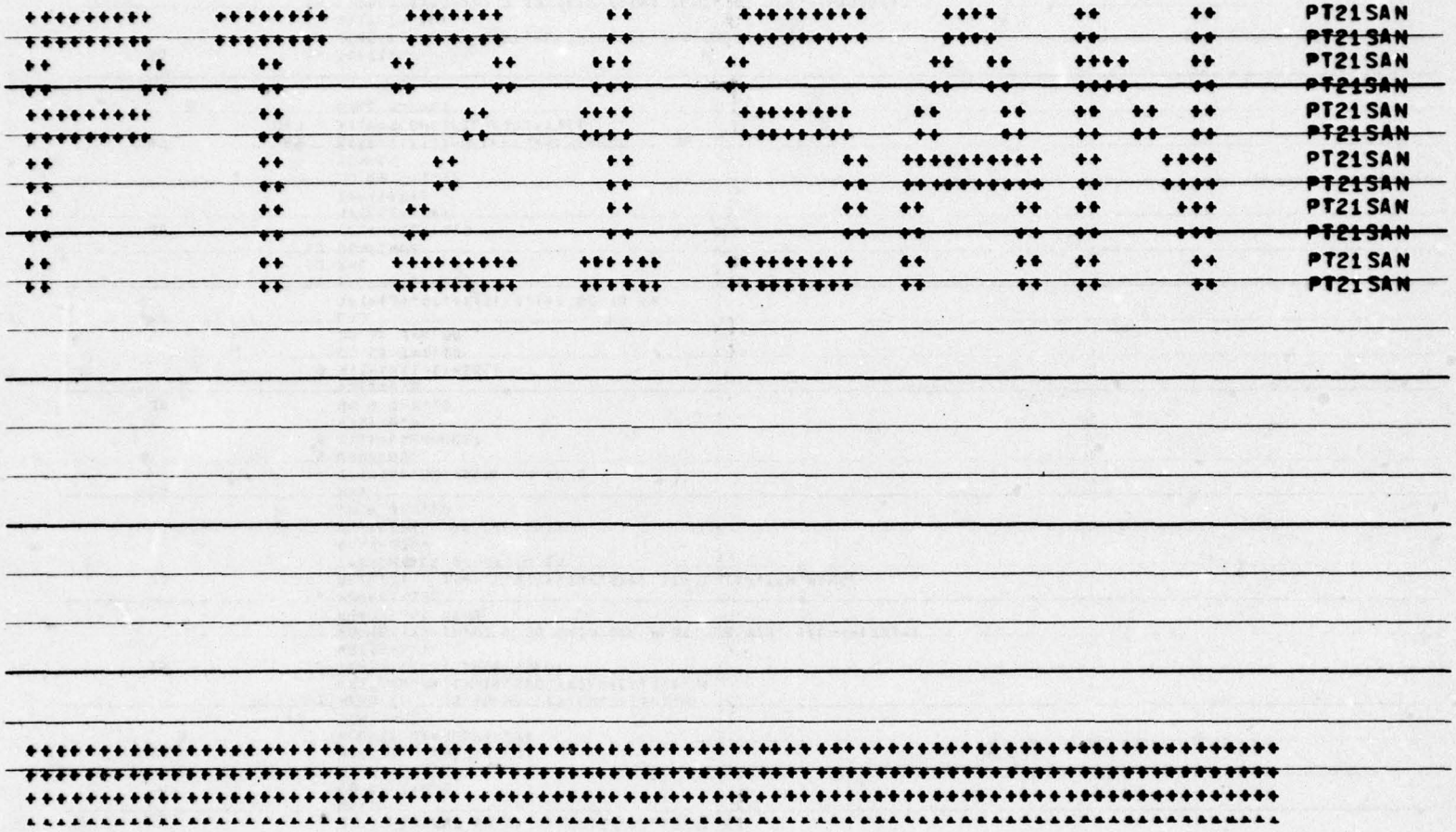
TAPE20 TAPE30 SMCONT CLSF.RM

```
                                        IDENT   SORTF
                                        ENTRY   SORTF
                                        EXT     TAPE20
                                        EXT     TAPE30
    0  0000000000000000000     SORTF   DATA    0
    1  6110000001                       CLOSEM  TAPE20
    +  6110000001                       CLOSEM  TAPE30
    7  7110000012                       SX1     18
                  5150000006 X          STORE   TAPE20,MRL=X1
   12  5150000006 X                     STORE   TAPE30,MRL=X1
         0100000000 X                   SORT
   15  5517202411716235555              OPTIONS VERIFY
   31  5555561114052355555             FILES   (INPUT,TAPE20),(OUTPUT,TAPE30)
   35  5502312405231132055              BYTESIZE 12
   41  5555551305315555555             KEY     5,1,1,8,LOGICAL,DISPLAY,D
   53  6110000001                       CLOSEM  TAPE20
   55  6110000001                       CLOSEM  TAPE30
   61  5110000067 +                     SAL     VALID
                  5150000301 X          STORE   TAPE20,PD=X1
   64  5150000001 X                     STORE   TAPE30,PD=X1
         0400000000 +                   EQ      SORTF
   67  1146175555555555555     VALID   DATA    10HI-O
   70                                   END

                  917000 CM  STORAGE USED          1187 STATEMENTS     197 SYMBOLS     000004 INVENTED SYMBOLS
                             MODE. 74 ASSEMBLY     2.118 SECONDS        55 REFERENCES
```


SYMBOLIC REFERENCE TABLE.

```
CLOSEM          0   EXTERNAL*   2/07     2/08     2/17     2/18
OPTIONS         1               2/12 D   2/13 D   2/14 D   2/14 D   2/14 D   2/15 D
SEQUFLAG        0               2/12 D   2/13 D   2/14 D
SEQUSAVE        3               2/14 D   2/14     2/14 D   2/14     2/16 D   2/16 D   2/16 D
SEQUSTON        0               2/15 D   2/15 D   2/16 D   2/16 D   2/16 D
                                2/16     2/16     2/16     2/16     2/16
SYSCOM          0   EXTERNAL*   2/11
SORTF           0   PROGRAM*    2/02 E   2/08 L   2/21
TAPE20          0   EXTERNAL*   2/03 X   2/07     2/09     2/14     2/17     2/19
TAPE30          0   EXTERNAL*   2/04 X   2/08     2/10     2/14     2/18     2/20
VALID           67  PROGRAM*    2/18     2/22 L
>MRL<           0               2/09 D   2/11 D
>PD<            0               2/19 D   2/21 D
```

Appendix C. LISTING FOR PROGRAM KPLOT


PT21SAN
PT21SAN
PT21SAN
PT21SAN
PT21SAN
PT21SAN
PT21SAN
PT21SAN
PT21SAN
PT21SAN
PT21SAN
PT21SAN

```
      PROGRAM KPLOT(INPUT,OUTPUT,TAPE5=INPUT,TAPE6=OUTPUT,TAPE7)
      DIMENSION P(50),Q(50),KSYM(10)
      COMMON /DAT/NP,X(200),Y(200),KR(200),KC(200),KV(200),VIEW(4),
     1IH,IM,SEC,MINV,MAXV,ISYM(200)
      COMMON/CALB/BIAS(8,8),SLOP(8,8)
      DATA KSYM/48,49,50,51,52,53,54,55,56,57/
      NP=10
      DO 73 I=6,8
      DO 73 J=2,8
      BIAS(I,J)=BIAS(5,J)
      SLOP(I,J)=SLOP(5,J)
   73 CONTINUE
    1 READ(7)   IH,IM,SEC,(VIEW(I),I=1,4)
      WRITE(6,2) IH,IM,SEC,(VIEW(I),I=1,4)
    2 FORMAT(2I3,F10.3,4A10)
      WRITE(6,3)
    3 FORMAT(1X,'INPUT 0 TO SKIP BAR PLOT, OR MIN. VAL=---(I3)')
      READ(5,4) MINV
    4 FORMAT(I3)
      READ(7)   ((P(I),Q(I),I=1,50)) ,IFIL,IAP,IGN,RANGE
      IF(MINV.LE.0) GO TO 14
      VALM=MINV
      DELT=(P(50)-VALM)/10.
      DO 6 J=1,50
      K=J
      IF(P(J).GE.VALM) GO TO 8
    6 CONTINUE
    8 X(1)=VALM+DELT
      Y(1)=0.0
      DO 9 I=2,10
      Y(I)=0.0
    9 X(I)=X(I-1)+DELT
      DO 13 I=1,10
      DO 11 J=K,50
      L=J
      IF(P(J).GT.(X(I)+0.1)) GO TO 12
   11 Y(I)=Y(I)+Q(J)
   12 K=L
   13 CONTINUE
      DELT=DELT*0.5
      IFIL=IFIL+1
      IAP=IAP+1
      DO 49 I=1,10
      IGN=1
   49  X(I)=((X(I)-DELT)/ISN)*RANGE
  C49 X(I)=SLOP(IFIL,IAP)*X(I)
      CALL BARPLT
  C
  C
   14 CONTINUE
      READ(7)   ((KR(I),KC(I),KV(I),I=1,200))
      WRITE(6,16)
   16 FORMAT(1X,'INPUT 0 TO SKIP POINT PLOT, OR NPPS=---(I3)')
      READ(5,4) NP
      IF(NP.LE.0) GO TO 100
  C
      DO 29 I=1,NP
```

```
                X(I)=KC(I)
                Y(I)=100-KR(I)+1
60              IF(X(I).GE.100.) X(I)=99.9
                IF(Y(I).GE.100.) Y(I)=99.9
                J=(KV(I)-1)/100+1
                IF(J.LE.0) J=1
                IF(J.GT.10) J=10
65           21 ISYM(I)=KSYM(J)
             25 CONTINUE
          C
             26 CONTINUE
                MAXV=KV(1)
70              MINV=KV(NP)
                CALL HSPOT
          C
            100 CONTINUE
                WRITE(6,101)
75          101 FORMAT(1X,'INPUT ) TO STOP, OR 1 TO CONTINUE---(I3)')
                READ(5,4) IGO
                IF(IGO.GT.0) GO TO 1
                STOP
                END
```

SYMBOLIC REFERENCE MAP (R=1)

ENTRY POINTS
6152 KPLOT

VARIABLES SN TYPE RELOCATION

0	BIAS	REAL	ARRAY	CALB	6517	DELT	REAL			
6510	I	INTEGER			6513	IAP	INTEGER			
6512	IFIL	INTEGER			6516	IGN	INTEGER			
6522	IGO	INTEGER			1755	I4	INTEGER		DAT	
1756	IM	INTEGER		DAT	1762	ISYM	INTEGER	ARRAY	DAT	
6511	J	INTEGER			6520	K	INTEGER			
1131	KC	INTEGER	ARRAY	DAT	621	KK	INTEGER	ARRAY	DAT	
6667	KSYM	INTEGER	ARRAY		1441	KW	INTEGER	ARRAY	DAT	
6521	L	INTEGER			1761	MAXV	INTEGER		DAT	
1760	MINV	INTEGER		DAT	0	NP	INTEGER		DAT	
6523	P	REAL	ARRAY		6605	Q	REAL	ARRAY		
6515	RANGE	REAL			1757	SEC	REAL		DAT	
100	SLOP	REAL	ARRAY	CALB	6516	VALM	REAL			
1751	VIEW	REAL	ARRAY	DAT	1	X	REAL	ARRAY	DAT	
311	Y	REAL	ARRAY	DAT						

FILE NAMES MODE

0	INPUT		2041	OUTPUT		0	TAPE5	FMT	2041	TAPE6 FMT
4102	TAPE7	UNFMT								

EXTERNALS TYPE ARGS

BARPLT		0	HSPOT		0

STATEMENT LABELS

6165	1		6600	2	FMT		6600	3	FMT	
6422	4	FMT	0	6			6226	8		
0	9		0	11			6296	12		
0	13		6274	14			6452	16	FMT	
0	21	INACTIVE	0	25			0	26	INACTIVE	
0	49		0	73			6352	100		
6470	101	FMT								

COMMON BLOCKS LENGTH

DAT	1210
CALB	128

STATISTICS

PROGRAM LENGTH	5368	350
BUFFER LENGTH	61438	3171
CM LABELED COMMON LENGTH	24728	1338

```
      BLOCK DATA ONE
      COMMON/CALB/BIAS(8,8),SLOP(8,8)
      DATA BIAS(1,1)/-.2145392857143E-3/,SLOP(1,1)/.3633314732143E-5/
      DATA BIAS(1,2)/-.2258823170732E-3/,SLOP(1,2)/.4962576219512E-5/
      DATA BIAS(1,3)/-.2317638888889E-3/,SLOP(1,3)/.7535763888889E-5/
      DATA BIAS(1,4)/-.2719545607211E-3/,SLOP(1,4)/.1226907909440E-4/
      DATA BIAS(1,5)/-.2319825899280E-3/,SLOP(1,5)/.2153298561151E-4/
      DATA BIAS(1,6)/-.5532470934688E-3/,SLOP(1,6)/.6917665604054E-4/
      DATA BIAS(1,7)/-.5354660222504E-3/,SLOP(1,7)/.1405129421072E-3/
      DATA BIAS(1,8)/-.1129732506850E-2/,SLOP(1,8)/.2938087220988E-3/
      DATA BIAS(2,1)/-.7222017214875E-3/,SLOP(2,1)/.1273480208068E-4/
      DATA BIAS(2,2)/-.8234724977074E-3/,SLOP(2,2)/.2083929862126E-4/
      DATA BIAS(2,3)/-.5262100345574E-3/,SLOP(2,3)/.3163896161029E-4/
      DATA BIAS(2,4)/-.8837073377149E-3/,SLOP(2,4)/.4475679816032E-4/
      DATA BIAS(2,5)/-.1593567163133E-2/,SLOP(2,5)/.1034158227242E-3/
      DATA BIAS(2,6)/-.2258336923077E-2/,SLOP(2,6)/.1900769230769E-3/
      DATA BIAS(2,7)/-.7144045033315E-2/,SLOP(2,7)/.4628852075858E-3/
      DATA BIAS(3,1)/-.6963927426160E-4/,SLOP(3,1)/.7221426160336E-5/
      DATA BIAS(3,2)/-.6241848101229E-4/,SLOP(3,2)/.1083213924051E-4/
      DATA BIAS(3,3)/-.3200304609929E-3/,SLOP(3,3)/.1331328014184E-4/
      DATA BIAS(3,4)/-.2102169372715E-2/,SLOP(3,4)/.3046522706927E-4/
      DATA BIAS(3,5)/-.1058639493559E-2/,SLOP(3,5)/.6333394191373E-4/
      DATA BIAS(3,6)/-.4210690601927E-2/,SLOP(3,6)/.1226116076048E-3/
      DATA BIAS(3,7)/-.4799160740311E-2/,SLOP(3,7)/.2589986824960E-3/
      DATA BIAS(3,8)/-.8764515642751E-2/,SLOP(3,8)/.5445672101430E-3/
      DATA BIAS(4,1)/-.6627953271036E-4/,SLOP(4,1)/.5951168224299E-5/
      DATA BIAS(4,2)/-.1695828301887E-3/,SLOP(4,2)/.9611698113208E-5/
      DATA BIAS(4,3)/-.6548209226900E-4/,SLOP(4,3)/.1296605299910E-4/
      DATA BIAS(4,4)/-.7129896085375E-4/,SLOP(4,4)/.1844246496422E-4/
      DATA BIAS(4,5)/-.4635422021325E-2/,SLOP(4,5)/.6356937032200E-4/
      DATA BIAS(4,6)/-.4267390876956E-2/,SLOP(4,6)/.1117857060701E-3/
      DATA BIAS(4,7)/-.6604527516208E-2/,SLOP(4,7)/.2417003186988E-3/
      DATA BIAS(4,8)/-.1376835471818E-1/,SLOP(4,8)/.5181995250158E-3/
      DATA BIAS(5,2)/-.1468391484886E-3/,SLOP(5,2)/.3050586070959E-5/
      DATA BIAS(5,3)/-.2006124970414E-3/,SLOP(5,3)/.4578887573964E-5/
      DATA BIAS(5,4)/-.4995411320753E-4/,SLOP(5,4)/.7300301886792E-5/
      DATA BIAS(5,5)/-.1553065188514E-3/,SLOP(5,5)/.1358704507513E-4/
      DATA BIAS(5,6)/-.7379298013244E-3/,SLOP(5,6)/.2694913907285E-4/
      DATA BIAS(5,7)/-.2049163134057E-2/,SLOP(5,7)/.6457466674298E-4/
      DATA BIAS(5,8)/-.1273320946455E-1/,SLOP(5,8)/.1748055439812E-3/
      END
```

SYMBOLIC REFERENCE MAP (R=1)

VARIABLES	SN	TYPE		RELOCATION						
0	BIAS	REAL	ARRAY	CALB	100	SLOP	REAL	ARRAY	CALB	

COMMON BLOCKS	LENGTH
CALB	128

STATISTICS

PROGRAM LENGTH	0B	0
CM LABELED COMMON LENGTH	200B	128

```
      SUBROUTINE BARPLT
      DIMENSION IVSTR(4),ISTR(4)
      COMMON /DAT/NP,X(200),Y(200),KR(200),KC(200),KV(200),VIEW(4),
     1IH,IM,SEC,MINV,MAXV,ISYM(200)
      DATA IWBAR,IDBAR/10,10/
      DATA IVSTR/78,66,84,83/
      CALL INITT(0)
      CALL TERM(3,1024)
      CALL   BINITT
      CALL PGWAIT(0)
      CALL   NPTS(10)
      XMAX=-100000.
      YMAX=-100000.
      XMIN= 100000.
      YMIN= 100000.
      CALL MNMX(X,XMIN,XMAX)
      CALL MNMX(Y,YMIN,YMAX)
      CALL DLIMX(XMIN,XMAX)
      CALL DLIMY(YMIN,YMAX)
      CALL   XFRM(1)
      CALL CHRSIZ(1)
      CALL   VBARST(1,IWBAR,IDBAR)
      CALL   CHECK(X,Y)
      CALL   DSPLAY(X,Y)
      CALL   MOVABS(150,760)
      CALL   ANMODE
    5 FORMAT(1X*TIME=*I2,I2,F6.3,$A10)
      WRITE(6,5) IH,IM,SEC,(VIEW(I),I=1,4)
C     CALL MOVABS(150,30)
      CALL MOVABS(500,30)
      CALL ANMODE
C     WRITE(6,6)
    6 FORMAT(1X*W/SR.=*,F4.2*)
      WRITE(6,4)
    4 FORMAT(4X,*CNT*)
      CALL MOVABS( 50,500)
      CALL ANMODE
      CALL VLABEL(4,IVSTR)
      CALL BELL
      CALL TINPUT(I)
      CALL ERASE
      CALL HOME
      RETURN
      END
```

SYMBOLIC REFERENCE MAP (R=1)

ENTRY POINTS
1 BARPLT

VARIABLES	SN	TYPE		RELOCATION						
202	I	INTEGER			134	IDBAR	INTEGER			
1755	IH	INTEGER		DAT	207	INSTR	INTEGER	*UNDEF		
1756	IM	INTEGER		DAT	1762	ISYM	INTEGER	ARRAY	DAT	
203	IVSTR	INTEGER	ARRAY		133	I4BAR	INTEGER			
1131	KC	INTEGER	ARRAY	DAT	521	KR	INTEGER	ARRAY	DAT	
1441	KV	INTEGER	ARRAY	DAT	1761	MAXV	INTEGER		DAT	
1760	MINV	INTEGER		DAT	0	NP	INTEGER		DAT	
1757	SEC	REAL		DAT	1751	VIEW	REAL	ARRAY	DAT	
1	X	REAL	ARRAY	DAT	175	XMAX	REAL			
200	XMIN	REAL			311	Y	REAL	ARRAY	DAT	
177	YMAX	REAL			201	YMIN	REAL			

FILE NAMES	MODE
TAPE5	FMT

EXTERNALS	TYPE	ARGS			
ANMODE		0	BELL		0
BINITT		0	CHECK		2
CHRSIZ		1	DLINX		2
DLINY		2	DSPLAY		2
ERASE		0	HOME		0
INITT		1	MYMX		3
MOVABS		2	NPTS		1
PGWAIT		1	TERM		2
TINPJT		1	VBARST		3
VLABEL		2	XFRM		1

STATEMENT LABELS
156 4 FMT 135 5 FMT 150 6 FMT NO REFS

COMMON BLOCKS	LENGTH
DAT	1210

STATISTICS

PROGRAM LENGTH	2138	139
CM LABELED COMMON LENGTH	22720	1210

```
      SUBROUTINE HSPOT
      DIMENSION A(2),B(2)
      COMMON /DAT/NP,X(200),Y(200),KR(200),KC(200),KV(200),VIEW(4),
     1IH,IM,SEC,MINV,MAXV,ISYM(200)
      DATA A,B/0.0,100.0,0.0,100.0/
      CALL INITT(0)
      CALL TERM(3,1024)
      CALL BINITT
      CALL PGWAIT(0)
      CALL DLIMX(A(1),A(2))
      CALL DLIMY(B(1),B(2))
      CALL NPTS(2)
      CALL LINE(-1)
      CALL CHECK(A,B)
      CALL DSPLAY(A,B)
      CALL   MOVABS(150,760)
      CALL   ANNODE
      WRITE(6,5) IH,IM,SEC,(VIEW(I),I=1,4)
    5 FORMAT(1X*TIME=*I2,I2,F6.3,4A10)
C     CALL MOVABS(150,750)
C     CALL ANNODE
C     WRITE(6,6) MINV,MAXV
    6 FORMAT(1X*MIN=*I4,*  MAX=*I4)
      CALL SIZES(0.2)
      CALL CHRSIZ(4)
      DO 11 I=1,NP
      DO 3 J=1,I
      IF(ABS(Y(I)-Y(J)).GT.1.3) GO TO 3
      IF(ISYM(J).NE.0) GO TO 3
      IF(X(I).EQ.X(J)) GO TO 11
    3 CONTINUE
      CALL MOVEA(X(I),Y(I))
   10 CALL HLABEL(1,ISYM(I))
      ISYM(I)=0
   11 CONTINUE
      CALL BELL
      CALL TINPUT(I)
      CALL ERASE
      CALL HOME
      RETURN
      END
```

SYMBOLIC REFERENCE MAP (R=1)

ENTRY POINTS
1 HSPOT

VARIABLES	SN	TYPE		RELOCATION						
176	A	REAL	ARRAY		176	B	REAL	ARRAY		
172	I	INTEGER			1755	I4	INTEGER		DAT	
1756	IN	INTEGER		DAT	1762	ISYM	INTEGER	ARRAY	DAT	
173	J	INTEGER			1131	KC	INTEGER	ARRAY	DAT	
521	KR	INTEGER	ARRAY	DAT	1441	KV	INTEGER	ARRAY	DAT	
1761	MAXV	INTEGER		DAT	1760	MINV	INTEGER		DAT	
0	NP	INTEGER		DAT	1757	SEC	REAL		DAT	
1751	VIEW	REAL	ARRAY	DAT	1	X	REAL	ARRAY	DAT	
311	Y	REAL	ARRAY	DAT						

FILE NAMES MODE
TAPE5 FMT

EXTERNALS	TYPE	ARGS			
ANMODE		0	BELL	0	
BINITT		0	CHECK	2	
CHRSIZ		1	DLINX	2	
DLINY		2	DSPLAY	2	
ERASE		0	HLABEL	2	
HOME		0	INITT	1	
LINE		1	MOVABS	2	
MOVEA		2	NPTS	1	
PGWAIT		1	SIZES	1	
TERM		2	TINPUT	1	

INLINE FUNCTIONS	TYPE	ARGS	
ABS	REAL	1	INTRIN

STATEMENT LABELS
53 3 158 5 FMT 154 6 FMT NO REFS
0 10 INACTIVE 66 11

COMMON BLOCKS	LENGTH
DAT	1210

STATISTICS
PROGRAM LENGTH 2008 126
CM LABELED COMMON LENGTH 22720 1210

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