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"AS-BUILT" DESIGN SPECIFICATION
FOR THE
CLASFYT PROGRAM

Job Order 71-308

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16. Abstract

This document is the "As Built" Design Specification for the CLASFYT program. The program produces a 1-channel Universal-formatted classification file. Trajectory coefficients and a composite set of tolerance values are calculated from 5 acquisitions of radiance values in each of the training fields corresponding to up to 10 agricultural products. These coefficients and tolerance values are used to classify each pixel in the test field of the same segment to be the same agricultural product as one of the training fields, none of the products or a screened pixel.

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CONTENTS

Section		Page
1.	SCOPE	1-1
2.	APPLICABLE DOCUMENTS	2-1
3.	SYSTEM DESCRIPTIONS	3-1
	3.1 SYSTEM FLOWCHART	3-1
	3.2 HARDWARE DESCRIPTION	3-1
	3.3 SOFTWARE DESCRIPTION	3-4
	3.4 FILE DESCRIPTION	3-7
	3.4.1 USER INFORMATION FILE	3-7
	3.4.2 ACQUISITION DATA FILES	3-10
	3.4.3 DATA FROM RT&E DATA BASE	3-11
	3.4.4 CLASSIFICATION FILE	3-12
	3.5 DETAILED SOFTWARE DESCRIPTION	3-14
	3.5.1 CLASFYT	3-14
	3.5.2 SUBROUTINE CROPTM	3-19
	3.5.3 FUNCTION MOVSYM	3-22
	3.5.4 FUNCTION NUMBR	3-24
	3.5.5 FUNCTION NUMBFL	3-26
	3.5.6 SUBROUTINE RDEXCT	3-28
	3.5.7 SUBROUTINE RDFLES	3-30
	3.5.8 SUBROUTINE RDVERT	3-33
	3.5.9 SUBROUTINE RECT	3-35
	3.5.10 SUBROUTINE SDEV	3-37
	3.5.11 SUBROUTINE TRJFIT	3-39

CONTENTS

Section Page

3.5.12 FUNCTION F2ERIV 3-42

3.5.13 FUNCTION F2NCTN 3-44

3.5.14 FUNCTION FCHISQ 3-46

3.5.15 SUBROUTINE MATINV 3-48

3.5.16 SUBROUTINE CHNFIT 3-50

3.5.17 SUBROUTINE FGERIV 3-53

3.5.18 FUNCTION FGNCTN 3-55

4. OPERATION INSTRUCTION 4-1

4.1 OPERATING DESCRIPTION 4-1

4.2 COMMANDS DESCRIPTION 4-2

4.2.1 START 4-3

4.2.2 CLASYT 4-4

4.2.3 END 4-5

4.3 OPERATING EXAMPLE 4-6

Appendices

A. COMMON BLOCKS A-1

B. CLASFYT CONSTANT DEFINITION B-1

C. JOB CONTROL SOFTWARE, ... C-1

D. PROGRAM LISTINGS D-1

E. OUTPUT LISTINGS. E-1

CLASFYT PROGRAM

1.0 SCOPE

This document contains the description of the CLASFYT program. The purpose of the program is as follows:

To use a training field to determine trajectory coefficients for each band of radiance values. Five acquisitions of radiance values are used to create a composite set of tolerance values for each of the 4 bands.

To use these trajectory coefficients to classify each pixel in a test field to be the same agricultural product, not the same product or a screened pixel.

2.0 APPLICABLE DOCUMENTS

The following documents form a part of this specification:

AD 63-2457-3308-01 Transferring of Badhwar Software.

JSC-16274, LEC-14064 Technical Memorandum Implementation of Badhwar Classification of Corn/Soybean Segments, G. D. Badhwar, W. W. Austin and J. C. Carnes, Agristars Report SR-j0-04001, JSC 16829.

AD NAS 9-15200 Technical Memorandum Format Specification for LACIE (Phase III) and Accuracy Assessment Computer Data Products.

M. J. Duggin, 9th Symposium on Remote Sensing of Environment, ERIM, Michigan (1974).

3.0 SYSTEM DESCRIPTION

3.1 HARDWARE DESCRIPTION

The software for CLASFYT is operational on the IBM 3031 computer at Purdue.

3.2 CLASFYT PROCESSOR SYSTEM FLOWCHART

The system level data flow diagram is shown in figure 3.1.

The following system flowchart assumes the use of the EXEC file described in Appendix C.

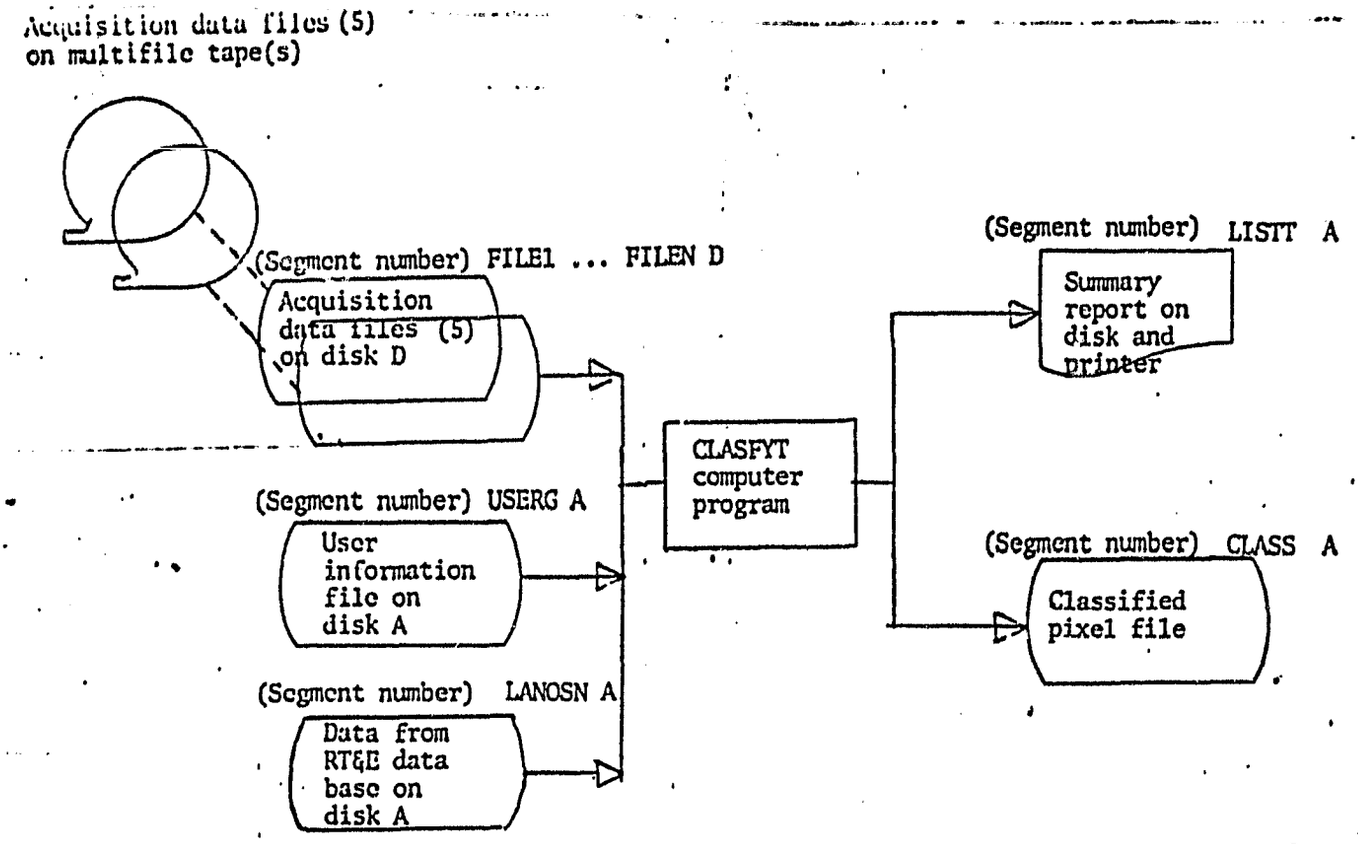
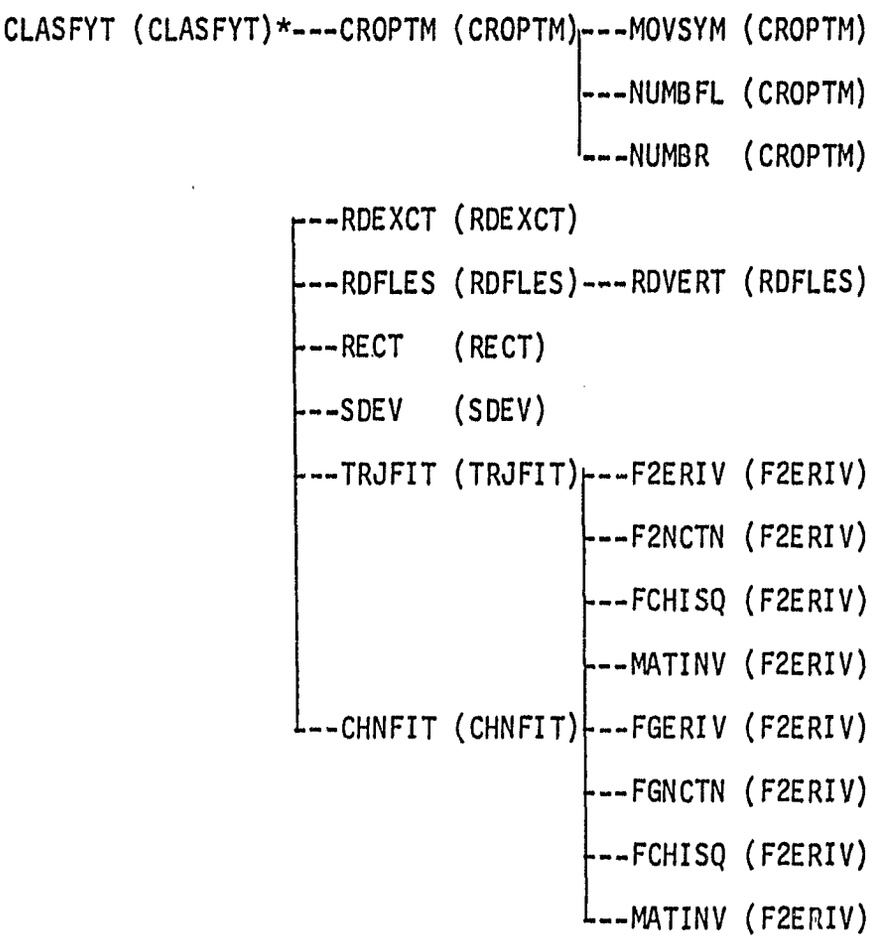


Figure 3.1

CLASFYT Hierarchy Diagram



*Parenthese enclose the name of the file which contains the source statements for the named program which precedes them: PROGRAM NAME (SOURCE STATEMENT FILE NAME).

Following is a brief description of CLASFYT program inputs and outputs. For a more detailed description refer to section 3.4.

Acquisition data files	- Header record and 4 channels of data for each of 5 acquisitions (See Section 3.4.3).
User information file	- User information file supplying crop, channel processing order, initial guesses for each of 4 channels, training field vertices and optional test field vertices (See Section 3.4.1).
Data from RT&E data base file	- Segment number, acquisition dates and Landsat numbers (See Section 3.4.2).
Summary report	- Report of date and time of processing, crop, vertices for training field, acquisition dates, all statistical data created by CLASFYT and time taken to execute the program.
Classified pixel file	- A file consisting of a header record and 117 data records. Each data record contains the classification code for each of the 196 pixels in a line of acquisition data (See Section 3.4.4).

3.3 SOFTWARE DESCRIPTION

This program classifies each pixel in a segment into one of several classes. The statistical characteristics of the classes are defined using the pixels in training fields; there is one training field for each class up to a maximum of ten classes. If a pixel is not classified as any of the input classes it is put into a special class called "unclassified". For a description of the method used see reference 3 in Section 2.0.

For each training field the program does the following:

(1) Chooses the first 40 pixels in the training field and for these pixels calculates the mean and standard deviation for each channel of each acquisition. (The other pixels in the training field are not used.)

(2) Eliminates any of the 40 pixels that have values (landsat counts) more than three times the standard deviation away from the mean in any channel of any acquisition.

(3) Recalculates the mean and standard deviation for the remaining pixels.

(4) Calls the routine TRJFIT which estimates the values of A, α, β, and t_o which give the best fit of the function

$$F(t) = A\left(\frac{t}{t_o}\right)^{\alpha} e^{-\beta(t^2 - t_o^2)} \quad \text{for } t \geq t_o$$

and

$$F(t) = A \qquad \text{for } t \leq t_o$$

to the time trajectory of the means in a particular channel. This is done for each channel. The fitting routine is based on the statistics calculated in step 3 above and a set of user-defined initial guesses for the values of the parameters A, α, β and t_o (Section 3.1).

(5) Estimates the standard deviation due to sensor and scene noise (Ref. 3, Section 2.0) for each channel in each acquisition.

(6) Calls the routine CHNFIT for each channel. This routine fits F(t) to the time trajectory of each of the remaining pixels of the original set of 40. In doing this the values of A, α and β obtained in step 4 above are used, but a new value of t_0 for each pixel is determined. Also a value for χ^2 which describes the goodness of fit is calculated for each pixel. This calculation is based on estimates of the "measurement noise" for each acquisition. This quantity is taken to be the larger of the standard deviations calculated in steps 3 and 5.

(7) The means (over pixels) and standard deviations of the χ^2 values are calculated for each channel and used to define a χ^2 threshold value for each channel.

(8) The means and standard deviations of the t_0 values are calculated for each channel and used to define an upper and lower t_0 threshold value for each channel.

Next, each pixel in the segment is classified using the results obtained in steps 1 to 8 above. For each pixel the following procedure is followed:

(1) The pixel is tested to determine if it should be classified as class 1. To do this each channel of data is processed separately in the order specified by the user. The default channel order is 2, 3, 4, 1. For each channel the routine CHNFIT is called. As described above, this routine provides an estimate of χ^2 and t_0 for this channel. If the value of χ^2 is above the threshold values for t_0 calculated in step 8 above, then the pixel is not classified as class 1. If the pixel is not rejected in any of the 4 channels then it is classified as class 1.

(2) If the pixel is rejected as class 1 in any channel, then it is tested in the same way to determine if it belongs to class 2. If it is rejected as class 2 then it is tested for class 3, etc. If it is rejected for all classes the it is put in a special class called "unclassified".

3.4 FILE DESCRIPTION

3.4.1 USER INFORMATION FILE (Segment number) USERT A

The following records describe the order of channel processing, the name, initial guesses for the 4 channels and the symbol for each of the crops, the training and test fields and allows the user to input any number of free-form comments.

In record types 1-9 the "keyword" is in columns 1-4 and any parameter data is in columns 11 through 72. Numbers in a series are separated by commas; blanks are optional.

Record types 10 and 11 which describe the fields are blank in columns 1 through 10 and the field definition is in columns 11-72.

1. "COMMENT" record
   EXAMPLE: COMMENT THIS IS A TEST EXECUTION OF THE PROGRAM
   These records allow the user to input any number of free-form comments.

2. "CHANNEL" record
   EXAMPLE: CHANNEL 2, 3, 4, 1
   This card specifies the order in which the channels are to be evaluated. The default is 2, 3, 4, 1.

3. "CROP" record(s)
   EXAMPLE: CROP CORN, SOYBEANS
   This record specifies the 4 character names of the agricultural products. The names begin with the first non-blank character and end at the fourth character or the comma separating the names. Any additional characters are ignored.

4. "Q INITIAL GUESS" record
   EXAMPLE: Q INIT 3.45, -3.65, -0.32, 1.50
   Q INIT 3.5, -1.0, -1.0, 1.2
   These records specify the A, Alpha, Beta and t_0 initial guesses for channel 1 for each of the crops to be evaluated.

5. "X INITIAL GUESS" record(s)

   EXAMPLE: X INIT 3.41, -9.61, -0.91, 1.50 (Corn)
   X INIT 3.5, -5.0, -1.0, 1.20 (Soybeans)

   These records specify the A, Alpha, Beta and t_o initial guesses for channel 2 for each of the crops to be evaluated.

6. "Y INITIAL GUESS" record(s)

   EXAMPLE: Y INIT 3.08, 8.65, 1.01, 1.47
   Y INIT 3.5, 7.0, 1.0, 1.2

   These records specify the A, Alpha, Beta and t_o initial guesses for channel 3 for each of the crops to be evaluated.

7. "Z INITIAL GUESS" record(s)

   EXAMPLE: Z INIT 2.91, 11.17, 1.3, 1.05
   Z INIT 3.5, 7.0, 1.0, 1.2

   These records specify the A, Alpha, Beta and t_o initial guesses for channel 4 for each of the crops to be evaluated.

8. "SYMBOL" record

   EXAMPLE: SYMBOL 195, 226

   This record specifies the symbols for the crops in the same order they are listed in the CROP record. Each symbol is defined by its base 10 number. These numbers are designated by crop codes produced by the data management section at J.S.C. and vary according to crop and year.

9. "*END" record

   EXAMPLE: *END

   This record specifies the end of the user supplied data except for the definition of the training field and the test field.

   Record type 10 must follow the *END record.

   Record type 11 is optional, the default is the whole scene. If record type 11 is present it must follow record type 10.

10. "TRAINING FIELD" record

(The training field record must follow the "*END" record and preceed the test field record.

EXAMPLE: (1,1), (97,90), (125, 90), (100,100), (80,100)

This record specifies the coordinates of the corners of the training field. The format of the line is as follows:

(1,1) Dummy variable to be used for sample skip factor and line skip factor; not currently used.

(X_1,Y_1) Upper leftmost corner of training field expressed as (sample, line).

(X_2,Y_2) Upper rightmost corner of training field expressed as (sample, line).

(X_3,Y_3) Lower rightmost corner of training field expressed as (sample, line).

(X_4,Y_4) Lower leftmost corner of training field expressed as (sample, line).

11. "TEST FIELD" record

(The test field record, if specified, must follow the training field record. The default is the whole scene.

EXAMPLE: (1,1), (1,1), (196,1), (196,117), (1,117)

This optional record specifies the coordinates of the corners of the test field. The default is the whole segment. The format is the same as the format for the training field record.

3.4.2 ACQUISITION DATA FILES

The following records of the 5 acquisitions data files are input to the CLASFYT program and are read by RDFLES.

These files each contain 4 channels of LANDSAT data for one acquisition. If an acquisition is used twice the corresponding file will be duplicated. Note that these files are in universal format. Record 1 is read with a 17(180A1) format statement; records 2-118 are read with a 5(180A1) format statement.

Record	Bytes	Contents
1	1-3060	Header record in universal format.
2	1-72	Filler.
	73-268	Gray level values for the 196 samples of band 1 for line 1.
	296-464	Gray level values for the 196 samples of band 2 for line 1.
	465-660	Gray level values for the 196 samples of band 3 for line 1.
	661-856	Gray level values for the 196 samples of band 4 for line 1.
3	1-856	Same data format as record 2; gray level values for bands 1-4 for line 2.
⋮		
N	1-856	Same data format as record 2; gray level values for bands 1-4 for line N-1.
⋮		
118	1-856	Same data fromat as record 2; gray level values for bands 1-4 for line 117.

3.4.3 DATA FROM RT&E DATA BASE FILE LANOSN FILE D

The following records describe the segment number and the date and Landsat number for each of the 5 acquisitions.

Record	Bytes	Format	Contents
1	1-4	A4	Segment number.
2	1-35	5(2X,A5)	Acquisition dates.
3	1-20	5I4	Landsat numbers.

3.4.4 CLASSIFICATION FILE (Segment number) CLASS A

The following records are output from the CLASFYT program.

Format

Record	Bytes	Format	Contents
1	1-3060	17(180A1)	Header record in Universal format.
2-118	1-72	17(180A1)	72 characters of blank filler.
	73-268		196 characters representing 1 line of classified data.

Record	Bytes	Contents
1	1-3060	Header records in Universal format.
2	1-72	Blank filler.
	73	Classification symbol for pixel 1 in line 1.
	⋮	
	N+72	Classification symbol for pixel N in line 1.
	⋮	
	268	Classification symbol for pixel 196 in line 1.
3	1-268	Same data format as record 2; 72 characters of blank filler and classification symbols for 196 pixels in line 2.
⋮		
N+1	1-268	Same data format as record 2; 72 characters of blank filler and classification symbols for 196 pixels in line N.

Classification file (continued).

Record	Byte	Contents
118	1-268	Same data format as record 2; 72 characters of blank filler and classification symbols for 196 pixels in line 117.

3.5 DETAILED SOFTWARE DESCRIPTION

3.5.1 CLASFYT

Purpose

CLASFYT uses a user determined training field in a full scene to determine trajectory coefficients for each channel of radiance values. These coefficients are used to classify each pixel in a test field to be a specific one of the crops of interest or unclassified.

Linkages

CLASFYT calls CROPTM, RDEXCT, CPTIME, RECT, SDEV, TRJFIT, CHNFIT and RDFLES.

Interface

Calling sequence:

Not applicable (an EXEC that can be used to call CLASFYT is described in Section 4.0).

Calling sequence parameters:

Not applicable.

Labeled COMMON parameters:

Full description of labeled COMMON blocks are contained in Appendix A.

Label	Variable	Element Position	Input/ Output	Description
/LINES/	LINENO	2	Ø	Line number.
/LINES/	IDATA(856,8)	3	I	One line of acquisition data per file.
/LINES/	NOACQS	4	Ø	Number of acquisitions.
/USER/	ICROP(10)	1	I	Names of crops.

Label	Variable	Position	Input/ Output	Description
/USER/	ZQ(4)	2	I	Arrays of Coefficients A Alpha, Beta and t_o for channel 1.
/USER/	ZX(4)	3	I	Array of coefficients A, Alpha, Beta and t_o for channel 2.
/USER/	ZY(4)	4	I	Arrays of coefficients A, Alpha, Beta and t_o for channel 3.
/USER/	ZZ(4)	5	I	Arrays of coefficients A, Alpha, Beta and t_o for channel 4.
/USER/	NMAX	6	I	Maximum number of points in field (default is 40).
/USER/	IORDRC(4)	7	I	Array specifying order channels are to be processed.
/USER/	NOCROP	8	I	Number of crops.
/USER/	ISYMBL(10)	9	I	Symbols for crops.
/MISC/	NOACQ	1	I	Number of acquisitions.
/MISC/	ACQDT(5)	2	I	Acquisition dates.
/MISC/	KSEGM	3	I	Segment number.
/MISC/	LANDST(5)	4	I	Landsat numbers.

Blank COMMON parameters:

None.

Inputs

Unit	Type	Description
7	Seq. data	Data from RT&E data base (See Section 3.4.3).
11	Seq. data	Acquisition data (See Section 3.4.2).
12	Seq. data	Acquisition data (See Section 3.4.2).
13	Seq. data	Acquisition data (See Section 3.4.2).
14	Seq. data	Acquisition data (See Section 3.4.2).
15	Seq. data	Acquisition data (See Section 3.4.2).
21	Seq. data	User information (parameters) (See Section 3.4.1).
30	Seq. data	Scratch file to reformat data.

Outputs

Unit	Type	Description
6	Report	Summary report.
8	Seq. data	Classified pixel file.
30	Seq. data	Scratch file to reformat data (See Section).

Storage requirement

Not applicable.

Description

CLASFYT calls CROPTM to read the user specified parameters crops of interest, initial guesses for coefficients A, Alpha, Beta, t_0, and symbols for each crop.

CLASFYT calls RDFLES to read the header record and the parameters for the training field.

CLASFYT calls RDFLES to read the header record and the parameters for the training field.

CLASFYT then calls CPTIME to get the current time and date and writes the report heading.

CLASFYT calculates the minimum and maximum boundaries for pixels in the test field, calculates days elapsed from the beginning of the year as a multiple of 100 for each acquisition date and sets a switch if an acquisition date is used twice.

The rectangular field bounded by the minimum and maximum pixel numbers and line numbers is then processed using the following steps:

A line of radiance values is read.

Each pixel in the field is checked to determine if it is in the training field.

The values for the pixels in the training fields are saved in a matrix.

When sufficient training field pixels (40) have been identified/accumulated, the mean and standard deviation for each of the four channels of radiance values are calculated for the selected training field pixels.

The radiance value for each of the four channels for the selected training field pixels is compared with the corresponding computed channel mean and channel standard deviation. Any selected training field pixel whose radiance value for any channel differs from the corresponding channel mean be more than 3 channel standard deviations is eliminated from the training field matrix.

The mean and standard deviation are re-calculated for the new group of training field pixels and are printed on the report.

CLASFYT calls TRJFIT to calculate CHI-square coefficients for each channel. The final coefficients are calculated using the CHI-square values and the constants from Duggins' paper (1974) for scene noise and CHNFIT is called for each channel. The initial guesses and final coefficient are written on the report for each channel.

The header record is constructed using input from the program constants, the user parameter file and the current date. The header record is written as the first record on the new classification file.

CLASFYT then evaluates the test field using the following steps:

A line of pixel data is read.

CHNFIT is called for each of the pixels for channel 4, channel 2, channel 3 and then channel 1 unless a different sequence is specified by the user.

The pixel is classified as a different product if the CHI square value calculated by CHNFIT does not fall within the limits calculated for the corresponding channel.

The line of classified pixels is written to the classification file.

The threshold values and the counts of values classified are written to the report.

Flowchart

Not applicable.

Listing

See Appendix D for program.

3.5.2 SUBROUTINE CROPTM

Purpose

CROPTM reads and analyzes cards describing the order of channel processing and the name of the crops of interest, initial values for A, Alpha, Beta and t_0, and symbols for each crop.

Linkages

CROPTM is called by CLASFYT, CROPTM calls MOVSYM, NUMBFL, and NUMBR.

Interface

Calling sequence:

CALL CROPTM (IERROR).

Calling Sequence parameters:

Argument	Input/ Output	Description
IERROR	Ø	0 - No error; 1 - error.

Function value:

Not applicable.

Labeled COMMON parameters:

Full description of labeled COMMON blocks are contained in Appendix A.

Label	Variable	Element Position	Input/ Output	Description
/USER/	ICROP(10)	1	Ø	Names of crops.
/USER/	ZQ(4,10)	2	Ø	Arrays of coefficients A, Alpha, Beta and t_0 for channel 1.
/USER/	ZX(4,10)	3	Ø	Arrays of coefficients A, Alpha, Beta and for channel 2.
/USER/	ZY(4,10)	4	Ø	Arrays of coefficients A, Alpha, Beta and t_0 for channel 3.

/USER/	QZ(4,10)	5	Ø	Arrays of coefficients A, Alpha, Beta and t_0 for channel 4.
/USER/	MAXPTS	6	Ø	Maximum points.
/USER/	IORDRC(4)	7	Ø	Array describing order channels are to be processed.
/USER/	NOCROP	8	Ø	Number of crops.
/USER/	ISYMBL(10)	9	Ø	Array of symbols.

Blank COMMON parameters:

None.

Inputs

Unit	Type	Description
21	Seq. data	User information file (See Section 3.4.1).

Outputs

None.

Storage requirement

Not applicable.

Description

Each record in the user defined parameter file is read and checked to have a valid control word in characters 1 through 4 defining the type of information in characters 11 through 80. If the control word in invalid, an error message is written; otherwise, the information is saved in the appropriate common block element.

Flowchart

Not applicable.

Listing

See Appendix D for program.

3.5.3 FUNCTION MOVSYM

Purpose

MOVSYM moves characters from array CARD to a series of left-justified words in array ITEMP.

Linkages

MOVSYM is called by SETUPT.

Interface

Calling sequence:

```
KOUNT = MOVSYM (CARD, ITEMP).
```

Calling sequence parameters:

Argument	Input/ Output	Description
CARD	I	80 characters of user supplied data in character format.
ITEMP	Ø	Array of left justified words or symbols.

Function value:

Name	Description
KOUNT	Count of symbols.

Labeled COMMON parameters:

None.

Blank COMMON parameters:

None.

Inputs

None.

Outputs

None.

Storage requirement

Not applicable.

Description

MOVSYM separates the characters in array CARD starting at character 11 and creates a series of left-justified words in array ITEMP.

Flowchart

Not applicable.

Listing

See Appendix D for program.

3.5.4 FUNCTION NUMBR

Purpose

NUMBR changes integers from character array CARD to computational numbers in array NUMVEC.

Linkages

NUMBR is called by CROPTM.

Interface

Calling sequence:

```
KOUNT = NUMBR (CARD, NUMVEC).
```

Calling sequence parameters:

Argument	Input/ Output	Description
CARD	I	80 characters of user supplied data in character format.
NUMVEC	Ø	Array of integer computational numbers.

Function value:

Name	Description
KOUNT	Number of computational integers.

Labeled COMMON parameters:

None.

Blank COMMON parameters:

None.

Inputs

None.

Outputs

None.

Storage requirement

Not applicable.

Description

NUMB separates the characters in array card starting at the 11th character and creates a series of computational integers.

Flowchart

Not applicable.

Listing

See Appendix D for program.

3.5.5 FUNCTION NUMBFL

Purpose

NUMBFL changes floating point numbers from characters in array CARD to computational numbers in array XNMVEC.

Linkages

NUMBFL is called by CROPTM.

Interface

Calling sequence:

KOUNT = NUMBFL (CARD, XNMVEC).

Calling sequence parameters:

Argument	Input/ Output	Description
CARD	I	80 characters of user supplied data in character format.
XNMVEC	Ø	Array of floating point computational number.

Function value:

Name	Description
KOUNT	Count of floating point numbers.

Labeled COMMON parameters:

None.

Blank COMMON parameters:

None.

Inputs

None.

Outputs

None.

Storage requirement

Not applicable.

Description

NUMBFL evaluates the characters in array CARD starting at character 11 and creates a series of computational floating point numbers.

Flowchart

Not applicable.

Listing

See Appendix D for program.

3.5.6 SUBROUTINE RDEXCT

Purpose

RDEXCT reads a file composed of the acquisition information from the LARS data base.

Linkages

RDEXCT is called by CLASFYT.

Interface

Calling sequence:

CALL RDEXCT.

Calling sequence parameters:

None.

Function value:

Not applicable.

Labeled COMMON parameters:

Full description of labeled COMMON blocks are contained in Appendix A.

Label	Variable	Element Position	Input/ Output	Description
/MISC/	NOACQ	1	I	Number of acquisition.
/MISC/	ACQDT(5)	2	I	Acquisition dates.
/MISC/	KSEGM	3	I	Segment number.
/MISC/	LANDST(5)	4	I	Landsat numbers.

Blank COMMON parameters:

None.

Inputs

Unit	Type	Description
7	Seq. data	Acquisition information from RT&E data base. (See Section 3.4.3).

Outputs

None.

Storage requirement

Not applicable.

Description

RDEXCT reads a fixed format file defining the segment number, acquisition dates and Landsat numbers. RDEXCT sets the number of acquisitions to 5.

Flowchart

Not applicable.

Listing

See Appendix D for program.

3.5.7 SUBROUTINE RDFLES

Purpose

RDFLES reads 1) the header record and one set of vertices or 2) one line of radiance values.

Linkages

READFL is called by CLASFYT.

Interface

Calling sequence:

CALL RDFLES (ITYPE, HDR, XFD, XFD, IERROR).

Calling sequence parameters:

Argument	Input/ Output	Description
ITYPE	I	1 to read header from each acquisition file and field definition; 2 to read 1 line of radiance values from each acquisition file.
HDR	Ø	Header record buffer.
XFD(4)	Ø	Array of sample vertices defining field.
YFD(4)	Ø	Array of sample lines defining field.
IERROR	Ø	0 if no error; 1 if error.

Function value:

Not applicable.

Labeled COMMON parameters:

Full description of labeled COMMON blocks are contained in Appendix A.

Label	Variable	Element Position	Input/ Output	Description
/LINES/	NXTLNE	1	Ø	Pointer to next line.
/LINES/	LINENO	2	I	Number of line to be read.
/LINES/	IDATA(856,8)	3	Ø	Line of radiance values for each acquisitions.
/LINES/	NOACQS	4	Ø	Number of acquisitions.

Blank COMMON parameters:

None.

Inputs

Unit	Type	Description
11	Seq. data	Acquisition data for date 1 (See Section 4.3.2).
12	Seq. data	Acquisition data for date 2 (See Section 4.3.2).
13	Seq. data	Acquisition data for date 3 (See Section 4.3.2).
14	Seq. data	Acquisition data for date 4 (See Section 4.3.2).
15	Seq. data	Acquisition data for date 5 (See Section 4.3.2).
21	Seq. data	Field definition.

Ouputs

None.

Storage requirement

Not applicable.

Description

READFL reads the header record from the universal formatted tape and the vertices for one field if ITYPE=1. If ITYPE=2, READFL reads one line of radiance values.

Flowcharts

Not applicable.

Listing

See Appendix D for program.

3.5.8 SUBROUTINE RDVERT

Purpose

RDVERT reads one set of vertices.

Linkages

RDVERT is called by CLASFYT.

Interface

Calling sequence:

```
CALL RDVERT (XFLD, YFLD, IERROR).
```

Calling sequence parameters:

Argument	Input/ Output	Description
XFLD(4)	Ø	Array of sample vertices defining field.
YFLD(4)	Ø	Array of line vertices defining field.
IERROR	Ø	0 - no errors; 1 - error.

Function value:

Not applicable.

Labeled COMMON parameters:

None.

Blank COMMON parameters:

None.

Inputs

Unit	Type	Description
21	Seq. data	User specified data file (See Section 4.3.1).

Outputs

None.

Storage requirement

Not applicable.

Description

RDVERT reads the vertices for one field.

Flowchart

Not applicable.

Listing

See Appendix D.

3.5.9 SUBROUTINE RECT

Purpose

RECT determines if a pixel lies within the specified vertices of a specific area.

Linkages

RECT is called by CLASFYT.

Interface

Calling sequence:

CALL RECT (LINE, PIXEL, YY, XX, ICOR).

Calling sequence parameters:

Argument	Input/ Output	Description
LINE	I	Current line number of pixel.
PIXEL	I	Current sample number of pixel.
YY(4)	I	Array of sample vertices defining field.
XX(4)	I	Array of line vertices defining field.
ICOR	Ø	0 if pixel in field; 1 if pixel not in field.

Function value:

Not applicable.

Labeled COMMON parameters:

None.

Blank COMMON parameters:

None.

Inputs

None.

Outputs

None.

Storage requirement

Not applicable.

Description

The pixel is checked to be a boundary pixel and considered in the training field if it is a boundary pixel. If the pixel is within the minimum and maximum limits of the specified area, the angles created between lines drawn between the pixel and boundary pixel are calculated and summed. If the sum of the angles is 360; the pixel is considered to be in the specified field.

Flowchart

Not applicable.

Listing

See Appendix D for program.

3.5.10 SUBROUTINE SDEV

Purpose

SDEV calculates the mean and standard deviation of a vector.

Linkages

SDEV is called by CLASFYT.

Interface

Calling sequence:

CALL SDEV (X, N, XB, S).

Calling sequence parameters:

Argument	Input/ Output	Description
X(N)	I	Array of values.
N	I	Number of values in array X.
XB	Ø	Mean of values in array X.
S	Ø	Standard deviation of values in array X.

Function value:

Not applicable.

Labeled COMMON parameters:

None.

Blank COMMON parameters:

None.

Inputs

None.

Storage Requirement

Not applicable.

Description

SDEV calculates the mean (XB) and standard deviation (S) of vector X with N points.

Flowchart

Not applicable.

Listing

See Appendix D for program.

3.5.11 SUBROUTINE TRJFIT

Purpose

TRJFIT makes a least-square fit to a non-linear function to calculate coefficients for the curve.

Linkages

TRJFIT is called by CLASFYT.

Interface

Calling sequence:

CALL TRJFIT (X, Y, SIGMAY, NFILES, NTERMS, MODE, ESTIM, DELTAA, SIGMAA, FLAMDA, YFIT, CHISQR).

Calling sequence parameters:

Argument	Input/ Output	Description
x	I	Array of Julian day/100 for acquisitions.
Y	I	Array of dependent variables.
SIGMAY	I	Array of errors on Y.
NFILES	I	Number of acquisitions.
NTERMS	I	Number of degrees of freedom.
MODE	I	Not used, was switch for calculation weight.
ESTIM	I,Ø	Array of coefficients A, Alpha, Beta and t_o.
DELTAA	I	Array of increments for A.
SIGMAA	Ø	Standard deviations.
FLAMDA	Ø	Proportion of gradient search.
YFIT	Ø	Array of fitted values.
CHISQR	Ø	Residual CHI-square value.

Function value:

Not applicable.

Labeled COMMON parameters:

None.

Blank COMMON parameters:

None.

Inputs

None.

Outputs

None.

Storage requirement

Not applicable.

Description

TRJFIT calculates alpha and beta matrices, using the least-square method, for defining all parameters of the curve for the selected pixels in the training field.

The CHI square value of the starting point is evaluated and the modified curvature matrix is inverted to find the new parameters.

The convergence depends on the CHI-square value and on the size of step FLAMDA which controls the location of the emergence day.

If the CHI-square value increases, FLAMDA is increased and the process is re-initiated. If the CHI-square value decreases, the parameters and uncertainties are evaluated.

Flowchart

Not applicable.

Listing

See Appendix D for program.

3.5.12 SUBROUTINE F2ERIV

Purpose

F2ERIV computes the derivative of the function of each of the X values.

Linkages

F2ERIV is called by TRJFIT.

Interface

Calling sequence:

CALL F2ERIV (X, I, ESTIM, DELTAA, NTERMS, DERIV).

Calling sequence parameters:

Argument	Input/ Ouput	Description
X	I	Array of time points for acquisition.
I	I	Current index in calling program.
ESTIM	I,Ø	Array of coefficients A, Alpha, Beta and t_o.
DELTAA	I	Array of increments for A.
NTERMS	I	Number of degrees of freedom.
DERIV	Ø	Array of derivatives with respect to parameters ESTIM.

Function value:

Not applicable.

Labeled COMMON parameters:

None.

Blank COMMON parameters:

None.

Inputs

None.

Outputs

None.

Storage requirement

Not applicable.

Description

The radiance value and t_o are set positive. Y is calculated as the radiance value/t_o. If Y is less than or equal to 1, the 4 derivatives are set to very small numbers; otherwise, the derivatives are set to calculated values. If the CHI-square value decreases, the process is reinitiated until convergence is obtained; the parameters and uncertainties are evaluated.

Flowchart

Not applicable.

Listing

See Appendix D for program.

3.5.13 FUNCTION F2NCTN

Purpose

F2NCTN evaluates a function of alpha, beta, to and time.

Linkages

F2NCTN is called by TRJFIT.

Interface

Calling sequence:

APPROX = F2NCTN (X, I, COEFS).

Calling sequence parameters:

Argument	Input/ Output	Description
X	I	Time array in days elapsed in year/100.
I	I	Index to value in X array.
COEFS	I	Array of estimates A, Alpha, Beta and t_o.

Function value:

Name	Description
APPROX	Evaluation of function of Alpha, Beta, t_o and X.

Labeled COMMON parameters:

None.

Blank COMMON parameters:

None.

Inputs

None.

Outputs

None.

Storage Requirement

Not applicable.

Description

F2NCTN sets the variable to positive and then evaluates the following equation Y = radiance value/time. If Y is less than or equal to 0, F2NCTN = radiance value, else Y = radiance value + alpha + alog (Y) + Beta * To^2 * (1-$time^2$).

Flowchart

Not applicable.

Listing

See Appendix D for program.

3.5.14 FUNCTION FCHISQ

Purpose

FCHISQ calculates the CHI square value per degree of freedom.

Linkages

FCHISQ is called by TRJFIT and CHNFIT.

Interface

Calling sequence:

```
GOODFT = FCHISQ (Y, SIGMAY, NPTS, NFREE, MODE, YFIT, WEIGHT).
```

Calling sequence parameters:

Argument	Input/ Output	Description
Y(NFILES)	I	Array of dependent variables.
SIGMAY(NFILES)	I	Array of errors on Y.
NPTS	I	Number of acquisitions.
NFREE	I	Number of degrees of freedom.
MODE	I	Not used.
YFIT(NFILES)	I	Array of fitted values.
WEIGHT(NFILES)	I	Array of weighting factors.

Function value:

Name	Description
GOODFT	CHI-square value per degree of freedom.

Labeled COMMON parameters:

None.

Blank COMMON parameters:

None.

Inputs

None.

Outputs

None.

Storage Requirement

Not applicable.

Description

FCHISQ calculates CHI square value = Σ (YFIT-Y)/SIGMA)^2

Flowchart

Not applicable.

Listing

See Appendix D for program.

3.5.15 SUBROUTINE MATINV

Purpose

MATINV inverts a matrix of order NORDER.

Linkages

MATINV is called by TRJFIT and CHNFIT.

Interface

Calling sequence:

CALL MATINV (ARRAY, NORDER, DET).

Calling sequence parameters:

Argument	Input/ Output	Description
ARRAY (NORDER)	I,Ø	Matrix.
NORDER	I	Order of matrix.
DET	Ø	Determinate of matrix.

Function value:

None.

Labeled COMMON parameters:

None.

Blank COMMON parameters:

None.

Inputs

None.

Outputs

None.

Storage requirement

Not applicable.

Description

MATINV uses the Gauss-Jordon reduction techniques.

Flowchart

Not applicable.

Listing

See Appendix D for program.

3.5.16 SUBROUTINE CHNFIT

Purpose

CHNFIT makes a least-square fit to a non-linear function to calculate coefficients for the curve.

Linkages

CHNFIT is called by CLASFYT.

Interface

Calling sequence:

CALL CHNFIT (X, Y, SIGMAY, NFILES, NTERMS, MODE, COEFS, DELTAA, SIGMAA, FLAMDA, YFIT, CHISQR, CON, CALP, CBET).

Calling sequence parameters:

Argument	Input/ Output	Description
X	I	Array of Julian day/100 for acquisitions.
Y	I	Array of dependent variables.
SIGMAY	I	Array of errors on Y.
NFILES	I	Number of acquisitions.
NTERMS	I	Number of degrees of freedom.
MODE	I	Not used, was switch for calculation weight.
COEFS	I,Ø	Array of coefficients A, Alpha, Beta and t_o.
DELTAA	I	Array of increments for A.
SIGMAA	Ø	Standard deviations.
FLAMDA	Ø	Proportion of gradient search.
YFIT	Ø	Array of fitted values.
CHISQR	Ø	Residual CHI-square value.

Argument	Input/ Output	Description
CON	I	Data point 1 returned from TRJFIT (A).
CALP	I	Data point 2 returned from TRJFIT (Alpha).
CBET	I	Data point 3 returned from TRJFIT (Beta).

Function value:

Not applicable.

Labeled COMMON parameters:

Full descriptions of labeled COMMON blocks are contained in Appendix A.

Label	Variable	Element Position	Input/ Output	Description
/CHAN/	ACH	1	Ø	A returned from TRJFIT.
/CHAN/	ALP	2	Ø	Alpha returned from TRJFIT.
/CHAN/	ABET	3	Ø	Beta returned from TRJFIT.

Blank COMMON parameters:

None.

Inputs

None.

Outputs

None.

Storage requirement

Not applicable.

Description

CHNFIT calculates alpha and beta matrices, using the least-square method, for defining all parameters of the curve for the selected pixels in the training field.

The CHI square value of the starting point is evaluated and the modified curvature matrix is inverted to find the new parameters.

The convergence depends on the CHI-square value and on the size of step FLAMDA which controls the location of the emergence day.

If the CHI-square value increases, FLAMDA is increased and the process is re-initiated. If the CHI-square value decreases, the parameters and uncertainties are evaluated.

Flowchart

Not applicable.

Listing

See Appendix D for program.

3.5.17 SUBROUTINE FGERIV

Purpose

FGERIV calculates the value of DERIV from the radiance value, alpha and beta.

Linkages

FGERIV is called by CHNFIT.

Interface

Calling sequence:

CALL FGERIV (X, I, COEFS, DELTAA, NTERMS, DERIV).

Calling sequence parameters:

Argument	Input/ Output	Description
X	I	Time array in days elapsed in year/100.
I	I	Index to value in time array.
COEFS	I	Array of coefficients A, Alpha, Beta and t_o.
DELTAA	NA	Not used.
NTERMS	NA	Not used.
DERIV	Ø	Value of function FGERIV.

Function value:

Not applicable.

Labeled COMMON parameters:

None.

Blank COMMON parameters:

None.

Inputs

None.

Outputs

None.

Storage Requirement

Not applicable.

Description

FGERIV calculates the value of DERIV from the values of alpha and beta and the current radiance value. If DERIV is negative, it is reset to zero. If DERIV is zero, it is rese' to 1:E-10.

Flowchart

Not applicable.

Listing

See Appendix D for program.

3.5.18 FUNCTION FGNCTN

Purpose

FGNCTN calculates the Y fit for the curve.

Linkages

FGNCTN is called by CHNFIT.

Interface

Calling sequence:

YFIT(I) = FGNCTN (X, I, A).

Calling sequence parameters:

Argument	Input/ Output	Description
X	I	Array of time points.
I	I	Index to current point.
A	I	Array of coefficients A, Alpha, Beta and t_o.

Function value:

Name	Description
YFIT(I)	Evaluated function.

Labeled COMMON parameters:

Full descriptions of labeled COMMON blocks are contained in Appendix A.

Label	Variable	Element Position	Input/ Output	Description
/CHAN/	ACH	1	I	A value returned from TRJFIT.
/CHAN/	ALP	2	I	Alpha value returned from TRJFIT.
/CHAN/	ABET	3	I	Beta value returned from TRJFIT.

Blank COMMON parameters:

None.

Inputs

None.

Outputs

None.

Storage Requirement

Not applicable.

Description

FGNCTN sets the alpha value positive and calculates F, current value of X/alpha. If F is less than or equal to 1., FGNCTN = ACH; otherwise FGNCTN is calculated from the parameters of the training field.

Flowchart

Not applicable.

Listing

See Appendix D for program.

4.0 OPERATION

4.1 OPERATING DESCRIPTION

CLASFYT is operational on the IBM 3031 computer at LARS, West Lafayette, Indiana.

The CLASFYT program is one of the programs of the BADHWAR SYSTEM.

CLASFYT requires the use of a D disk which is assigned as a temporary disk and an E disk which is used to hold LARS routines. The user therefore, must not assign a disk to his machine using either MODE E or MODE D. These disks will be assigned as needed.

Prior to executing the CLASFYT program the user must establish on his A disk a USER INFORMATION file as described in Section 3.4.1.

4.2 COMMANDS DESCRIPTION

To execute CLASFYT the user will enter the following series of commands which invoke the JOB CONTROL SOFTWARE. These commands are divided into two classes namely (1) FUNCTION commands and (2) PROGRAM commands. The FUNCTION commands, which perform all the functions except executing the program, are reusable, i.e., once they are invoked they remain in effect until reentered. The PROGRAM commands, which simply execute the program, must be reentered each time the program is to be executed.

The following list gives the commands required to execute the CLASFYT program. They are all FUNCTION commands except the PROGRAM command CLASFYT. These commands are to be given in the listed order.

START

CLASFYT.....

END

The following sections describe each of the commands in detail. Input fields are separated by blanks. If more than one word is required to describe an input field, the description is enclosed in pointed brackets <>. If an input is optional the field is enclosed in square brackets []. Do not include these explanatory characters <> [] when actually submitting input to the computer. To enter a command the user types one input per defined input field and separates each fie. with a blank.

4.2.1 START

The START command spools the user's console file. The use of this command along with the END command will provide a listing of all information appearing on the user console file. (If running an interactive job this is the terminal.) If running a batch job this is a system defined device. The START command is invoked by the user typing the following:

START

4.2.2 CLASFYT

The CLASFYT command is a PROGRAM command and is used to invoke the execution of the CLASFYT program. All input Landsat data is from the LARS RT&E Data BASE and a series of programs is required to do the necessary interface. The following diagram illustrates this software flow.

```
                          ..RTEER  <LARS ROUTINE>
                          :
CLASFYT.......LCTINF......:.SEGALL <LARS ROUTINE>
                          :
                          :.TSRTHS....IVALUE
```

For a detailed description of the JOB CONTROL SOFTWARE See Appendix C.

This CLASFYT command must not be given unless the user has established a user's file on his A disc under the file description <SEGMENT NUMBER> USERT A as described in Section 3.4.1. Furthermore the SEGMENT NUMBER must contain 4 digits of the segment. For example: segment 0882 dictates that the USER INFORMATION file be named:

0882 USERT A

The CLASFYT command is invoked by the user typing the following:

CLASFYT <SEGMENT#> <ACQ.#1> <ACQ.#2> <ACQ.#3> <ACQ.#4> <ACQ.#5>

As described in Section 3.4.2 the CLASFYT program requires the user to execute using 5 segment acquisitions.

The classification file output from an execution of CLASFYT is written to a file named <SEGMENT NUMBER> CLASS A. Program inputs acquired from the LARS Data Base and the USER INFORMATION file is spooled to the HOUSTON printer.

4.2.3 END

This command closes the user's console file and causes a spooled copy to be sent to the HOUSTON printer. This command has no effect if the START command was not previously issued. The END command is invoked by the user typing the following:

```
END
```

4.3 OPERATING EXAMPLE

For our example we assume that the user has established on his A disk the required USER INFORMATION file. In addition since our example deals with an execution using segment 882 the user's information file must be established under the filename 0882 and filetype USERT.

COMMAND	EXPLANATION OR ACTION TAKEN
START	Spools the console file.
CLASFYT 0882 78159 78186 78222 78231 78267	Executes the CLASFYT using 5 acquisition of segment 882.
END	Closes the user's console file and prints the file.

APPENDIX A

COMMON BLOCK /LINES/

NXTLNE	Not currently used.
LINENO	Current line number.
IDATA(856,8)	Acquisition data.
NOACQS	Number of acquisitions.

COMMON BLOCKS /MISC/

NOACQ	Number of acquisitions.
ACQDT(5)	Acquisition dates stored left justified in double precision word.
KSEGM	Segment number stored as 4 character word.
LANDST(5)	Landsat numbers.

COMMON BLOCK /USER/

ICROP(10)	Names of crops of interest.
ZQ(4,10)	Initial guesses for A, Alpha, Beta and t_0 for channel 1.
ZX(4,10)	Initial guesses for A, Alpha, Beta and t_0 for channel 2.
ZY(4,10)	Initial guesses for A, Alpha, Beta and t_0 for channel 3.
QZ(4,10)	Initial guesses for A, Alpha, Beta and t_0 for channel 4.
ISYMBL(10)	Symbols for crops of interest.
IORDRC(4)	Order of channel processing.
NOCROP	Number of crops to process.

APPENDIX B

CLASFYT Variable Definitions

VARIABLE	DEFINITION
ACQDT	ACQUISITION DATES
ALOG	REAL LOG FUNCTION
ALPH1	2ND CURVE FIT VALUE CH 1, SET AFTER TRJFIT, USED BY BOTH CHNFIT
ALPH2	2ND CURVE FIT VALUE CH 2, SET AFTER TRJFIT, USED BY BOTH CHNFIT
ALPH3	3RD CURVE FIT VALUE CH 3, SET AFTR TRJFIT, USED BY BOTH CHNFIT
ALPH4	2ND CURVE FIT VALUE CH 4, SET AFTER TRJFIT, USED BY BOTH CHNFIT
A1	INIT GUESS 1 CH 1, SET AFTER TRJFIT, USED ALL CALLS TO CHNFIT
A2	INIT GUESS 1 CH 2, SET AFTER TRJFIT, USED ALL CALLS TO CHNFIT
A3	INIT GUESS 1 CH 3, SET AFTER TRJFIT, USED ALL CALLS TO CHNFIT
A4	INIT GUESS 1 CH 4, SET AFTER TRJFIT, USED ALL CALLS TO CHNFIT
BETA1	3RD CURVE FIT VALUE CH 1, SET AFTER TRJFIT, USED BY BOTH CHNFIT
BETA2	3RD CURVE FIT VALUE CH 2, SET AFTER TRJFIT, USED BY BOTH CHNFIT
BETA3	3RD CURVE FIT VALUE CH 3, SET AFTER TRJFIT, USED BY BOTH CHNFIT
BETA4	3RD CURVE FIT VALUE CH 4, SET AFTER TRJFIT, USED BY BOTH CHNFIT
BSEG	SEGMENT NUMBER STORED LOGICAL*1
CHNFIT	CHANNEL FIT SUBROUTINE
CHV	HOLD AREA FOR CHANNEL VALUES
CLNDST	CONSTANTS FOR LANDSAT
CPTIME	SYSTEM TIME ROUTINE
CROPTM	SUBROUTINE TO READ USER INFORMATION FILE
HBUF	BUFFER FOR CLASSIFIED PIXELS
HDR	HEADER
I	TEMP. INDEX
ICOR	RETURN PARAMETER FOR PIXEL WITHIN DEFINED VERTICES
ICPTIM	START TIME IN HUNDREDTH OF SECONDS
ICPTIM	INITIAL TIME
ICROP	NAME OF CROP
ICUT	MATRIX OF PIXELS CUT, INDEXED BY CHANNEL AND CROP
ICUTT	SUMM OF PIXELS CUT FOR EACH CROP
IDATA	BUFFER FOR RADIANCE VALUE TAPE
IDAY	2 CHARACTER DAY
IDUPDT	INDEX TO DUPLICATE DATE OR ZERO IF NO DUPLICATE DATE
IHOLD1	HOLD AREA FOR INTEGER
IHOLD4	HOLD AREA FOR LOGICAL*1 CHARACTERS
IMON	2 CHARACTER MONTH
IORDRC	ORDER TO PROCESS CHANNELS FOR CHNFIT
IPP	PIXEL POINTER
ISCREN	NUMBER OF PIXELS WITH ZERO RADIANCE VALUES
ISYM	SYMBOLS FOR CROPS
ITYPE	SWITCH USED FOR CALL TO RDFLES FOR HEADER OR RAD. VALUES
IYEAR	2 CHAR CURRENT YEAR
J	TEMP. INDEX
JSEGM	SEGMENT NUMBER AS DISPLAY CODE
K	TEMP. INDEX

VARIABLE DEFINITION

KA - KZ	SYMBOL FOR A CONTINUING WITH KB, KC, ... , KZ
KBLANK	ALPHANUMERIC BLANK
KCHAN	CURRENT CHANNEL, USED IN DISPLAY
KEQUAL	ALPHANUMERIC EQUAL
KSEGM	SEGMENT NUMBER AS COMPUTATION NUMBER
KUNCLS	SYMBOL FOR UNCLASSIFIED PIXELS
KURACQ	INDEX TO CURRENT ACQUISITION
KURCHN	INDEX TO CURRENT CHANNEL
KURCRP	INDEX TO CURRENT CROP
KURPIX	INDEX TO CURRENT PIXEL IN TRAINING FLD
KURPXL	INDEX TO CURRENT PIXEL IN TEST FLD
KZ	THROUGH KZ AS THE SYMBOL FOR Z
K1 - K4	SYMBOL FOR 1 CONTINUING WITH K2, K3, K4
L	TEMP. INDEX
LACQDT	ACQUISTION DATE AS LOGICAL*1
LANDST	ARRAY OF LANDSAT VALUES, ONE/ACQUISITION
LIMIT	MAXIMUM LIMIT FOR CALLS TO CHNFIT
LINENO	CURRENT LINE NUMBER FOR RADIANCE VALUES
LLINE	INDEX FOR LINE DO LOOP
LOC	TEMP LOCATION FOR UNPACKING INPUT DATA
M	TEMP. INDEX
MAXLNE	LARGEST LINE NUMBER IN CURRENT FLD
MAXPIX	LARGEST PIXEL NUMBER IN TRAINING FLD
MAXPXL	LARGEST PIXEL NUMBER IN TEST FLD
MINLNE	SMALLEST LINE NUMBER IN CURRENT FLD
MINPIX	SMALLEST PIXEL NUMBER IN TRAINING FLD
MINPXL	SMALLEST PIXEL NUMBER IN TEST FLD
MODE	WEIGHTING INDICATOR, ALWAY 1, NOT USED
NFILES	NUMBER OF ACQUISITION FILES
NMAX	MAXIMUM NUMBER OF CHOSEN PIXELS
NOACQ	NUMBER OF ACQUISITIONS
NOACQS	NUMBER OF ACQUISITIONS
NOCROP	NUMBER OF CROPS TO CHECK
NOKROP	NUMBER OF PIXELS THAT BELONG TO NONE OF THE CROPS
NOPIX	INDEX TO CURRENT PIXEL IN ORIGINAL PIXELS IN TRAIN FLD
NPTSTF	CURRENT NO OF POINTS IN TRAINING FLD
NTERMS	NUMBER OF DEGREES OF FREEDOM (4)
NVCPTM	ENDING TIME IN HUNDREDTHS OF SECONDS
NVCPTM	ENDING VIRTUAL TIME
NXTLNE	NOT USED
PELTA	8TH ARGUMENT IN CALLING SEQUENCE TO TRJFIT, NOT USED OTHERWISE
QCHI	CHI SQ VALUE RETURNED FROM TRAINING CALL TO TRJFIT FOR CH 1
QCOEFS	CH 1 1ST VALUE CURVE FIT APPROX, SET IN TRJFIT, USED BOTH CHNFIT
QDAT	CH 1 HOLD AREA FOR CHOSEN RADIANCE VALUES
QFTX	11TH PARAMETER IN CALL TO TRJFIT, NOT USED.
QFTY	11TH PARAMETER IN CALL TO TRJFIT, NOT USED.
QISQR	CH 1 CHI SQ VALUE FROM TRJFIT, USED IN BOTH CALLS TO CHNFIT
QMAX	SET EQUAL TO TCUT
QMEAN	CH 1 MEAN FOR ORIG. PIXELS, THEN SELECTED PIXELS
QMEANN	MEAN OF CHI SQ. VALUES AFTER TRJFIT AND CHNFIT FOR TRAINING FLD
QPT	SINGLE DIMENSION ARRAY FOR CHAN 1 VALUES, USED TO CALL SDEV
QR	TEMP LOCATION

VARIABLE DEFINITION

DTA	DELTA VALUE IN CALL TO CHNFIT
DTB	DELTA VALUE IN CALL TO CHNFIT
RDEXCT	SUBROUTINE TO READ DATA FROM RT&E DATA BASE
RDFLES	SUBROUTINE TO READ RADIANCE VALUES
RECT	SUBROUTINE TO DETERMINE IF PIXEL WITHIN DEFINED VERTICES
SDEV	SUBROUTINE TO CALCULATE MEAN AND STANDARD DEVIATION
SGA	SIGMA VALUE IN CALL TO CHNFIT
SGB	SIGMA VALUE IN CALL TO CHNFIT
SGM0	CH 1 ST. DEV. FOR ALL TEST PIXELS AND THEN CHOSEN PIXELS
SGMX	CH 2 ST. DEV. FOR ALL TEST PIXELS AND THEN CHOSEN PIXELS
SGMY	CH 3 ST. DEV. FOR ALL TEST PIXELS AND THEN CHOSEN PIXELS
SGMZ	CH 4 ST. DEV. FOR ALL TEST PIXELS AND THEN CHOSEN PIXELS
SGM1	CH 1 FTN OF SGM0, USED CALL TO TRJFIT, RECALC'D FOR TEST CHNFIT
SGM2	CH 2 FTN OF SGMX, USED CALL TO TRJFIT, RECALC'D FOR TEST CHNFIT
SGM3	CH 3 FTN OF SGMY, USED CALL TO TRJFIT, RECALC'D FOR TEST CHNFIT
SGM4	CH 4 FTN OF SGMZ, USED CALL TO TRJFIT, RECALC'D FOR TEST CHNFIT
SIGMA	9TH ARGUMENT IN CALLING SEQUENCE TO TRJFIT, NOT USED OTHERWISE
SN0	TEMP. VALUE IN CALCULATING CH 1 CONSTANT FOR CHNFIT
SNX	TEMP. VALUE IN CALCULATING CH 2 CONSTANT FOR CHNFIT
SNY	TEMP. VALUE IN CALCULATING CH 3 CONSTANT FOR CHNFIT
SNZ	TEMP. VALUE IN CALCULATING CH 4 CONSTANT FOR CHNFIT
SQ	ST.DEV. FOR CH 1 FOR CHOSEN PIXELS (SGM0), THEN CHI SQ(NOT USED)
SQRT	SQUARE ROOT FUNCTION
ST	TEMP LOC ST.DEV. FOR TRAIN FLD APPROX AFTER CHNFIT (ALL CHAN)
SX	ST.DEV. FOR CH 2 FOR CHOSEN PIXELS (SGMX), THEN CHI SQ(NOT USED)
SY	ST.DEV. FOR CH 3 FOR CHOSEN PIXELS (SGMY), THEN CHI SQ(NOT USED)
SZ	ST.DEV. FOR CH 4 FOR CHOSEN PIXELS (SGMZ), THEN CHI SQ(NOT USED)
TCUT	CONSTANT 6.23, RESET TO 7.036 IF DUPLICATE DATE
TFT01M	CH1 MEAN TRAIN FLD PIXEL T0'S (TRPT01) AFTER CHNFIT ON TRAIN FLD
TFT02M	CH2 MEAN TRAIN FLD PIXEL T0'S (TRPT02) AFTER CHNFIT ON TRAIN FLD
TFT03M	CH3 MEAN TRAIN FLD PIXEL T0'S (TRPT03) AFTER CHNFIT ON TRAIN FLD
TFT04M	CH4 MEAN TRAIN FLD PIXEL T0'S (TRPT04) AFTER CHNFIT ON TRAIN FLD
TODAY	TODAY'S DATE
TRJFIT	TRAJECTORY FIT SUBROUTINE
TRPT01	T0 VALUE FOR CH 1 FOR EACH PIXEL AFTER CHNFIT ON TRAIN FLD
TRPT02	T0 VALUE FOR CH 2 FOR EACH PIXEL AFTER CHNFIT ON TRAIN FLD
TRPT03	T0 VALUE FOR CH 3 FOR EACH PIXEL AFTER CHNFIT ON TRAIN FLD
TRPT04	T0 VALUE FOR CH 4 FOR EACH PIXEL AFTER CHNFIT ON TRAIN FLD
TRT0LW	LOWEST VALUE FOR TEST PIXEL T0 (TRAIN FLD T0 MEAN +-.25 OR .2
TRT0UP	HIGHEST VALUE FOR TEST PIXEL T0 (TRAIN FLD T0 MEAN +-.25 OR .2
TRT01M	TRAINING FIELD T0 MEAN FOR CH 1
TRT02M	TRAINING FIELD T0 MEAN FOR CH 2
TRT03M	TRAINING FIELD T0 MEAN FOR CH 3
TRT04M	TRAINING FIELD T0 MEAN FOR CH 4
T01	T0 VALUE RETURNED FROM TRJFIT FOR CH 1
T02	T0 VALUE RETURNED FROM TRJFIT FOR CH 2
T03	T0 VALUE RETURNED FROM TRJFIT FOR CH 3
T04	T0 VALUE RETURNED FROM TRJFIT FOR CH 4
T1	FTN ST. DEV CHOSEN PXLS(SGM0) OR CURRENT PXL, USED TO CALC SGM1
T1X	TEMP USED IN CALCULATING SGM1 FOR BOTH CHNFIT CALLS
T2	FTN ST. DEV CHOSEN PXLS(SGMX) OR CURRENT PXL, USED TO CALC SGM2
T2X	TEMP USED IN CALCULATING SGM2 FOR BOTH CHNFIT CALLS

VARIABLE DEFINITION

T3	FTN ST. DEV CHOSEN PXLS(SGMY) OR CURRENT PXL, USED TO CALC SGM3
T3X	TEMP USED IN CALCULATING SGM3 FOR BOTH CHNFIT CALLS
T4	FTN ST. DEV CHOSEN PXLS(SGMZ) OR CURRENT PXL, USED TO CALC SGM4
T4X	TEMP USED IN CALCULATING SGM4 FOR BOTH CHNFIT CALLS
WEIGHT	WEIGHTING VALUES (1./SIGMA**2)
XCH	HOLD AREA USED IN UNPACKING RADIANCE VALUES
XCHI	CHI SQ VALUE RETURNED FROM TRAINING CALL TO TRJFIT FOR CH 2
XCHIN	CONTROL VALUE FOR CALLS TO TRJFIT AND CHNFIT
XCOEFS	CH 2 1ST VALUE CURVE FIT APPROX, SET IN TRJFIT, USED BOTH CHNFI
XDAT	CH 2 HOLD AREA FOR CHOSEN PIXEL
XDAY	ARRAY OF ACQUISITION DAYS OF YEAR / 100.
XDIF	TEMP
XDIFTM	DIFFERENCE IN STARTING AND ENDING TIME
XDIFVT	DIFFERENCE IN STARTING AND ENDING VIRTUAL TIMES
XFD	USER SPECIFIED X COORDIANTES OF FIELDS
XFIT	11TH PARAMETER IN CHNFIT, NOT USED OTHERWISE
XH1	CH1 HIGH LIMIT FOR TRAIN PIXELS, MEAN OF ORIG PIXELS + 3 ST DEV
XH2	CH2 HIGH LIMIT FOR TRAIN PIXELS, MEAN OF ORIG PIXELS + 3 ST DEV
XH3	CH3 HIGH LIMIT FOR TRAIN PIXELS, MEAN OF ORIG PIXELS + 3 ST DEV
XH4	CH4 HIGH LIMIT FOR TRAIN PIXELS, MEAN OF ORIG PIXELS + 3 ST DEV
XISQR	CH 2 CHI SQ. VALUE FROM TRJFIT, USED IN BOTH CALLS TO CHNFIT
XLAMDA	TOLERANCE VALUE USED IN CALLS TO TRJFIT AND CHNFIT
XL1	CH1 LOW LIMIT FOR TRAIN PIXELS, MEAN OF ORIG PIXELS - 3 ST DEV
XL2	CH2 LOW LIMIT FOR TRAIN PIXELS, MEAN OF ORIG PIXELS - 3 ST DEV
XL3	CH3 LOW LIMIT FOR TRAIN PIXELS, MEAN OF ORIG PIXELS - 3 ST DEV
XL4	CH4 LOW LIMIT FOR TRAIN PIXELS, MEAN OF ORIG PIXELS - 3 ST DEV
XMAX	SET EQUAL TO TCUT
XMEAN	CH 2 MEAN FOR ORIG. PIXELS, THEN SELECTED PIXELS
XMEANN	MEAN OF CHI SQ. VALUES AFTER TRJFIT AND CHNFIT FOR TRAINING FLD
XPT	SINGLE DIM ARRAY FOR CH 2 RADIANCE VALUES, USED TO CALL SDEV
XR	TEMP
XTJ	TEMP HOLD AREA FOR FLOAT PT DATE VALUE
XTOL	MINIMUM TOLERANCE AFTER CALL TO CHNFIT
YCHI	CHI SQ VALUE RETURNED FROM TRAINING CALL TO TRJFIT FOR CH 3
YCOEFS	CH 3 1ST. VALUE CURVE FIT APPROX, SET IN TRJFIT, USED BOTH CHNFIT
YDAT	CH 3 HOLD AREA FOR CHOSEN PIXEL
YFD	USER SPECIFIED Y COORDINATES OF FIELDS
YFT	11TH PARAMETER IN CALLS TO CHNFIT, NOT USED OTHERWISE
YISQR	CH 3 CHI SQ. VALUE FROM TRJFIT, USED IN BOTH CALLS TO CHNFIT
YMAX	SET EQUAL TO TCUT
YMEAN	CH 3 MEAN FOR ORIG. PIXELS, THEN SELECTED PIXELS
YMEANN	MEAN OF CHI SQ. VALUES AFTER TRJFIT AND CHNFIT FOR TRAINING FLD
YPT	SINGLE DIM ARRAY FOR CH 3 RADIANCE VALUES, USED TO CALL SDEV
YR	TEMP
ZA	TEMP APPROX FIT VALUE CHNFIT IN TRAIN FLD, RESET IN CHNFIT TEST
ZB	TEMP APPROX FIT VALUE CHNFIT IN TRAIN FLD, RESET IN CHNFIT TEST
ZCHI	CHI SQ VALUE RETURNED FROM TRAINING CALL TO TRJFIT FOR CH 4
ZCOEFS	CH 4 1ST VALUE CURVE FIT APPROX, SET IN TRJFIT, USED BOTH CHNFIT
ZDAT	CH 4 HOLD AREA FOR CHOSEN PIXEL
ZFL	LINE NUMBER USED IN CALL TO RECT
ZFP	PIXEL NUMBER USED IN CALL TO RECT

VARIABLE DEFINITION

ZICOP	CH 4 CHI SQ. VALUE FROM TRJFIT, USED IN BOTH CALLS TO CHNFIT
ZMAX	SET EQUAL TO TCUT
ZMEAN	CH 4 MEAN FOR ORIG. PIXELS, THEN SELECTED PIXELS
ZMEANN	MEAN OF CHI SQ. VALUES AFTER TRJFIT AND CHNFIT FOR TRAINING FLD
ZPT	SINGLE DIM ARRAY FOR CH 4 RADIANCE VALUES, USED TO CALL SDEV
ZQ	INITIAL USER GUESS FOR CH 1 CURVE
ZR	TEMP LOCATION
ZX	INITIAL USER GUESS FOR CH 2 CURVE
ZY	INITIAL USER GUESS FOR CH 3 CURVE
ZZ	INITAIL USER GUESS FOR CH 4 CURVE

APPENDIX C

```
    &CONTROL OFF
*
* CLASFYT EXEC
* ------------
*
*
* HISTORY
* -------
*
*    CAROLINE HORTON     LEMSCO     11/01/80      ORIGINAL EXEC
*    MARY A TOMPKINS     LEMSCO     01/29/81      REDO
*
* PURPOSE
* -------
*
*    THIS EXEC EXECUTES A FORTRAN PROGRAM (LCTINF) WHICH ACCESSES
*    THE LARS RT&E DATA BASE FOR ACQUISITION REQUESTED. LISTINF WRITES
*    AN EXEC LCTINFO WHICH CREATES DATA FILES FOR EACH ACQ. AFTER
*    EXCUTION OF THE ABOVE THE CLASFYS PROGRAM IS LOADED.
*
*    ARGUMENTS TO THE EXEC ARE AS FOLLOWS:
*        ARGUMENT NO.          DESCRIPTION
*             &1               SEGMENT NUMBER
*             &2               ACQ. NUMBER
*             &3               ACQ. NUMBER
*             &4               ACQ. NUMBER
*             &5               ACQ. NUMBER
*             &6               ACQ. NUMBER
*     5 ACQ. NUMBER ARE REQUIRED.
*
*
*    FILE DEFINITION DESCRIPTION FOR ALL FILES USED IN THESE PROGRAMS
*    AND EXECS ARE AS FOLLOWS:
*        UNIT                  DESCRIPTION
*          2                   LISTINFO EXEC
*          3                   TERMINAL:READ
*          4                   LARS SEGALL ROUTINE
*          5                   TERMINAL:WRITE LARS ERROR MESSAGES
*          6                   PRINTER FILE STORED IN FILE &1 LISTT
*          7                   INPUT FILE-#ACQ.LANDSAT# SUN ANGLES
*          8                   COEFFICIENTS  STORED IN FILE &1 CLASS
*          9                   USED IN HARDWAR SYSTEM GROUND TRUTH
*         10                   USED IN HARDWAR SYSTEM CLASS/CLUSTER
*         11                   &1 FILE1 D -- RADIANCE FILE1
*         12                   &1 FILE2 D -- RADIANCE FILE2
*         13                   &1 FILE3 D -- RADIANCE FILE3
*         14                   &1 FILE4 D -- RADIANCE FILE4
*         15                   &1 FILE5 D -- RADIANCE FILE5
*         16-18                USED IN HARDWAR SYSTEM
*         20                   DOCUMENTATION -- STORED IN CTDOC FILE
*         21                   A USERT -- USER CONTROL PARAMETER FILE
*         22                   GT FILE RECALL FILE
*         23                   CLASS FILE RECALL FILE
*         24-29                HARDWAR SYSTEM
*         30                   REREAD UNIT
*
* EXCEPTIONS
* ----------
*
*    THE FOLLOWING ERRORS CAUSE PROGRAM TERMINATION:
*       1. NO TEMPORARY DISK AVAILABLE.
*       2. INSUFFICIENT PARAMETERS INPUT TO PROGRAM
*       3. ERROR IN ACCESSING LARS DATA BASE
*
*
* PROCEDURE
* ---------
*
*
* ASSIGN A TEMP DISK .SPECIFY LIBRARIES. ASSIGN PRINTER
*
*
*
    &SPACE 3
    &TYPE CLASFYT &1 &2 &3 &4 &5 &6
    TAG DEV PRINTER HOUSTON
    SPOOL PRINTER CONT HOLD TO USCS
    GLOBAL TXTLIB CMSLIB FORTHOD2
```

```
     CP QUERY VIRTUAL 192
     &IF &RETCODE NE 0 GETDISK TEMP 2M CLEAR
     &IF &RETCODE NE 0 &TYPE NO TEMP DISK ACCESSED.
     &IF &RETCODE NE 0 &EXIT 1
*
*
* GET LARS DISK WHICH CONTAINS RT&E DATA BASE
     GETDISK JSCDISK 19A E
*
*
* FILEDEF TERMINAL AND FILEDEF EXEC FILE WRITTEN DURING RUN.
*
     FILEDEF 3 TERM (PERM
     FILEDEF 5 TERM (PERM
     FILEDEF FT02F001 DISK LCTINFO EXEC D (LRECL 80 BLKSIZE 80 PERM
     FILEDEF FT07F001 DISK LANDSUN FILE D (LRECL 80 BLKSIZE 80 PERM
     FILEDEF FT20F001 DISK CTDOC FILE (LRECL 80 BLKSIZE 80 PERM
*
*
* CHECK FOR ACCEPTABLE PARAMETER COUNT
*
     &IF &INDEX EQ 6 &GOTO -TRUE
     &TYPE TOO FEW - TOO MANY INPUTS
     &EXIT 2
*
-TRUE     &ACQCNT = &INDEX - 1
*
*
* IF LENGTH OF &1 (SEGMENT NUMBER) < 4 CONCATENATE 0.
*
-LOP &SEGLNG = &LENGTH &1
     &IF &SEGLNG EQ 4 &SKIP 3
     &1 = &CONCAT 0 &1
     &SEGLNG = &SEGLNG + 1
     &GOTO -LOP
*
*
* STACK ALL EXEC INPUT TO ALLOW LCTINF TO ACQUIRE TAPE NUMBERS
* FILE NUMBERS, AND SATELLITE NUMBERS, FOR EACH ACQ.
*
     &STACK &ACQCNT
     &COUNT = 0
     &LOOP 2 &INDEX
     &COUNT = &COUNT + 1
     &STACK &&COUNT
*
*
* LOAD FORTRAN PROGRAM WHICH WILL ACCESS LARS RT&E DATA BASE.
* PROGRAM WILL WRITE LCTINFO EXEC D. FILES FOR EACH ACQ.WILL BE
* TRANSFERRED FROM TAPE TO DISK IN LCTINFO EXEC.FILE DEF FOR FILES
* WILL BE DONE.
*
     LOAD LCTINF SEGALLHX RTEERRHX (NOMAP CLEAR START
     REL E(DFT
     EXEC LCTINFO D
     &READ VARS &ERR
     &IF &ERR EQ 1 EXIT 3
*
*
* FILE DEF FOR USER DEFINED CONTROL FILE AND OUTPUT FILE.
*
     FILEDEF 6 DISK &1 LISTT (PERM
     FILEDEF 8 DISK &1 CLASS (LRECL 3060 BLKSIZE 3060 RECFM U PERM
     FILEDEF FT21F001 DISK &1 USERT A1 (BLKSIZE 80 PERM
*
*
     LOAD CLASFYT (CLEAR START NOMAP
*
*
* PRINT REPORT
*
     PRINT CTDOC FILE
     PRINT &1 LISTT(CC
     SPOOL PRINTER CLOSE
     &EXIT
&END
```

C-2

```
     &CONTROL OFF
*
* END EXEC
* --------
*
*
* PURPOSE
* -------
*    THIS EXEC WILL CLOSE CONSOLE FILE AND PRINT THE FILE
*
*
* PROCEDURE
*
     SPOOL CONSOLE STOP CLOSE
     &EXIT
&END
```

```
     &CONTROL OFF
*
*
* START EXEC
* ----------
*
*
*
* PURPOSE
* -------
*    THIS EXEC WILL ALLOW THE USER TO SPOOL ALL RESPONCES TO THE
*    CONSOLE.THIS IS TO BE USED WITH END EXEC WHICH WILL PRINT THE FILE.
*
*
* PROCEDURE
* ---------
*
     TAG DEV CONS HOUSTON
    .SPOOL CONS START NOHOLD TO RSCS
     &EXIT
&END
```

REQUESTED OPTIONS: NOTERM

OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

```
C     PROGRAM LCTINF                                                    LCT00010
C                          GET INFO FROM LARS/WRITE EXEC CLSYFT PROGRAM LCT00020
C     ------------------------------------------------------------      LCT00030
C                                                                       LCT00040
C HISTORY                                                               LCT00050
C -------                                                               LCT00060
C     M A TOMPKINS     LEMSCO     01/27/81      ORIGINAL CODE          LCT00070
C                                                                       LCT00080
C METHOD                                                                LCT00090
C ------                                                                LCT00100
C                                                                       LCT00110
C     READ NUMBER OF ACQS.,SEGMENT NUMBER,AND ACQ. NUMBERS.ACCESS THE   LCT00120
C     LARS RT&E DATA BASE. IF SUCESSFUL WRITE LCTINFO EXEC TO MOUNT     LCT00130
C     TAPES AND TRANSFER DATA TO DISC FILES. FILEDEF ALL NEW DISK FILES.LCT00140
C     WRITE INPUT FILE CONSISTING OF  SATELITE NUMBER FOR               LCT00150
C     EACH ACQUISITION. WRITE SEGMENT NUMBER AND ACQUISITION            LCT00160
C     UMBERS FOR DOCUMENTARY PURPOSES.                                  LCT00170
C                                                                       LCT00180
C MACHINE DEPENDENT CODE                                                LCT00190
C ----------------------                                                LCT00200
C                                                                       LCT00210
C     NONE.                                                             LCT00220
C                                                                       LCT00230
C EXTERNAL REFERENCES                                                   LCT00240
C -------------------                                                   LCT00250
C                                                                       LCT00260
C     SEGALL     LARS ROUTINE TO ACQUIRE INFO FROM RT&E DATA BASE      LCT00270
C     TSRTHS     TAGSORT USING HIBBARD'S SHELL SORT                    LCT00280
C     RTEERR     LARS ERROR ROUTINE                                    LCT00290
C                                                                       LCT00300
C EXCEPTIONS                                                            LCT00310
C ----------                                                            LCT00320
C                                                                       LCT00330
C     IF IERR <> 0 OR 4 WRITE ERROR MESSAGE AND WRITE EXEC              LCT00340
C     TO TERMINATE PROGRAM.                                             LCT00350
C                                                                       LCT00360
C LOCAL DECLARATIONS                                                    LCT00370
C ------------------                                                    LCT00380
C                                                                       LCT00390
ISN 0002      INTEGER INDEX(80,112)                                     LCT00400
C                                  INFO ON EACH ACQ REQUESTED FORM DATA BASELCT00410
ISN 0003      INTEGER LSEGNO                                            LCT00420
C                                  LANDSAT SEGMENT NUMBER               LCT00430
ISN 0004      INTEGER NACQRQ                                            LCT00440
C                                  NUMBER OF ACQUISITION REQUESTED      LCT00450
ISN 0005      INTEGER LSEGTP(64)                                        LCT00460
C                                  TEMP FOR TESTING OF LSEGAQ           LCT00470
ISN 0006      INTEGER NUMACQ                                            LCT00480
C                                  NO. OF ACQ REQUESTED:  NO. OF ACQ. FOUND.LCT00490
ISN 0007      INTEGER LSEGAQ(64)                                        LCT00500
C                                  LANDSAT SEG. ACQ. DATE               LCT00510
ISN 0008      INTEGER IERR                                              LCT00520
C                                  RT&E DATA BASE ERROR CODE            LCT00530
ISN 0009      INTEGER LACQRQ(4,10)                                      LCT00540
C                                  LANDSAT INFO REQUESTED BY USER       LCT00550
ISN 0010      INTEGER NACQRQ                                            LCT00560
C                                  NUMBER OF ACQ. REQUESTED             LCT00570
ISN 0011      INTEGER INTAG(10)                                         LCT00580
C                                  ORDER TAGS (INDEX)                   LCT00590
ISN 0012      INTEGER LSTAPE                                            LCT00600
C                                  LAST TAPE NUMBER                     LCT00610
ISN 0013      INTEGER NFLSKP                                            LCT00620
C                                  NUMBER OF FILES TO SKIP              LCT00630
ISN 0014      INTEGER IUNIT                                             LCT00640
C                                  UNIT NUMBER FOR FILE DEFINITION      LCT00650
C                                                                       LCT00660
C                                                                       LCT00670
C                                                                       LCT00680
C                                                                       LCT00690
C                                                                       LCT00700
C                                                                       LCT00710
C                                                                       LCT00720
C                                                                       LCT00730
```

```
                C PROCEDURE                                                          LCT00740
                C ---------                                                          LCT00750
                C                                                                    LCT00760
                C                                                                    LCT00770
                C READ FROM STACK THE NUMBER OF ACQ NEEDED,SEGMENT NUMBER, AND       LCT00780
                C SPECIFIC ARQUISITIONS SOUGHT.                                      LCT00790
                C                                                                    LCT00800
                C                                                                    LCT00810
                C START WRITING LCTINFO EXEC.                                        LCT00820
                C                                                                    LCT00830
ISN 0015                WRITE(2,90)                                                  LCT00840
ISN 0016              90 FORMAT(' &CONTROL OFF')                                     LCT00850
                C                                                                    LCT00860
ISN 0017                READ(3,100)NUMACQ                                            LCT00870
ISN 0018              100 FORMAT(I1)                                                 LCT00880
                C                                                                    LCT00890
ISN 0019                READ(3,110)LSEGNO                                            LCT00900
ISN 0020              110 FORMAT(I4)                                                 LCT00910
                C                                                                    LCT00920
ISN 0021                DO 105 I = 1,NUMACQ                                          LCT00930
ISN 0022                   READ(3,120)LSEGAQ(I)                                      LCT00940
ISN 0023              105 CONTINUE                                                   LCT00950
                C                                                                    LCT00960
ISN 0024              120 FORMAT(I5)                                                 LCT00970
                C                                                                    LCT00980
                C                                                                    LCT00990
                C WHEN CALLING LARS SEGALL ROUTINE THE ARRAY OF ACQ MUST NOT         LCT01000
                C CONTAIN ANY DUPLICATE ACQ NUMBERS. THE LSEGTP ARRAY CONSIST        LCT01010
                C OF UNIQUE ACQ NUMBERS.NACQRQ IS THE COUNT OF UNIQUE NUMBERS.       LCT01020
                C                                                                    LCT01030
ISN 0025                NACQRQ = 0                                                   LCT01040
ISN 0026                DO 140 K = 1,NUMACQ                                          LCT01050
ISN 0027                   DO 130 J = 1,NUMACQ                                       LCT01060
ISN 0028                      IF(LSEGAQ(K).EQ.LSEGTP(J)) GO TO 140                   LCT01070
ISN 0030              130     CONTINUE                                               LCT01080
ISN 0031                      NACQRQ = NACQRQ + 1                                    LCT01090
ISN 0032                      LSEGTP(NACQRQ) = LSEGAQ(K)                             LCT01100
ISN 0033              140 CONTINUE                                                   LCT01110
                C                                                                    LCT01120
                C                                                                    LCT01130
                C CALL LARS SEGALL ROUTINE FOR  LL INFO ON THE REQUESTED ACQ.        LCT01140
                C BECAUSE OF THE POSSIBILITY O  DUPLICATE INFO ON SOME SEGMENTS      LCT01150
                C AND THE POSSIBILITY THAT THE ORDER OF THE INFO RETURNED MAY BE     LCT01160
                C DIFFERENT FROM REQUESTED SEG ORDER A SEARCH IS REQUIRED TO ORDER    LCT01170
                C AND DELETE IF ANY DUPLICATE INFO.                                  LCT01180
                C                                                                    LCT01190
ISN 0034                CALL SEGALL(LSEGNO,NACQRQ,LSEGTP,INDEX,IERR,4,'E')           LCT01200
                C                                                                    LCT01210
                C                                                                    LCT01220
                C CHECK IERR MESSAGE IF <> 0 OR 4 CALL LARS RTEERR ROUTINE FOR       LCT01230
                C ERROR MESSAGE.                                                     LCT01240
                C                                                                    LCT01250
ISN 0035                IF(IERR.EQ.0.OR.IERR.EQ.4) GO TO 300                         LCT01260
ISN 0037                CALL RTEERR(IERR,5)                                          LCT01270
ISN 0038                WRITE(2,250)                                                 LCT01280
ISN 0039              250 FORMAT(' &STACK 1',/,' &EXIT')                             LCT01290
ISN 0040                GO TO 900                                                    LCT01300
                C                                                                    LCT01310
ISN 0041              300 WRITE(2,310)                                               LCT01320
ISN 0042              310 FORMAT(' &STACK 0')                                        LCT01330
                C                                                                    LCT01340
                C                                                                    LCT01350
                C SEARCH INFO RETURNED FROM DATA BASE. STORE INFO INTO LACQRQ        LCT01360
                C ARRAY .                                                            LCT01370
                C                                                                    LCT01380
ISN 0043                DO 450 J = 1,NUMACQ                                          LCT01390
ISN 0044                   DO 370 I = 1,NACQRQ                                       LCT01400
ISN 0045                      ITEM = I                                               LCT01410
ISN 0046                      IF(INDEX(12,I).EQ.LSEGAQ(J)) GO TO 400                 LCT01420
ISN 0048              370     CONTINUE                                               LCT01430
ISN 0049              400     LACQRQ(1,J) = INDEX(1,ITEM)                            LCT01440
ISN 0050                      LACQRQ(2,J) = INDEX(2,ITEM)                            LCT01450
ISN 0051                      LACQRQ(3,J) = INDEX(57,ITEM)                           LCT01460
ISN 0052                      LACQRQ(4,J) = INDEX(1,ITEM)*1000 + INDEX(2,ITEM)       LCT01470
ISN 0053              450 CONTINUE                                                   LCT01480
                C                                                                    LCT01490
                C                                                                    LCT01500
                C SORT INTAG ACCORDING TO SORT KEY MADE BY CONCATNATING TAPE#FILE#   LCT01510
```

```
                C
ISN 0054            CALL TSRTHS(INTAG, LACQRQ,4,NUMACQ,4,'A')                    LCT01520
                C                                                                LCT01530
                C                                                                LCT01540
                C WRITE PORTION OF EXEC TO TRANSFER TAPE FILES TO DATA FILES     LCT01550
                C IF AN ACQ IS REUSED THE DISK FILE IS DUP.                      LCT01560
                C                                                                LCT01570
                C                                                                LCT01580
ISN 0055            LSTAPE = 0                                                   LCT01590
ISN 0056            DO 600 I = 1,NUMACQ                                          LCT01600
ISN 0057              IF(LSTAPE.EQ.LACQRQ(1,INTAG(I)))GO TO 520                  LCT01610
                C                                                                LCT01620
                C                                                                LCT01630
                C NO TAPE IS MOUNTED OR A NEW ONE IS TO BE MOUNTED               LCT01640
                C                                                                LCT01650
ISN 0059              WRITE(2,500)LACQRQ(1,INTAG(I))                             LCT01660
ISN 0060          500 FORMAT(' TAPMOUNT ',I4,' TAP1 RO 1600')                    LCT01670
ISN 0061              WRITE(2,510)                                               LCT01680
ISN 0062          510 FORMAT(' TAPE REW(TAP1')                                   LCT01690
ISN 0063              NFLSKP = LACQRQ(2,INTAG(I))-1                              LCT01700
                C                                                                LCT01710
                C                                                                LCT01720
                C TAPE IS MOUNTED CONTINUE WRITING EXEC.                         LCT01730
                C                                                                LCT01740
ISN 0064          520 IF(NFLSKP.GT.0)WRITE(2,530)NFLSKP                          LCT01750
ISN 0066          530 FORMAT(' TAPE FSF ',I4)                                    LCT01760
ISN 0067              IF(NFLSKP.GE.0)WRITE(2,540)                                LCT01770
ISN 0069          540 FORMAT(' FILEDEF INMOVE TAP1 (BLOCK 3060 RECFM U PERM')    LCT01780
ISN 0070              IF(NFLSKP.LT.0)WRITE(2,550)LSEGNO,INTAG(I-1)               LCT01790
ISN 0072          550 FORMAT(' FILEDEF INMOVE DISK ',I5,' FILE',I1,              LCT01800
                     &       ' D(LRECL 3060 BLOCK 3060 RECFM U PERM')          LCT01810
ISN 0073              WRITE(2,560)LSEGNO,INTAG(I)                                LCT01820
ISN 0074          560 FORMAT(' FILEDEF OUTMOVE DISK ',I5,' FILE',I1,             LCT01830
                     &       ' D(LRECL 3060 BLOCK 3060 RECFM U PERM')          LCT01840
ISN 0075              WRITE(2,580)                                               LCT01850
ISN 0076          580 FORMAT(' MOVEFILE')                                        LCT01860
ISN 0077              LSTAPE = LACQRQ(1,INTAG(I))                                LCT01870
ISN 0078              NFLSKP = LACQRQ(2,INTAG(I+1))-(LACQRQ(2,INTAG(I))+1)       LCT01880
ISN 0079          600 CONTINUE                                                   LCT01890
                C                                                                LCT01900
                C                                                                LCT01910
                C WRITE FILEDEF FOR THE ABOVE FILES.                             LCT01920
                C                                                                LCT01930
ISN 0080            DO 620 I = 1,NUMACQ                                          LCT01940
ISN 0081              IUNIT = INTAG(I) + 10                                      LCT01950
ISN 0082              WRITE(2,610)IUNIT,LSEGNO,INTAG(I)                          LCT01960
ISN 0083          610 FORMAT(' FILEDEF FT',I2,'F001 DISK ',I5,' FILE',          LCT01970
                     &       I1,' D(LRECL 3060 BLOCK 3060 RECFM U PERM')       LCT01980
ISN 0084          620 CONTINUE                                                   LCT01990
                C                                                                LCT02000
                C                                                                LCT02010
                C DETACH TAPE DRIVE                                              LCT02020
                C                                                                LCT02030
ISN 0085            WRITE(2,630)                                                 LCT02040
ISN 0086          630 FORMAT(' DETACH 181')                                      LCT02050
                C                                                                LCT02060
                C                                                                LCT02070
                C WRITE  SEG. NO.,ACQS.,AND SAT. NUMBER TO PROGRAM INPUT FILE.   LCT02080
                C                                                                LCT02090
ISN 0087            WRITE(7,710)LSEGNO                                           LCT02100
ISN 0088          710 FORMAT(I4)                                                 LCT02110
ISN 0089              WRITE(7,720)(LSEGAQ(I),I = 1,5)                            LCT02120
ISN 0090          720 FORMAT(5I7)                                                LCT02130
ISN 0091              WRITE(7,700)(LACQRQ(3,I),I = 1,NUMACQ)                     LCT02140
ISN 0092          700 FORMAT(10I4)                                               LCT02150
                C                                                                LCT02160
                C                                                                LCT02170
                C FOR DOCUMENTARY PURPOSES WRITE SEGMENT NUMBER, ACQUISITION     LCT02180
                C NUMBER, AND LANDSAT NUMBER REQUESTED BY USER.                  LCT02190
                C                                                                LCT02200
ISN 0093            WRITE(20,750)                                                LCT02210
ISN 0094          750 FORMAT(' PROGRAM INPUTS:')                                 LCT02220
ISN 0095              WRITE(20,800)LSEGNO                                        LCT02230
ISN 0096          800 FORMAT(' SEGMENT NUMBER:',I5)                              LCT02240
ISN 0097              WRITE(20,810)(LSEGAQ(I),I = 1,NUMACQ)                      LCT02250
ISN 0098          810 FORMAT(' ACQUISITIONS:',8I10)                              LCT02260
ISN 0099              WRITE(20,820)(LACQRQ(3,J),J = 1,NUMACQ)                    LCT02270
ISN 0100          820 FORMAT(' LANDSAT NUMBERS',5I3)                             LCT02280
ISN 0101          900 STOP                                                       LCT02290
```

ISN 0102 END LCT02300

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

SYMBOL	INTERNAL STATEMENT NUMBERS																	
I	0021	0022	0044	0045	0046	0056	0057	0059	0063	0070	0073	0077	0078	0078	0080	0081	0082	0089	0089
	0089	0091	0091	0091	0097	0097	0097												
J	0027	0028	0043	0046	0049	0050	0051	0052	0099	0099	0099								
K	0026	0028	0032																
O	0067																		
IERR	0008	0034	0035	0035	0037														
ITEM	0045	0049	0050	0051	0052	0052													
INDEX	0002	0034	0046	0049	0050	0051	0052	0052											
INTAG	0011	0054	0057	0059	0063	0070	0073	0077	0078	0078	0081	0082							
IUNIT	0014	0081	0082																
LACQRQ	0009	0049	0050	0051	0052	0054	0057	0059	0063	0077	0078	0078	0091	0099					
LSEGAQ	0007	0022	0028	0032	0046	0089	0097												
LSEGNO	0003	0019	0034	0070	0073	0082	0087	0095											
LSEGTP	0005	0028	0032	0034															
LSTAPE	0012	0055	0057	0077															
NACQRQ	0004	0010	0025	0031	0031	0032	0034	0044											
NFLSKP	0013	0063	0064	0064	0067	0070	0078												
NUMACQ	0006	0017	0021	0026	0027	0043	0054	0056	0080	0091	0097	0099							
RTEERR	0037																		
SEGALL	0034																		
TSRTHS	0054																		

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

LABEL	DEFINED	REFERENCES
90	0016	0015
100	0018	0017
105	0023	0021
110	0020	0019
120	0024	0022
130	0030	0027
140	0033	0026 0028
250	0039	0038
300	0041	0035
310	0042	0041
370	0048	0044
400	0049	0046
450	0053	0043
500	0060	0059
510	0062	0061
520	0064	0057
530	0066	0064
540	0069	0067
550	0072	0070
560	0074	0073
580	0076	0075
600	0079	0056
610	0083	0082
620	0084	0080
630	0086	0085
700	0092	0091
710	0088	0087
720	0090	0089
750	0094	0093
800	0096	0095
810	0098	0097
820	0100	0099
900	0101	0040

/ MAIN / SIZE OF PROGRAM 009?40 HEXADECIMAL BYTES

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
I	SF	I*4	000328	J	SF	I*4	00032C	K	SF	I*4	000330	O		R*4	000334
IERR	SFA	I*4	000338	ITEM	SF	I*4	00033C	INDEX	SFA	I*4	000620	INTAG	SFA	I*4	000358
IUNIT	SF	I*4	000340	IBCOM#	F XF	I*4	000000	LACQRQ	SFA	I*4	000380	LSEGAQ	SF	I*4	000420
LSEGNO	SFA	I*4	000344	LSEGTP	SFA	I*4	000520	LSTAPE	S	I*4	000348	NACQRQ	SFA	I*4	00034C
NFLSKP	SF	I*4	000350	NUMACQ	SFA	I*4	000354	RTEERR	SF XF		000000	SEGALL	SF XF		000000
TSPTHS	SF XF		000000												

SOURCE STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
105	23	0092B2	130	30	0092F4	140	33	00930C	300	41	009360
370	48	009392	400	49	00939C	450	53	0093F6	520	64	00948C
600	79	00959E	620	84	0095EE	900	101	009710			

COMPILER GENERATED LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
100000	1	009230	100001	22	00928E	100002	24	0092BC	100003	27	0092C8
100004	28	0092CA	100005	31	0092EE	100006	34	00931E	100001	36	009332
100007	37	00933E	100008	44	009376	100009	45	009378	100011	54	009406
100012	57	00941A	100013	59	009434	100014	65	009496	100015	67	009484
100016	68	0094D0	100017	70	0094E4	100018	71	0094EE	100019	73	00951A
100020	80	0095A8	100021	81	0095AA	100022	85	0095F8			

FORMAT STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
90	16	000028	100	18	000039	110	20	00003D	120	24	000041
250	39	000045	310	42	000058	500	60	000068	510	62	000087
530	66	000099	540	69	0000A9	550	72	0000DA	560	74	000125
580	76	000171	610	83	00017E	630	86	0001CD	710	88	0001DC
720	90	0001E0	700	92	0001E6	750	94	0001EC	800	96	000200
810	98	000216	820	100	00022C						

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)

*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

STATISTICS SOURCE STATEMENTS = 101, PROGRAM SIZE = 38720, SUBPROGRAM NAME = MAIN

STATISTICS NO DIAGNOSTICS GENERATED

****** END OF COMPILATION ****** 276K BYTES OF CORE NOT USED

REQUESTED OPTIONS: NOTERM

OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

```
ISN 0002            SUBROUTINE TSPTHS(                                          TSR00010
                C                           TAGSORT USING HIBBARD'S SHELL SORT  TSR00020
                  O INTAG,                                                      TSR00030
                C                           INTGER ARRAY OF TAGS (POINTERS) SORTED BY  TSR00040
                C                           INTEGER KEY                         TSR00050
                                                                                TSR00060
                  I KRECRD,                                                     TSR00070
                C                           ARRAY OF INTEGER RECORDS TO SORT    TSR00080
                  I NWIREC,                                                     TSR00090
                C                           NUMBER OF WORDS IN ONE RECORD       TSR00100
                  I NRECS,                                                      TSR00110
                C                           NUMBER OF RECORDS (ALSO NUMBER OF TAGS)  TSR00120
                  I KEYLOC,                                                     TSR00130
                C                           LOCATION WITHIN RECORD OF SORT KEY  TSR00140
                  I KSORDR)                                                     TSR00150
                C                           KEY SORT ORDER 'A' FOR ACENDING, 'D' FOR  TSR00160
                C                           DECENDING                           TSR00170
                C     ------------------------------------------------------    TSR00180
                C                                                               TSR00190
                C HISTORY                                                       TSR00200
                C -------                                                       TSR00210
                C                                                               TSP10220
                C                                                               TSR00230
                C     M A TOMPKINS      LEMSCO  01/27/81       ORIGINAL CODE    TSR00240
                C                                                               TSP00250
                C                                                               TSP00260
                C METHOD                                                        TSR00270
                C -------                                                       TSR00280
                C                                                               TSR00290
                C     CHECK FOR VALID ARGUMENTS.                                TSR00300
                C     SORT TAGS IN SPECIFIED KEY SEQUENCE USING HIBBARD'S IMPROVED  TSR00310
                C     SHELLSORT (CACM ALGORITHM # 201)                          TSR00320
                C                                                               TSR00330
                C                                                               TSR00340
                C MACHINE DEPENDENT CODE                                        TSR00350
                C ----------------------                                        TSP00360
                C                                                               TSR00370
                C     NONE                                                      TSP00380
                C                                                               TSR00390
                C                                                               TSP00400
                C EXTERNAL REFERENCES                                           TSR00410
                C -------------------                                           TSP00420
                C                                                               TSP00430
                C     INTEGER IVALUE        ALLOWS THE USE OF LITERALS          TSP00440
                C                                                               TSR00450
                C                                                               TSP00460
                C EXCEPTIONS                                                    TSP00470
                C ----------                                                    TSP00480
                C                                                               TSR00490
                C     THE FOLLOWING INVALID ARGUMENT VALUES PREVENT SORTING AND CAUSE  TSR00500
                C     INTAG(1) TO BE SET TO 0:                                  TSP00510
                C        NWIREC < 1                                             TSR00520
                C        NRECS < 1                                              TSP00530
                C        SORT KEY WHOLLY OR PARTIALLY OUTSIDE RECORD            TSR00540
                C        KSORDR NOT 'A' OR 'D'                                  TSP00550
                C                                                               TS 00560
                C                                                               TS 00570
                C LOCAL DECLARATIONS                                            TSR00580
                C ------------------                                            TS 00590
                C                                                               TS 00600
ISN 0003            INTEGER INTAG(1)                                            TS 00610
                C                           INTEGER ARGUMENT                    TSR00620
ISN 0004            INTEGER KRECRD(NWIREC,NRECS)                                TSR00630
                C                           ARRAY ARGUMENT                      TSR00640
ISN 0005            INTEGER KDIST                                               TSR00650
                C                           COMPARISON DISTANCE                 TSR00660
ISN 0006            INTEGER KRN                                                 TSR00670
                C                           PRIMARY COMPARISON RECORD NUMBER    TSR00680
ISN 0007            INTEGER KRNDIS                                              TSP00690
                C                           DISTANT COMPARISON RECORD NUMBER    TSR00700
ISN 0008            INTEGER KTN                                                 TSR00710
                C                           TAG NUMBER OF PRIMARY COMPARISON RECORD  TSR00720
ISN 0009            INTEGER KTMAX                                               TSR00730
```

```
                C                                MAXIMUM TAG NUMBER OF PCP                                TSR00740
     ISN 0010         INTEGER KTNHI                                                                    TSR00750
                C                                CURRENT HIGHEST TAG NUMBER OF PCR                        TSR00760
                C                                                                                         TSR00770
                C                                                                                         TSR00780
                C PROCEDURE                                                                               TSR00790
                C ---------                                                                               TSR00800
                C                                                                                         TSR00810
                C                                                                                         TSR00820
                C CHECK ARGUMENTS. SET FLAG FOR BAD ARGUMENT(S).                                          TSR00830
                C                                                                                         TSR00840
     ISN 0011           INTAG(1) = 0                                                                      TSR00850
                C                                                                                         TSR00860
     ISN 0012           IF(KSORDR.NE.IVALUE('A').AND.KSORDR.NE.IVALUE('D')) GO TO 900                     TSR00870
                C                                                                                         TSR00880
     ISN 0014           IF(NW1REC.LT.1) GO TO 900                                                         TSR00890
     ISN 0016           IF(NRECS.LT.1) GO TO 900                                                          TSR00900
                C                                                                                         TSR00910
     ISN 0018           IF(KEYLOC.LT.1) GO TO 900                                                         TSR00920
     ISN 0020           IF(KEYLOC.GT.NW1REC) GO TO 900                                                    TSR00930
                C                                                                                         TSR00940
                C                                                                                         TSR00950
                C INITIALIZE TAGS                                                                         TSR00960
                C                                                                                         TSR00970
     ISN 0022           DO 160 KRN = 1,NRECS                                                              TSR00980
     ISN 0023              INTAG(KRN) = KRN                                                               TSR00990
     ISN 0024         160 CONTINUE                                                                       TSR01000
                C                                                                                         TSR01010
                C                                                                                         TSR01020
                C PERFORM SORT                                                                            TSR01030
                C                                                                                         TSR01040
     ISN 0025           KDIST = NRECS                                                                     TSR01050
                C                                                                                         TSR01060
                C WHILE KDIST <> 1 DO                                                                     TSR01070
                C                                                                                         TSR01080
     ISN 0026         200 IF(KDIST.EQ.1) GO TO 900                                                       TSR01090
     ISN 0028             KDIST = 2*((KDIST + 2)/4) - 1                                                 TSR01100
     ISN 0029             KTNMAX = NRECS - KDIST                                                        TSR01110
     ISN 0030             DO 400 KTNHI = 1,KTNMAX                                                       TSR01120
     ISN 0031                KTN = KTNHI                                                                TSR01130
     ISN 0032           250     IF(KTN.LT.1) GO TO 300                                                  TSR01140
     ISN 0034                      KRN = INTAG(KTN)                                                    TSR01150
     ISN 0035                      KRNDIS = INTAG(KTN + KDIST)                                         TSR01160
     ISN 0036                      IF((KSORDR.EQ.IVALUE('A')).AND.                                     TSR01170
                    &                 (KRECRD(KEYLOC,KRN).LE.KRECRD(KEYLOC,KRNDIS))) GO TO 400        TSR01180
     ISN 0038                      IF((KSORDR.EQ.IVALUE('D')).AND.                                     TSR01190
                    &                 (KRECRD(KEYLOC,KRN).GE.KRECRD(KEYLOC,KRNDIS))) GO TO 400        TSR01200
     ISN 0040                      INTAG(KTN) = KRNDIS                                                 TSR01210
     ISN 0041                      INTAG(KTN + KDIST) = KRN                                            TSR01220
     ISN 0042                      KTN = KTN - KDIST                                                   TSR01230
     ISN 0043                   GO TO 250                                                              TSR01240
     ISN 0044           300     CONTINUE                                                                TSR01250
     ISN 0045           400  CONTINUE                                                                   TSR01260
     ISN 0046                GO TO 200                                                                 TSR01270
                C                                                                                         TSR01280
                C                                                                                         TSR01290
                C                                                                                         TSR01300
     ISN 0047           900  RETURN                                                                     TSR01310
     ISN 0048                END                                                                       TSR01320
```

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

SYMBOL	INTERNAL	STATEMENT NUMBERS							
KRN	0006	0022	0023	0023	0034	0036	0038	0041	
KTN	0008	0031	0032	0034	0035	0040	0041	0042	0042
INTAG	0002	0003	0011	0023	0034	0035	0040	0041	
KDIST	0005	0025	0026	0028	0028	0029	0035	0041	0042
KTMAX	0009								
KTNHI	0010	0030	0031						
NRECS	0002	0004	0016	0022	0025	0029			
IVALUE	0012	0012	0036	0038					
KEYLOC	0002	0018	0020	0036	0036	0038	0038		
KRECRD	0002	0004	0036	0036	0038	0038			
KRNDIS	0007	0035	0036	0038	0040				
KSORDR	0002	0012	0012	0036	0038				
KTNMAX	0029	0030							
NW1REC	0002	0004	0014	0020					
TSRTHS	0002								

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

LABEL	DEFINED	REFERENCES					
160	0024	0022					
200	0026	0046					
250	0032	0043					
300	0044	0032					
400	0045	0030	0036	0038			
900	0047	0012	0014	0016	0018	0020	0026

/ TSRTHS / SIZE OF PROGRAM 00035C HEXADECIMAL BYTES

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
KRN	SF	I*4	0000C0	KTN	SF	I*4	0000C4	INTAG	SF XR	I*4	000000	KDIST	SF	I*4	0000C8
KTMAX		I*4	NR	KTNHI	SF	I*4	0000CC	NRECS	F	I*4	000000	IVALUE	XF	I*4	000000
KEYLOC		I*4	0000D4	KRECRD	XR	I*4	0000C0	KRNDIS	SF	I*4	0000D8	KSORDR		I*4	0000DC
KTNMAX	SF	I*4	0000E0	NW1REC		I*4	0000E4	TSRTHS		R*4	0000E8				

SOURCE STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
160	24	000174	200	26	000182	250	32	000188	300	44	0002CA
400	45	0002CA	900	47	0002F0						

COMPILER GENERATED LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
100001	2	000104	200001	13	00012F	100002	14	000140	100003	16	000148
100004	18	000150	100005	20	000158	100006	22	000164	100007	23	000166
100008	25	00017F	100009	28	000188	100010	31	000180	100011	34	0001C0
100012	38	000240	100013	40	00029E	100014	46	0002DC			

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)

*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

STATISTICS SOURCE STATEMENTS = 47, PROGRAM SIZE = 860, SUBPROGRAM NAME =TSRTHS

STATISTICS NO DIAGNOSTICS GENERATED

****** END OF COMPILATION ****** 288K BYTES OF CORE NOT USED

APPENDIX D

REQUESTED OPTIONS: NOTERM

OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

```
                C  PROGRAM TO READ SCREENED IMAGE DATA DISK FILES AND FIT THE TEMPORAL   CLA00010
                C  DATA IN ALL CHANELS TO PRODUCE A CLASSIFICATION MAP                   CLA00020
                C                                                                        CLA00030
                C  PROGRAMMER-------------------BADHWAR 6/7/79                         CLA00040
                C  CONVERSION TO LARS-----------HORTON 1980                              CLA00050
                C                                                                        CLA00060
                C  PROGRAM CONTAINS 4 SECTIONS                                           CLA00070
                C  SECTION 1--READS DATE, USER DEFINED DATA, CALCULATES DATES            CLA00080
                C             AS DAYS OF YEARS, CALCULATES SINES OF SUN ANGLES,          CLA00090
                C             FINDS POSSIBLE DUPLICATE ACQUISITION DATE (KREP)           CLA00100
                C             AND PRINTS HEADER                                          CLA00110
                C                                                                        CLA00120
                C   SECTION 2--READS HEADER RECORD                                       CLA00130
                C             READS TRAINING FIELD COORDINATES                           CLA00140
                C             READS TRAINING FIELD AND COLLECTS RAD.VALUES FOR 40 PIXELSCLA00150
                C             CALCS MEAN AND ST.DEV. FOR 40 PIXELS FOR EACH ACQ, CHAN    CLA00160
                C             REMOVES ALL PIXELS WITH RAD VALUE GTR 3 ST.DEV.FROM MEAN   CLA00170
                C             RECALCS MEAN AND ST.DEV. FOR CHOSEN PIXELS                 CLA00180
                C               (SGM0, SGMX, SGMY, SGMZ INDEXED BY CURRENT ACQ, CROP)    CLA00190
                C             CALLS TRFIT FOR FIT VALUES A (A1,A2,A3,A4), ALPHA          CLA00200
                C               (ALPH1,ALPH2,ALPH3,ALPH4), BETA (BETA1,BETA2,BETA3,      CLA00210
                C               BETA4) AND TO (T01, T02, T03, T04) INDEXED BY            CLA00220
                C               CURRENT CROP                                             CLA00230
                C                                                                        CLA00240
                C  SECTION 3--CREATES AND WRITES HEADER TO FILE 8                        CLA00250
                C                                                                        CLA00260
                C  SECTION 4--READS AND PROCESSES TEST FIELD USING CONSTANTS CALCULATED  CLA00270
                C             IN SECTION 2 (                                             CLA00280
                C             AND CALLS CHNFIT TO                                        CLA00290
                C                                                                        CLA00300
                      COMMON /LINES/ NXTLNE, LINENO, IDATA(856,8), NOACOS                CLA00310
ISN 0002              LOGICAL*1 IDATA, IHOLD(4)                                          CLA00320
ISN 0003              EQUIVALENCE (IHOLD(1),IHOLD4)                                      CLA00330
ISN 0004              COMMON /USER/ICROP(10),Z0(4,10),ZX(4,10),ZY(4,10),ZZ(4,10),NMAX,   CLA00340
ISN 0005             1   IORDRC(4), NOCROP, ISYMBL(10)                                   CLA00350
ISN 0006              LOGICAL*1 ISYMBL, JSYMBL(10)                                       CLA00360
ISN 0007              COMMON /MISC/ NOACQ, ACQDT(5), KSEGM, LANDST(5)                    CLA00370
ISN 0008              REAL * 8 ACQDT                                                     CLA00380
ISN 0009              LOGICAL*1 BSEG(2), LACQDT(90)                                      CLA00390
ISN 0010              EQUIVALENCE (BSEG(1), JSEGM)                                       CLA00400
ISN 0011              EQUIVALENCE (LACQDT(1), ACQDT(1))                                  CLA00410
                C                                                                        CLA00420
ISN 0012              REAL*8 TODAY                                                       CLA00430
                C                                                                        CLA00440
ISN 0013              DIMENSION CHV(196,4,5),XDAY(5),XFIT(1),YFT(1), CLNDST(2,4)         CLA00450
ISN 0014              DIMENSION QCOEFS(4), XCOEFS(4), YCOEFS(4), ZCOEFS(4)               CLA00460
ISN 0015              DIMENSION T01(8), T02(8), T03(8), T04(8)                           CLA00470
ISN 0016              DIMENSION A1(10), A2(10), A3(10), A4(10)                           CLA00480
ISN 0017              DIMENSION ALPH1(10), ALPH2(10), ALPH3(10), ALPH4(10)               CLA00490
ISN 0018              DIMENSION BETA1(10), BETA2(10), BETA3(10), BETA4(10)               CLA00500
ISN 0019              DIMENSION TRTOUP(4,10), TRTOLW(4,10),THRCHI(4,10)                  CLA00510
ISN 0020              DIMENSION XL1(5),XH1(5),XL2(5),XH2(5),XL3(5),XH3(5),XL4(5),XH4(5)  CLA00520
ISN 0021              DIMENSION XCH(4,5),QDAT(5,90),QPT(90)                              CLA00530
ISN 0022              DIMENSION QCHI(5), XCHI(5), YCHI(5), ZCHI(5)                       CLA00540
ISN 0023              DIMENSION QFTX(5),QFTY(5)                                          CLA00550
ISN 0024              DIMENSION QMEAN(5), XMEAN(5), YMEAN(5), ZMEAN(5)                   CLA00560
ISN 0025              DIMENSION SGM0(5,10), SGMX(5,10), SGMY(5,10), SGMZ(5,10)           CLA00570
ISN 0026              REAL*8 WEIGHT(5)                                                   CLA00580
                C                                                                        CLA00590
ISN 0027              DIMENSION TRPT02(90),TRPT03(90),TRPT04(90),TRPT01(90)              CLA00600
ISN 0028              DIMENSION QTA(1),QTH(1),SGA(1),SGB(1),ZA(1),ZB(1)                  CLA00610
ISN 0029              DIMENSION SIGMA(5),PELTA(5),SGM1(5),SGM2(5),SGM3(5),SGM4(5)        CLA00620
ISN 0030              REAL*4 XFD(4),YFD(4),XDAT(5,90),YDAT(5,90),                        CLA00630
                     1 XPT(90),YPT(90),XDAT(5)                                          CLA00640
ISN 0031              DIMENSION ZDAT(5,90),ZPT(90)                                       CLA00650
ISN 0032              DIMENSION ICUT(4,10),  ICUTT(10), KROP(10), NOTCRP(10)             CLA00660
ISN 0033              LOGICAL*1 HDR(3060)                                                CLA00670
ISN 0034              INTEGER*2 CTIME(4)                                                 CLA00680
ISN 0035              LOGICAL*1 HBUF(360)                                                CLA00690
ISN 0036              EQUIVALENCE (HBUF(1),HDR(73))                                      CLA00700
                C                                                                        CLA00710
                C                                                                        CLA00720
                                                                                         CLA00730
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ISN 0037          LOGICAL*1 KA,KB,KC,KD,KE,KF,KG,KH,KI,KJ,KL,KM,KN,KO,KP,KQ,KR,KS   CLA00750
ISN 0038          LOGICAL*1 KT,KU,KV,KW,KX,KY,KZ                                    CLA00760
ISN 0039          LOGICAL*1 KEQUAL, KBLANK, KUNCLS                                  CLA00770
                  C                                                                 CLA00780
ISN 0040          DATA CLNDST(1,1)/1./, CLNDST(1,2)/1./, CLNDST(1,3)/1./            CLA00790
ISN 0041          DATA CLNDST(1,4)/1./                                              CLA00800
ISN 0042          DATA CLNDST(2,1)/1.161/,CLNDST(2,2)/1.230/,CLNDST(2,3)/1.246/     CLA00810
ISN 0043          DATA CLNDST(2,4)/1.062/                                           CLA00820
                  C                                                                 CLA00830
ISN 0044          DATA KA/'A'/,KB/'B'/,KC/'C'/,KD/'D'/,KE/'E'/,KF/'F'/,KG/'G'/      CLA00840
ISN 0045          DATA KH/'H'/,KI/'I'/,KJ/'J'/,KK/'K'/,KL/'L'/,KM/'M'/,KN/'N'/      CLA00850
ISN 0046          DATA KO/'O'/,KP/'P'/,KQ/'Q'/,KR/'R'/,KS/'S'/,KT/'T'/,KV/'U'/      CLA00860
ISN 0047          DATA KV/'V'/,KW/'W'/,KX/'X'/,KY/'Y'/,KZ/'Z'/,KEQUAL/'='/          CLA00870
ISN 0048          DATA KBLANK/' '/,K1/'1'/,K2/'2'/,K3/'3'/,K4/'4'/, KUNCLS/'+'/      CLA00880
                  C                                                                 CLA00890
ISN 0049           DATA XTOL/1.E-03/,MODE/1/,NTERMS/1/,LIMIT/50/                     CLA00900
                  C                                                                 CLA00910
                  C  SYMBOL VALUES MUST BE OCT 217, 357 AND 17 FOR MISMAP           CLA00920
ISN 0050             DATA JSYMBL /'A','B','C','D','E','F','G','H','I','J'/         CLA00930
ISN 0051             DATA TCUT/6.23/                                                CLA00940
                  C                                                                 CLA00950
                  C                                                                 CLA00960
                  C  **********  INITIALIZATION                                     CLA00970
ISN 0052             NFILES = 5                                                     CLA00980
                  C                                                                 CLA00990
                  C                                                                 CLA01000
                  C  *****  READ CLOCK                                              CLA01010
ISN 0053             CALL CPTIME (TODAY, CTIME ,ICPTIM, JCPTM)                      CLA01020
                  C                                                                 CLA01030
                  C                                                                 CLA01040
                  C  *****  CALL 'CROPTM' TO READ USER SUPPLIED INFORMATION          CLA01050
                  C                          CROP OF INTEREST                       CLA01060
                  C                          INITIAL VALUES FOR A, ALPHA, BETA, TO  CLA01070
                  C                          MAXIMUM NUMBER OF POINTS TO BE CHOSEN  CLA01080
                  C                          ORDER OF CHANNELS (DEFAULT 2,3,4,1)    CLA01090
                  C                                                                 CLA01100
                  C  SET DEFAULT SYMBOLS                                            CLA01110
ISN 0054             DO 2 I = 1,10                                                  CLA01120
ISN 0055          2  ISYMBL(I) = JSYMBL(I)                                          CLA01130
                  C                                                                 CLA01140
ISN 0056             CALL CROPTM (IERROR)                                           CLA01150
ISN 0057             IF (IERROR .NE. 0) STOP                                        CLA01160
                  C                                                                 CLA01170
                  C  *******  CALL 'RDEXCT' TO READ ACQUITION DATES                  CLA01180
ISN 0059             CALL RDEXCT                                                    CLA01190
ISN 0060             NOACQS = NOACQ                                                 CLA01200
                  CCCC  WRITE (6,9992) LANDST                                       CLA01210
ISN 0061          9992  FORMAT (' LANDST=',5I5)                                     CLA01220
                  C                                                                 CLA01230
                  C  PRINT OUT LISTING ON LINE PRINTER.                             CLA01240
ISN 0062             WRITE(6,6000) TODAY,CTIME(1),CTIME(2),KSEGM,(ICROP(I),I=1,NOCROP) CLA01250
ISN 0063           6000 FORMAT(1H1,10X,'ACCURACY ASSESSMENT QUALITY ASSURANCE '//  CLA01260
                     *'CLASSIFICATION'//11X,'PROCESSING DATE - ',A8,' AT ',I2,':',I2// CLA01270
                     *11X,'SEGMENT NUMBER - ',A4,5X,'CROP(S) OF INTEREST - ',10(A4,2X)) CLA01280
                  C                                                                 CLA01290
ISN 0064             REWIND 30                                                      CLA01300
ISN 0065             WRITE (30,6001) TODAY                                          CLA01310
ISN 0066             REWIND 30                                                      CLA01320
ISN 0067             READ (30,6002) IMON, IDAY,IYEAR                                CLA01330
ISN 0068          6001  FORMAT (A8)                                                 CLA01340
ISN 0069          6002  FORMAT (I2,1X,I2,1X,I2)                                    CLA01350
ISN 0070             REWIND 30                                                      CLA01360
                  C                                                                 CLA01370
                  C  **********  PROCESS ACQUISITION DATES:                         CLA01380
                  C       CONVERT DATE FROM DISPLAY CODE TO COMPUTATIONAL NUMBER    CLA01390
                  C       DIVIDE 'DAY OF YEAR' BY 100                               CLA01400
                  C       CHECK TO SEE IF DAYS ARE DUPLICATED                       CLA01410
                  C                                                                 CLA01420
                  C WRITE 'DATE OF YEAR' FOR ACQ DATES TO TEMP FILE, REREAD AS FL.PT. CLA01430
ISN 0071             REWIND 30                                                      CLA01440
ISN 0072             WRITE (30,5) ACQDT                                             CLA01450
ISN 0073          5  FORMAT (5A8)                                                   CLA01460
ISN 0074             REWIND 30                                                      CLA01470
ISN 0075             READ (30,6) (XXDAT(II),II=1,5)                                 CLA01480
ISN 0076          6   FORMAT (5(2X,F3.0,3X))                                       CLA01490
                  C                                                                 CLA01500
                  C  CALC XDAY TO USE FOR CALLS TO TRJFIT AND CHNFIT                CLA01510
ISN 0077             DO 7 J=1,NFILES                                                CLA01520
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ISN 0078            XTJ=XXDAT(J)                                                    CLA01530
ISN 0079            XDAY(J)=XTJ/100.                                                CLA01540
ISN 0080        7   CONTINUE                                                        CLA01550
                C                                                                   CLA01560
                C  CHECK TO SEE IF THE DAYS ARE REPEATED                            CLA01570
ISN 0081            IDUPDT=0                                                        CLA01580
ISN 0082            DO 1 JM=2,NFILES                                                CLA01590
ISN 0083            IF(XXDAT(JM).EQ.XXDAT(JM-1)) IDUPDT=JM                          CLA01600
ISN 0085        1   CONTINUE                                                        CLA01610
                C                                                                   CLA01620
                C  ***************  PROCESS TRAINING FIELD FOR EACH CROP  ***************CLA01630
ISN 0086            DO 900 KURCRP = 1,NOCROP                                        CLA01640
                C   **********  REWIND TAPE AND READ HEADER RECORDS  **********      CLA01650
                C                                                                   CLA01660
ISN 0087            ITYPE = 1                                                       CLA01670
ISN 0088            CALL RDFLES(ITYPE, HDR,XFD,YFD)                                 CLA01680
                C                                                                   CLA01690
                C  ***  DETERMINE THE MAX MIN VALUES OF LINENO. AND PIXNO.OF TRAIN FIELDCLA01700
ISN 0089            MAXLNE=1                                                        CLA01710
ISN 0090            MINLNE=196                                                      CLA01720
ISN 0091            MINPIX=196                                                      CLA01730
ISN 0092            MAXPIX=1                                                        CLA01740
ISN 0093            DO 10 JM=1,4                                                    CLA01750
ISN 0094            IPP=XFD(JM)                                                     CLA01760
ISN 0095            LINENO=YFD(JM)                                                  CLA01770
ISN 0096            IF(LINENO.GE.MAXLNE) MAXLNE=LINENO                              CLA01780
ISN 0098            IF(LINENO.LE.MINLNE) MINLNE=LINENO                              CLA01790
ISN 0100            IF(IPP.GE.MAXPIX) MAXPIX=IPP                                    CLA01800
ISN 0102            IF(IPP.LE.MINPIX) MINPIX=IPP                                    CLA01810
ISN 0104        10  CONTINUE                                                        CLA01820
                C                                                                   CLA01830
                C                                                                   CLA01840
                C                                                                   CLA01850
                C                                                                   CLA01860
                C                                                                   CLA01870
                C  **********  READ LINES OF IMAGE DATA AND SAVE PIXELS IN THE      CLA01880
                C        TRAINING FIELD IN MATRICES QDAT, XDAT, YDAT AND ZDAT       CLA01890
                C                                                                   CLA01900
                C  SET COUNTER FOR NUMBER POINTS IN TRAINING FIELD                  CLA01910
ISN 0105            NPTSTF=0                                                        CLA01920
                C                                                                   CLA01930
                C  PROCESS EACH LINE IN TRAINING FIELD                              CLA01940
ISN 0106            DO 530 LLINE = MINLNE, MAXLNE                                   CLA01950
ISN 0107            LINENO = LLINE                                                  CLA01960
                C                                                                   CLA01970
                C  READ NEXT LINE OF PIXEL DATA                                     CLA01980
ISN 0108            ITYPE = 2                                                       CLA01990
ISN 0109            CALL RDFLES (ITYPE, IDATA,XFD,YFD)                              CLA02000
ISN 0110            IF (ITYPE .EQ. -1) GO TO 24                                     CLA02010
                C                                                                   CLA02020
                C  MOVE RADIANCE VALUES                                             CLA02030
                C                                                                   CLA02040
ISN 0112            DO 50 KK = 1,5                                                  CLA02050
ISN 0113            KURACQ = KK                                                     CLA02060
ISN 0114            IF (KURACQ .GT. NOACQ) KURACQ = NOACQ                           CLA02070
ISN 0116            DO 50 KURCHN = 1,4                                              CLA02080
ISN 0117            INCRE = (KURCHN - 1) * 196                                      CLA02090
                C                                                                   CLA02100
ISN 0118            DO 49 KURPXL = MINPIX,MAXPIX                                    CLA02110
ISN 0119            LOC = INCRE + KURPXL + 72                                       CLA02120
ISN 0120            IHOLD1(4) = IDATA(LOC,KURACQ)                                   CLA02130
ISN 0121            CHV(KURPXL,KURCHN,KK) = IHOLD4                                  CLA02140
ISN 0122        49  CONTINUE                                                        CLA02150
ISN 0123        50  CONTINUE                                                        CLA02160
                C                                                                   CLA12170
                C  ******  PROCESS EVERY PIXEL BETWEEN MINIMUM AND MAXIMUM PIXELS  *****CLA02180
ISN 0124            DO 520 IPP = MINPIX,MAXPIX                                      CLA02190
                C                                                                   CLA02200
                C  DETERMINE IF PIXEL IS IN TRAINING FIELD                          CLA02210
ISN 0125            IF (MINPIX .LE. 1  .AND.  MAXPIX .GE. 196) GO TO 501            CLA02220
ISN 0127            ZFL=LINENO                                                      CLA02230
ISN 0128            ZFP=IPP                                                         CLA02240
ISN 0129            CALL RFCT (ZFL,ZFP,YFD,XFD,ICOR)                                CLA02250
ISN 0130            IF(ICOR.EQ.1) GO TO 520                                         CLA02260
                C                                                                   CLA02270
                C                                                                   CLA02280
                C  SAVE RADIANCE VALUES FOR PIXEL UNLESS A CHANNEL 4 VALUE IS GRTR 127  CLA02290
ISN 0132        501 DO 510 KURACQ = 1,5                                             CLA02300
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                C  IGNORE PIXEL IF ANY VALUE IN CHANNEL 4 GREATER THAN 127                CLA02310
      ISN 0133        IF (CHV(IPP,4,KURACQ) .GT. 127.) GO TO 520                        CLA02320
      ISN 0135        INDEX = LANDST(KURACQ) - 1                                        CLA02330
      ISN 0136        DO 505 KURCHN = 1,3                                               CLA02340
      ISN 0137        XCH(KURCHN,KURACQ)=CHV(IPP,KURCHN,KURACQ)*CLNDST(INDEX,KURCHN)    CLA02350
                CCCC  IF (KURACQ .EQ. 4) WRITE (3,9999) LINENO, IPP, KURCHN,            CLA02360
                CCCC 1  CHV(IPP,KURCHN,KURACQ), XCH(KURCHN,KURACQ)                      CLA02370
      ISN 0138  9999  FORMAT (' LINE=',I3,' PIXEL=',I3,' CHAN=',I3,' VALUE=',F8.2,     CLA02380
                     1  ' CORRECTED VALUE=',F8.2)                                      CLA02390
      ISN 0139  505   CONTINUE                                                          CLA02400
      ISN 0140        XCH(4,KURACQ)=2.0*CHV(IPP,4,KURACQ)*CLNDST(INDEX,4)               CLA02410
      ISN 0141        XXXX = XCH(4,KURACQ) / 2.                                         CLA02420
                CCCC  IF (KURACQ.EQ.4) WRITE (3,9999) LINENO, IPP, KURCHN,              CLA02430
                CCCC 1  CHV(IPP,4,KURACQ), XXXX                                         CLA02440
      ISN 0142  510   CONTINUE                                                          CLA02450
                C                                                                       CLA02460
      ISN 0143        NPTSTF=NPTSTF+1                                                   CLA02470
                C                                                                       CLA02480
                C  STORE TRAINING FIELD DATA HERE                                       CLA02490
      ISN 0144        DO 515 KURACQ=1,NFILES                                            CLA02500
      ISN 0145        QDAT(KURACQ,NPTSTF)=XCH(1,KURACQ)                                 CLA02510
      ISN 0146        XDAT(KURACQ,NPTSTF)=XCH(2,KURACQ)                                 CLA02520
      ISN 0147        YDAT(KURACQ,NPTSTF)=XCH(3,KURACQ)                                 CLA02530
      ISN 0148        ZDAT(KURACQ,NPTSTF)=XCH(4,KURACQ)                                 CLA02540
      ISN 0149  515   CONTINUE                                                          CLA02550
                C                                                                       CLA02560
                C  IF ENOUGH PIXELS COLLECTED, START CALCULATING CONSTANTS              CLA02570
      ISN 0150        IF(NPTSTF.EQ.NMAX) GO TO 48                                       CLA02580
                C                                                                       CLA02590
                C                                                                       CLA02600
                C  IF THE LAST PIXEL ON LINE HAS BEEN PROCESSED,GO TO NEXT LINE         CLA02610
      ISN 0152  520   CONTINUE                                                          CLA02620
                C                                                                       CLA02630
                C  CHECK IF THE LAST LINE HAS BEEN PROCESSED                            CLA02640
      ISN 0153  530    CONTINUE                                                         CLA02650
                C                                                                       CLA02660
                C                                                                       CLA02670
                C                                                                       CLA02680
                C   ****  STOP PROCESSING IF THERE ARE NO PIXELS IN THE TRAINING FIELD. CLA02690
      ISN 0154  28      IF(NPTSTF.GT.1) GO TO 48                                        CLA02700
                C                                                                       CLA02710
      ISN 0156        WRITE (6, 950) NPTSTF                                             CLA02720
      ISN 0157        WRITE (3, 950) NPTSTF                                             CLA02730
      ISN 0158  950     FORMAT(1H0,'PROGRAM TERMINATED BECAUSE THERE WERE LESS THAN 2 PI CLA02740
                     *XELS IN THE TRAINING FIELD.', /,                                  CLA02750
                     1  ' NUMBER OF TRAINING FIELD POINTS SELECTED =',I2)              CLA02760
                C                                                                       CLA02770
      ISN 0159        STOP                                                              CLA02780
                C                                                                       CLA02790
                C                                                                       CLA02800
                C                                                                       CLA02810
                C   **********  COMPUTE THE MEAN AND STANDARD DEVIATION  **********     CLA02820
      ISN 0160  48      DO 29 KURACQ=1,NFILES                                           CLA02830
      ISN 0161        DO 31 KURPIX=1,NPTSTF                                             CLA02840
      ISN 0162        QPT(KURPIX)=QDAT(KURACQ,KURPIX)                                   CLA02850
      ISN 0163        ZPT(KURPIX)=ZDAT(KURACQ,KURPIX)                                   CLA02860
      ISN 0164        XPT(KURPIX)=XDAT(KURACQ,KURPIX)                                   CLA02870
      ISN 0165  31      YPT(KURPIX)=YDAT(KURACQ,KURPIX)                                 CLA02880
                C                                                                       CLA02890
      ISN 0166        CALL SDEV(QPT,NPTSTF,QMEANN,SQ)                                   CLA02900
      ISN 0167        QMEAN(KURACQ)=QMEANN                                              CLA02910
      ISN 0168        SGMQ(KURACQ,KURCRP)=SQ                                            CLA02920
      ISN 0169        CALL SDEV (XPT,NPTSTF,XMEANN,SX)                                  CLA02930
      ISN 0170        XMEAN(KURACQ)=XMEANN                                              CLA02940
      ISN 0171        SGMX(KURACQ,KURCRP)=SX                                            CLA02950
      ISN 0172        CALL SDEV (YPT,NPTSTF,YMEANN,SY)                                  CLA02960
      ISN 0173        YMEAN(KURACQ)=YMEANN                                              CLA02970
      ISN 0174        SGMY(KURACQ,KURCRP)=SY                                            CLA02980
      ISN 0175        CALL SDEV(ZPT,NPTSTF,ZMEANN,SZ)                                   CLA02990
      ISN 0176        ZMEAN(KURACQ)=ZMEANN                                              CLA03000
      ISN 0177        SGMZ(KURACQ,KURCRP)=SZ                                            CLA03010
      ISN 0178  29      CONTINUE                                                        CLA03020
                C                                                                       CLA03030
                C  ******  REMOVE THE FIELD OF PIXELS WITH SD MORE THAN 3 SIGMA.  ******CLA03040
      ISN 0179        NOPIX=0                                                           CLA03050
                C                                                                       CLA03060
                C  CALCULATE LOW AND HIGH VALUE FOR EACH ACQUISITION                    CLA03070
      ISN 0180        DO 125 KURACQ = 1,NFILES                                          CLA03080
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ISN 0181            XL1(KURACQ)=QMEAN(KURACQ)-3.*SGMQ(KURACQ,KURCRP)                    CLA03090
ISN 0182            XH1(KURACQ)=QMEAN(KURACQ)+3.*SGMQ(KURACQ,KURCRP)                    CLA03100
ISN 0183            XL2(KURACQ)=XMEAN(KURACQ)-3.*SGMX(KURACQ,KURCRP)                    CLA03110
ISN 0184            XH2(KURACQ)=XMEAN(KURACQ)+3.*SGMX(KURACQ,KURCRP)                    CLA03120
ISN 0185            XL3(KURACQ)=YMEAN(KURACQ)-3.*SGMY(KURACQ,KURCRP)                    CLA03130
ISN 0186            XH3(KURACQ)=YMEAN(KURACQ)+3.*SGMY(KURACQ,KURCRP)                    CLA03140
ISN 0187            XL4(KURACQ)=ZMEAN(KURACQ)-3.*SGMZ(KURACQ,KURCRP)                    CLA03150
ISN 0188            XH4(KURACQ)=ZMEAN(KURACQ)+3.*SGMZ(KURACQ,KURCRP)                    CLA03160
ISN 0189      125   CONTINUE                                                            CLA03170
                    C                                                                 CLA03180
                    C  CHECK EACH PIXEL AGAINST EACH FILE                             CLA03190
ISN 0190            DO 129 KURPIX=1,NPTSTF                                            CLA03200
ISN 0191            DO 126 KURACQ=1,NFILES                                            CLA03210
ISN 0192            IF(QDAT(KURACQ,KURPIX).LT.XL1(KURACQ).OR.QDAT(KURACQ,KURPIX).GT.  CLA03220
                   1 XH1(KURACQ)) GO TO 129                                           CLA03230
ISN 0194            IF(XDAT(KURACQ,KURPIX).LT.XL2(KURACQ).OR.XDAT(KURACQ,KURPIX).GT.  CLA03240
                   1 XH2(KURACQ)) GO TO 129                                           CLA03250
ISN 0196            IF(YDAT(KURACQ,KURPIX).LT.XL3(KURACQ).OR.YDAT(KURACQ,KURPIX).GT.  CLA03260
                   1 XH3(KURACQ)) GO TO 129                                           CLA03270
ISN 0198            IF(ZDAT(KURACQ,KURPIX).LT.XL4(KURACQ).OR.ZDAT(KURACQ,KURPIX).GT.  CLA03280
                   1 XH4(KURACQ)) GO TO 129                                           CLA03290
ISN 0200      126 CONTINUE                                                            CLA03300
                    C                                                                 CLA03310
                    C  PIXEL IN BOUNDS, SAVE IT                                       CLA03320
ISN 0201            NOPIX=NOPIX+1                                                     CLA03330
ISN 0202            DO 128 KURACQ=1,NFILES                                            CLA03340
ISN 0203            QDAT(KURACQ,NOPIX)=QDAT(KURACQ,KURPIX)                            CLA03350
ISN 0204            XDAT(KURACQ,NOPIX)=XDAT(KURACQ,KURPIX)                            CLA03360
ISN 0205            YDAT(KURACQ,NOPIX)=YDAT(KURACQ,KURPIX)                            CLA03370
ISN 0206            ZDAT(KURACQ,NOPIX)=ZDAT(KURACQ,KURPIX)                            CLA03380
ISN 0207      128   CONTINUE                                                          CLA03390
ISN 0208      129   CONTINUE                                                          CLA03400
                    C                                                                 CLA03410
ISN 0209            DO 140 KURACQ=1,NFILES                                            CLA03420
ISN 0210            DO 130 KURPIX=1,NOPIX                                             CLA03430
ISN 0211            QPT(KURPIX)=QDAT(KURACQ,KURPIX)                                   CLA03440
ISN 0212            XPT(KURPIX)=XDAT(KURACQ,KURPIX)                                   CLA03450
ISN 0213            YPT(KURPIX)=YDAT(KURACQ,KURPIX)                                   CLA03460
ISN 0214            ZPT(KURPIX)=ZDAT(KURACQ,KURPIX)                                   CLA03470
ISN 0215      130   CONTINUE                                                          CLA03480
                    C                                                                 CLA03490
                    C  FIND STANDARD DEVIATION FOR PIXELS IN BOUNDS                   CLA03500
ISN 0216            CALL SDEV(QPT,NOPIX,QMEANN,SQ)                                    CLA03510
ISN 0217            CALL SDEV(XPT,NOPIX,XMEANN,SX)                                    CLA03520
ISN 0218            CALL SDEV(YPT,NOPIX,YMEANN,SY)                                    CLA03530
ISN 0219            CALL SDEV(ZPT,NOPIX,ZMEANN,SZ)                                    CLA03540
                    C                                                                 CLA03550
                    C                                                                 CLA03560
ISN 0220            QMEAN(KURACQ)=QMEANN                                              CLA03570
ISN 0221            IF(KURACQ.EQ.IDUPDT) SQ=20.*SQ                                    CLA03580
ISN 0223            IF(KURACQ.EQ.IDUPDT) SX=20.*SX                                    CLA03590
ISN 0225            IF(KURACQ.EQ.IDUPDT) SY=20.*SY                                    CLA03600
ISN 0227            IF(KURACQ.EQ.IDUPDT) SZ=20.*SZ                                    CLA03610
ISN 0229            SGMQ(KURACQ,KURCRP)=SQ                                            CLA03620
ISN 0230            XMEAN(KURACQ)=XMEANN                                              CLA03630
ISN 0231            SGMX(KURACQ,KURCRP)=SX                                            CLA03640
ISN 0232            YMEAN(KURACQ)=YMEANN                                              CLA03650
ISN 0233            SGMY(KURACQ,KURCRP)=SY                                            CLA03660
ISN 0234            ZMEAN(KURACQ)=ZMEANN                                              CLA03670
ISN 0235            SGMZ(KURACQ,KURCRP)=SZ                                            CLA03680
ISN 0236      140   CONTINUE                                                          CLA03690
ISN 0237            NPTSTF=NOPIX                                                      CLA03700
                    C                                                                 CLA03710
                    C                                                                 CLA03720
                    C  MOVE INITIAL GUESSES TO SINGLE DIMENSION ARRAY                 CLA03730
ISN 0238            DO 2999 I = 1,4                                                   CLA03740
ISN 0239            QCOEFS(I) = ZQ(I,KURCRP)                                          CLA03750
ISN 0240            XCOEFS(I) = ZX(I,KURCRP)                                          CLA03760
ISN 0241            YCOEFS(I) = ZY(I,KURCRP)                                          CLA03770
ISN 0242            ZCOEFS(I) = ZZ(I,KURCRP)                                          CLA03780
ISN 0243      2999  CONTINUE                                                          CLA03790
                    C                                                                 CLA03800
                    C  PRINT OUT MEAN AND STD. DEV. FOR TRAINING FIELD.               CLA03810
                    C                                                                 CLA03820
ISN 0244            WRITE (6,6003) NPTSTF, (ACQDT(J),J=1,NFILES)                      CLA03830
ISN 0245      6003  FORMAT (1H0,'MEANS AND STD. DEV. FOR TRAINING FIELD',            CLA03840
                     *' BASED ON ',I2,' PIXELS -',/2X,'CHANNEL  ',20X,               CLA03850
                     *',----------ACQUISITION DATES----------'/2X,'NUMBER',15X,5(A8)) CLA03860
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                C                                                                       CLA03870
   ISN 0246           WRITE(6,6004) K1,QMEAN,(SGMQ(KK,KURCRP),KK=1,5)                   CLA03880
   ISN 0247           WRITE(6,6004) K2,XMEAN,(SGMX(KK,KURCRP),KK=1,5)                   CLA03890
   ISN 0248           WRITE(6,6004) K3,YMEAN,(SGMY(KK,KURCRP),KK=1,5)                   CLA03900
   ISN 0249           WRITE(6,6004) K4,ZMEAN,(SGMZ(KK,KURCRP),KK=1,5)                   CLA03910
   ISN 0250        6004 FORMAT(1H0,3X,A1,6X,'MEAN',5X,5F8.2/1X,'STD. DEV.',5F8.2)       CLA03920
                C                                                                       CLA03930
   ISN 0251           WRITE(6,6005)                                                     CLA03940
   ISN 0252        6005 FORMAT(1H0,'CONSTANTS FOR MODEL -'//2X,'CHANNEL'/               CLA03950
                      *2X,'NUMBER',14X,'A',10X,' ALPHA',9X,'BETA',9X,'T0',10X,'CHISQ') CLA03960
   ISN 0253           WRITE(6,6006) K1, QCOEFS                                          CLA03970
                C                                                                       CLA03980
                C                                                                       CLA03990
                C  ******  CALL TRJFIT TO CALCULATE ALPHA, BETA AND TO FOR EACH CHANNEL CLA04000
   ISN 0254           DO 3000 KURACQ=1,NFILES                                           CLA04010
   ISN 0255           QR=QMEAN(KURACQ)                                                  CLA04020
   ISN 0256           QMEAN(KURACQ)=ALOG(QR)                                            CLA04030
   ISN 0257        3000  SGM1(KURACQ)=SGMQ(KURACQ,KURCRP)/QR                           CLA04040
                C                                                                       CLA04050
   ISN 0258           XLAMDA=1.E-03                                                     CLA04060
   ISN 0259           XCHIN=200.                                                        CLA04070
                C                                                                       CLA04080
                C  CH1 FIT                                                              CLA04090
   ISN 0260           DO 3001 LA = 1,500                                                CLA04100
                C                                                                       CLA04110
   ISN 0261           CALL TRJFIT(XDAY,QMEAN,SGM1,NFILES,4,MODE,QCOEFS,PELTA,SIGMA,     CLA04120
                     1 XLAMDA,QFTX,QISQR)                                               CLA04130
   ISN 0262           XDIF=XCHIN-QISQR                                                  CLA04140
   ISN 0263           IF(ABS(XDIF).LE.XTOL) GO TO 3002                                  CLA04150
   ISN 0265           XCHIN=QISQR                                                       CLA04160
   ISN 0266        3001  CONTINUE                                                       CLA04170
                C                                                                       CLA04180
   ISN 0267        3002  XXTOL = XLAMDA/2.                                             CLA04190
   ISN 0268           WRITE(6,6007) (QCOEFS(K),XXTOL,K=1,4),QISQR                       CLA04200
   ISN 0269           WRITE(6,6006)K2,XCOEFS                                            CLA04210
   ISN 0270        6006 FORMAT(1H0,2X,A1,2X,'INITIAL',4(F7.2,7X))                       CLA04220
                C                                                                       CLA04230
                C  FIT MEAN & S.D. OF THE TRAINING FIELD TO ANALYTIC EXPRESSION         CLA04240
                C     F(T)=A*(T/T0)**ALPHA *EXP(BETA*T0*T0(1T/T0)**2.)                  CLA04250
   ISN 0271           DO 32 KURACQ=1,NFILES                                             CLA04260
   ISN 0272           XR=XMEAN(KURACQ)                                                  CLA04270
   ISN 0273           XMEAN(KURACQ)=ALOG(XR)                                            CLA04280
   ISN 0274        32    SGM2(KURACQ)=SGMX(KURACQ,KURCRP)/XR                           CLA04290
                C                                                                       CLA04300
   ISN 0275           XLAMDA=1.E-03                                                     CLA04310
   ISN 0276           XCHIN=200.                                                        CLA04320
                C                                                                       CLA04330
                C  CH2 DATA FIT TO THE ABOVE EXPREESION                                 CLA04340
   ISN 0277           DO 33 LA=1,500                                                    CLA04350
   ISN 0278           CALL TRJFIT(XDAY,XMEAN,SGM2,NFILES,4,MODE,XCOEFS,PELTA,SIGMA,     CLA04360
                     1 XLAMDA,QFTX,XISQR)                                               CLA04370
   ISN 0279           XDIF=XCHIN-XISQR                                                  CLA04380
   ISN 0280           IF(ABS(XDIF).LE.XTOL) GO TO 34                                    CLA04390
   ISN 0282           XCHIN=XISQR                                                       CLA04400
   ISN 0283        33    CONTINUE                                                      CLA04410
                C                                                                       CLA04420
   ISN 0284        34    XXTOL = XLAMDA/2.                                             CLA04430
   ISN 0285           WRITE(6,6007) (XCOEFS(K),XXTOL,K=1,4),XISQR                       CLA04440
   ISN 0286        6007 FORMAT(1H ,3X,'  FINAL   ',4(F7.2,'+-',F5.2),F7.2)            CLA04450
   ISN 0287           WRITE(6,6006) K3,YCOEFS                                           CLA04460
   ISN 0288           DO 35 KURACQ=1,NFILES                                             CLA04470
   ISN 0289           YR=YMEAN(KURACQ)                                                  CLA04480
   ISN 0290           YMEAN(KURACQ)=ALOG(YR)                                            CLA04490
   ISN 0291        35      SGM3(KURACQ)=SGMY(KURACQ,KURCRP)/YR                         CLA04500
   ISN 0292           XLAMDA=1.E-03                                                     CLA04510
   ISN 0293           XCHIN=200.                                                        CLA04520
                C  FIT TO CH3 DATA                                                      CLA04530
   ISN 0294           DO 36 LA = 1,500                                                  CLA04540
   ISN 0295           CALL TRJFIT(XDAY,YMEAN,SGM3,NFILES,4,MODE,YCOEFS,PELTA,SIGMA,     CLA04550
                     1 XLAMDA,QFTY,YISQR)                                               CLA04560
   ISN 0296           XDIF=XCHIN-YISQR                                                  CLA04570
   ISN 0297           IF(ABS(XDIF).LE.XTOL) GO TO 37                                    CLA04580
   ISN 0299           XCHIN=YISQR                                                       CLA04590
   ISN 0300        36    CONTINUE                                                      CLA04600
                C                                                                       CLA04610
                C  OBTAIN THE CHISQ DITRIBUTION OF ALL PIXELS IN THE TRAINING FIELD     CLA04620
                C  COMPUTE THE THRESHOLD CHISQ VALUES FOR THE TWO CHANNELS.            CLA04630
                C                                                                       CLA04640
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ISN 0301      37    XXTOL = XLAMDA/2.                                          CLA04650
ISN 0302            WRITE(6,6007) (YCOEFS(L),XXTOL,L=1,4),YISQR                CLA04660
ISN 0303            WRITE(6,6006) K4,ZCOEFS                                    CLA04670
                C  CH4 DATA FIT                                                CLA04680
ISN 0304            DO 47 KURACQ=1,NFILES                                      CLA04690
ISN 0305            ZR=ZMEAN(KURACQ)                                           CLA04700
ISN 0306            ZMEAN(KURACQ)=ALOG(ZR)                                     CLA04710
ISN 0307      47    SGM4(KURACQ)=SGMZ(KURACQ,KURCRP)/ZR                        CLA04720
ISN 0308            XLAMDA=1.E-03                                              CLA04730
ISN 0309            XCHIN=200.                                                 CLA04740
ISN 0310            DO 45 LA = 1,500                                           CLA04750
ISN 0311            CALL TRJFIT(XDAY,ZMEAN,SGM4,NFILES,4,MODE,ZCOEFS,PELTA,SIGMA,  CLA04760
                   1 XLAMDA, QFTY,ZISQR)                                       CLA04770
ISN 0312            XDIF=XCHIN-ZISQR                                           CLA04780
ISN 0313            IF(ABS(XDIF).LE.XTOL) GO TO 46                             CLA04790
ISN 0315            XCHIN=ZISQR                                                CLA04800
ISN 0316      45    CONTINUE                                                   CLA04810
                C                                                              CLA04820
ISN 0317      46    XXTOL = XLAMDA/2.                                          CLA04830
ISN 0318            WRITE(6,6007) (ZCOEFS(L),XX  ,L=1,4),ZISQR                 CLA04840
                C                                                              CLA04850
                C  SKIP LINES                                                  CLA04860
ISN 0319            WRITE (6,6666)                                             CLA04870
ISN 0320      6666  FORMAT (/)                                                 CLA04880
                C                                                              CLA04890
ISN 0321            A1(KURCRP)=QCOEFS(1)                                       CLA04900
ISN 0322            ALPH1(KURCRP)=QCOEFS(2)                                    CLA04910
ISN 0323            BETA1(KURCRP)=QCOEFS(3)                                    CLA04920
ISN 0324            T01(KURCRP) = QCOEFS(4)                                    CLA04930
                C                                                              CLA04940
ISN 0325            A3(KURCRP)=YCOEFS(1)                                       CLA04950
ISN 0326            ALPH3(KURCRP)=YCOEFS(2)                                    CLA04960
ISN 0327            BETA3(KURCRP)=YCOEFS(3)                                    CLA04970
ISN 0328            T03(KURCRP) = YCOEFS(4)                                    CLA04980
                C                                                              CLA04990
ISN 0329            A2(KURCRP)=XCOEFS(1)                                       CLA05000
ISN 0330            ALPH2(KURCRP)=XCOEFS(2)                                    CLA05010
ISN 0331            BETA2(KURCRP)=XCOEFS(3)                                    CLA05020
ISN 0332            T02(KURCRP) = XCOEFS(4)                                    CLA05030
                C                                                              CLA05040
ISN 0333            A4(KURCRP)=ZCOEFS(1)                                       CLA05050
ISN 0334            ALPH4(KURCRP)=ZCOEFS(2)                                    CLA05060
ISN 0335            BETA4(KURCRP)=ZCOEFS(3)                                    CLA05070
ISN 0336             T04(KURCRP) = ZCOEFS(4)                                   CLA05080
                C                                                              CLA05090
ISN 0337            DO 38 L=1,NPTSTF                                           CLA05100
ISN 0338            DO 39 M=1,NFILES                                           CLA05110
ISN 0339            QR=QDAT(M,L)                                               CLA05120
ISN 0340            XR=XDAT(M,L)                                               CLA05130
ISN 0341            YR=YDAT(M,L)                                               CLA05140
ISN 0342            ZR=ZDAT(M,L)                                               CLA05150
ISN 0343            SNQ=SQRT(.07*QR)                                           CLA05160
ISN 0344            SNX=SQRT(.07*XR)                                           CLA05170
ISN 0345            SNY=SQRT(.06*YR)                                           CLA05180
ISN 0346            SNZ=SQRT(.05*ZR)                                           CLA05190
                C  THE ABOVE VALUES ARE FROM DUGGIN'S PAPER(1974) FOR SCENE    CLA05200
                C  NOISE                                                       CLA05210
ISN 0347            IF(SNQ.GT.SGMQ(M,KURCRP)) SNQ=.9*SGMQ(M,KURCRP)            CLA05220
ISN 0349            IF(SNX.GT.SGMX(M,KURCRP)) SNX=.9*SGMX(M,KURCRP)            CLA05230
ISN 0351            IF(SNY.GT.SGMY(M,KURCRP)) SNY=.9*SGMY(M,KURCRP)            CLA05240
ISN 0353            IF(SNZ.GT.SGMZ(M,KURCRP)) SNZ=.9*SGMZ(M,KURCRP)            CLA05250
ISN 0355            T1X=.0361*QR+SNQ*SNQ                                       CLA05260
ISN 0356            T2X=.04*XR+SNX*SNX                                         CLA05270
ISN 0357            T3X=.116*YR+SNY*SNY                                        CLA05280
ISN 0358            T4X=1.21+SNZ*SNZ                                           CLA05290
ISN 0359            T1=SQRT(T1X)                                               CLA05300
ISN 0360            T2=SQRT(T2X)                                               CLA05310
ISN 0361            T3=SQRT(T3X)                                               CLA05320
ISN 0362            T4=SQRT(T4X)                                               CLA05330
ISN 0363            QMEAN(M)=ALOG(QR)                                          CLA05340
ISN 0364            SGM1(M)=SGMQ(M,KURCRP)/QR                                  CLA05350
ISN 0365            XMEAN(M)=ALOG(XR)                                          CLA05360
ISN 0366            SGM2(M)=SGMX(M,KURCRP)/XR                                  CLA05370
ISN 0367            IF(SGMQ(M,KURCRP).LT.T1) SGM1(M)=T1/QR                     CLA05380
ISN 0369            IF(SGMX(M,KURCRP).LT.T2) SGM2(M)=T2/XR                     CLA05390
ISN 0371            YMEAN(M)=ALOG(YR)                                          CLA05400
ISN 0372            SGM3(M)=SGMY(M,KURCRP)/YR                                  CLA05410
ISN 0373            IF(SGMY(M,KURCRP).LT.T3) SGM3(M)=T3/YR                     CLA05420
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ISN 0375            ZMEAN(M)=ALOG(ZR)                                          CLA05430
ISN 0376            SGM4(M)=SGM7(M,KURCRP)/ZR                                  CLA05440
ISN 0377            IF(SGM7(M,KURCRP).LT.T4) SGM4(M)=T4/ZR                     CLA05450
ISN 0379      39    CONTINUE                                                   CLA05460
                    C                                                        CLA05470
                    C                                                        CLA05480
                    C  CHANNEL 3 FIT                                         CLA05490
ISN 0380            ZR(1)=YCOEFS(4)                                            CLA05500
ISN 0381            XLAMDA=1.E-03                                              CLA05510
ISN 0382            XCHIN=200.                                                 CLA05520
                    C                                                        CLA05530
ISN 0383            DO 813 I = 1,NFILES                                        CLA05540
ISN 0384      813   WEIGHT(I) = 1. / (SGM3(I) * SGM3(I))                      CLA05550
                    C                                                        CLA05560
ISN 0385            DO 40 LA = 1,LIMIT                                         CLA05570
ISN 0386            CALL CHNFIT (XDAY,YMEAN,SGM3,NFILES,NTERMS,MODE,ZB,QTB,SGB,CLA05580
                   1 XLAMDA,YFT,YISQR,A3(KURCRP),ALPH3(KURCRP),BETA3(KURCRP),WEIGHT) CLA05590
ISN 0387            XDIF=XCHIN-YISQR                                           CLA05600
ISN 0388            IF(ABS(XDIF).LE.XTOL) GO TO 41                             CLA05610
ISN 0390            XCHIN=YISQR                                                CLA05620
ISN 0391      40    CONTINUE                                                   CLA05630
                    C                                                        CLA05640
ISN 0392      41    YCHI(L)=YISQR                                              CLA05650
ISN 0393            TRPT03(L)=ZB(1)                                            CLA05660
                    C                                                        CLA05670
                    C  CHANNEL 2 FIT                                         CLA05680
ISN 0394            ZA(1) = T02(KURCRP)                                        CLA05690
ISN 0395            XLAMDA=1.E-03                                              CLA05700
ISN 0396            XCHIN=200.                                                 CLA05710
                    C                                                        CLA05720
ISN 0397            DO 812 I = 1,NFILES                                        CLA05730
ISN 0398      812   WEIGHT(I) = 1. / (SGM2(I) * SGM2(I))                      CLA05740
ISN 0399            DO 42 LA = 1,LIMIT                                         CLA05750
ISN 0400            CALL CHNFIT (XDAY,XMEAN,SGM2,NFILES,NTERMS,MODE,ZA,QTA,SGA,CLA05760
                   1 XLAMDA,XFIT,XISQR,A2(KURCRP),ALPH2(KURCRP),BETA2(KURCRP),WEIGHT) CLA05770
ISN 0401            XDIF=XCHIN-XISQR                                           CLA05780
ISN 0402            IF(ABS(XDIF).LE.XTOL) GO TO 43                             CLA05790
ISN 0404            XCHIN = XISQR                                              CLA05800
ISN 0405      42    CONTINUE                                                   CLA05810
                    C                                                        CLA05820
ISN 0406      43    XCHI(L)=XISQR                                              CLA05830
ISN 0407            TRPT02(L)=ZA(1)                                            CLA05840
                    C                                                        CLA05850
                    C  CHANNEL 4 FIT                                         CLA05860
ISN 0408            ZR(1)=T04(KURCRP)                                          CLA05870
ISN 0409            XLAMDA=1.E-03                                              CLA05880
ISN 0410            XCHIN=200.                                                 CLA05890
                    C                                                        CLA05900
ISN 0411            DO 814 I = 1,NFILES                                        CLA05910
ISN 0412      814   WEIGHT(I) = 1. / (SGM4(I) * SGM4(I))                      CLA05920
ISN 0413            DO 64 LA=1,LIMIT                                           CLA05930
ISN 0414            CALL CHNFIT(XDAY,ZMEAN,SGM4,NFILES,NTERMS,MODE,ZB,QTB,SGB,CLA05940
                   1 XLAMDA,YFT,ZISQR,A4(KURCRP),ALPH4(KURCRP),BETA4(KURCRP),WEIGHT) CLA05950
ISN 0415            XDIF=XCHIN-ZISQR                                           CLA05960
ISN 0416            IF(ABS(XDIF).LE.XTOL) GO TO 65                             CLA05970
ISN 0418            XCHIN = ZISQR                                              CLA05980
ISN 0419      64    CONTINUE                                                   CLA05990
                    C                                                        CLA06000
ISN 0420      65    ZCHI(L)=ZISQR                                              CLA06010
ISN 0421            TRPT04(L)=ZB(1)                                            CLA06020
ISN 0422            ZB(1)=T01(KURCRP)                                          CLA06030
                    C                                                        CLA06040
                    C  CHANNEL 1 FIT                                         CLA06050
ISN 0423            XLAMDA=1.E-03                                              CLA06060
ISN 0424            XCHIN=200.                                                 CLA06070
ISN 0425            DO 811 I = 1,NFILES                                        CLA06080
ISN 0426      811   WEIGHT(I) = 1. / (SGM1(I) * SGM1(I))                      CLA06090
ISN 0427            DO 3030 LA = 1,LIMIT                                       CLA06100
ISN 0428            CALL CHNFIT(XDAY,QMEAN,SGM1,NFILES,NTERMS,MODE,ZB,QTB,SGB,CLA06110
                   1 XLAMDA,YFT,QISQR,A1(KURCRP),ALPH1(KURCRP),BETA1(KURCRP),WEIGHT) CLA06120
ISN 0429            XDIF=XCHIN-QISQR                                           CLA06130
ISN 0430            IF(ABS(XDIF).LE.XTOL) GO TO 3031                           CLA06140
ISN 0432      3030  CONTINUE                                                   CLA06150
                    C                                                        CLA06160
ISN 0433      3031  QCHI(L)=QISQR                                              CLA06170
ISN 0434            TRPT01(L)=ZB(1)                                            CLA06180
ISN 0435      38    CONTINUE                                                   CLA06190
                    C  ******  END OF CALLS TO CHNFIT FOR TRAINING FIELD MEANS ******  CLA06200
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                C                                                                CLA06210
                C  COMPUTE MEAN AND S.D. OF CHISQ VALUES                         CLA06220
ISN 0436            CALL SDEV(QCHI,NPTSTF,QMEANN,SQ)                             CLA06230
ISN 0437            CALL SDEV (YCHI,NPTSTF,YMEANN,SY)                            CLA06240
ISN 0438            CALL SDEV (XCHI,NPTSTF,XMEANN,SX)                            CLA06250
ISN 0439            CALL SDEV (ZCHI,NPTSTF,ZMEANN,SZ)                            CLA06260
                C  COMPUTE THE THRESHOLD CUTS ON CHISQ FOR MAP                   CLA06270
                C                                                                CLA06280
                C                                                                CLA06290
ISN 0440            IF(IDUPDT.GT.1) TCUT=7.036                                   CLA06300
ISN 0442            THRCHI(1,KURCRP)=TCUT*QMEANN                                 CLA06310
ISN 0443            THRCHI(2,KURCRP)=TCUT*XMEANN                                 CLA06320
ISN 0444            THRCHI(3,KURCRP)=TCUT*YMEANN                                 CLA06330
ISN 0445            THRCHI(4,KURCRP)=TCUT*ZMEANN                                 CLA06340
                C  DETERMINE THE MAXIMUM VALUE OF CHISQ'S                        CLA06350
                C                                                                CLA06360
                CCCC  YMAX=0.                                                    CLA06370
                CCCC  ZMAX=0.                                                    CLA06380
                CCCC  XMAX=0.                                                    CLA06390
                CCCC  QMAX=0.                                                    CLA06400
                CCCC  DO 69 II=1,NPTSTF                                          CLA06410
                CCCC  IF(QCHI(II).GT.QMAX) QMAX=QCHI(II)                         CLA06420
                CCCC  IF(XCHI(II).GT.XMAX) XMAX=XCHI(II)                         CLA06430
                CCCC  IF(YCHI(II).GT.YMAX) YMAX=YCHI(II)                         CLA06440
                CCC 69IF(ZCHI(II).GT.ZMAX) ZMAX=ZCHI(II)                         CLA06450
                C                                                                CLA06460
ISN 0446            QMAX=TCUT                                                    CLA06470
ISN 0447            XMAX=TCUT                                                    CLA06480
ISN 0448            YMAX=TCUT                                                    CLA06490
ISN 0449            ZMAX=TCUT                                                    CLA06500
ISN 0450            IF(THRCHI(1,KURCRP).LT.QMAX) THRCHI(1,KURCRP)=QMAX           CLA06510
ISN 0452            IF(THRCHI(2,KURCRP).LT.XMAX) THRCHI(2,KURCRP)=XMAX           CLA06520
ISN 0454            IF(THRCHI(3,KURCRP).LT.YMAX) THRCHI(3,KURCRP)=YMAX           CLA06530
ISN 0456            IF(THRCHI(4,KURCRP).LT.ZMAX) THRCHI(4,KURCRP)=ZMAX           CLA06540
                C                                                                CLA06550
                C  *****  CALCULATE MEANS FOR STANDARD DEVIATIONS AND SET UPPER AND LOW CLA06560
                C  *****    LIMITS FOR CROP CRITERIAN                            CLA06570
ISN 0458            CALL SDEV(TRPT01,NPTSTF,TRT01M,ST)                           CLA06580
ISN 0459            CALL SDEV(TRPT02,NPTSTF,TRT02M,ST)                           CLA06590
ISN 0460            CALL SDEV(TRPT03,NPTSTF,TRT03M,ST)                           CLA06600
ISN 0461            CALL SDEV(TRPT04,NPTSTF,TRT04M,ST)                           CLA06610
                C                                                                CLA06620
ISN 0462            TRTOLW(1,KURCRP)=TRT01M-.25                                  CLA06630
ISN 0463            TRTOUP(1,KURCRP)=TRT01M+.25                                  CLA06640
ISN 0464            TRTOUP(2,KURCRP)=TRT02M+.20                                  CLA06650
ISN 0465            TRTOUP(3,KURCRP)=TRT03M+.20                                  CLA06660
ISN 0466            TRTOUP(4,KURCRP)=TRT04M+.20                                  CLA06670
ISN 0467            TRTOLW(2,KURCRP)=TRT02M-.20                                  CLA06680
ISN 0468            TRTOLW(3,KURCRP)=TRT03M-.20                                  CLA06690
ISN 0469            TRTOLW(4,KURCRP)=TRT04M-.20                                  CLA06700
                C                                                                CLA06710
                C  **********  END OF PROCESSING OF TRAINING FIELD  ***********   CLA06720
                C                                                                CLA06730
                C ********************************************************************** CLA06740
                C ********************************************************************** CLA06750
                C                                                                CLA06760
                C  SECTION 3--CREATE AND WRITE HEADER RECORD ON UNIT 8            CLA06770
ISN 0470        900   CONTINUE                                                   CLA06780
                C                                                                CLA06790
                C                                                                CLA06800
                C                                                                CLA06810
                C  *******  CREATE THE OUTPUT FILE ON UNIT 8  *******             CLA06820
                C  CLEAR THE HEADER RECORD ARRAY.                                CLA06830
ISN 0471            DO 104 I=1,3060                                              CLA06840
ISN 0472          104 HDR(I)=0                                                   CLA06850
                C                                                                CLA06860
                C COMPUTING SYSTEM ID (LOGICAL*1S 1-32)                          CLA06870
ISN 0473            HDR( 1)=KA                                                   CLA06880
ISN 0474            HDR( 2)=KA                                                   CLA06890
ISN 0475            HDR( 3)=KBLANK                                               CLA06900
ISN 0476            HDR( 4)=KO                                                   CLA06910
ISN 0477            HDR( 5)=KU                                                   CLA06920
ISN 0478            HDR( 6)=KA                                                   CLA06930
ISN 0479            HDR( 7)=KL                                                   CLA06940
ISN 0480            HDR( 8)=KBLANK                                               CLA06950
ISN 0481            HDR( 9)=KC                                                   CLA06960
ISN 0482            HDR(10)=KH                                                   CLA06970
ISN 0483            HDR(11)=KF                                                   CLA06980
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ISN 0484            HDR(12)=KC                                          CLA06990
ISN 0485            HDR(13)=KK                                          CLA07000
ISN 0486            HDR(14)=KBLANK                                      CLA07010
ISN 0487            HDR(15)=KC                                          CLA07020
ISN 0488            HDR(16)=KL                                          CLA07030
ISN 0489            HDR(17)=KA                                          CLA07040
ISN 0490            HDR(18)=KS                                          CLA07050
ISN 0491            HDR(19)=KS                                          CLA07060
ISN 0492            HDR(20)=KI                                          CLA07070
ISN 0493            HDR(21)=KF                                          CLA07080
ISN 0494            HDR(22)=KI                                          CLA07090
ISN 0495            HDR(23)=KE                                          CLA07100
ISN 0496            HDR(24)=KR                                          CLA07110
ISN 0497            DO 114 I=25,52                                      CLA07120
ISN 0498          114 HDR(I)=KBLANK                                     CLA07130
                  C SENSOR ID (1 - CLASSIFICATION FILE)                 CLA07140
ISN 0499            HDR(53)=1                                           CLA07150
ISN 0500            DO 115 I=54,60                                      CLA07160
ISN 0501          115 HDR(I)=KBLANK                                     CLA07170
                  C DATE OF PROCESSING - DAY                            CLA07180
ISN 0502            HDR(61)=IDAY                                        CLA07190
                  C DATE OF PROCESSING - MONTH                          CLA07200
ISN 0503            HDR(62)=IMON                                        CLA07210
                  C DATE OF PROCESSING - YEAR                           CLA07220
ISN 0504            HDR(63)=IYEAR                                       CLA07230
                  C TAPE SEQUENCE NUMBER                                CLA07240
ISN 0505            HDR(64)=1                                           CLA07250
                  C  SEGMENT NUMBER                                     CLA07260
ISN 0506              REWIND 30                                         CLA07270
ISN 0507              WRITE (30,1000) KSEGM                             CLA07280
ISN 0508              REWIND 30                                         CLA07290
ISN 0509              READ (30,1001) JSEGM                              CLA07300
ISN 0510          1000  FORMAT (A4)                                     CLA07310
ISN 0511          1001  FORMAT (I4)                                     CLA07320
ISN 0512            HDR(65) = ASEG(1)                                   CLA07330
ISN 0513            HDR(66) = ASEG(2)                                   CLA07340
ISN 0514            HDR(67) = ASEG(3)                                   CLA07350
ISN 0515            HDR(68) = ASEG(4)                                   CLA07360
                  C CHANNELS ACTIVE (10000000)                          CLA07370
ISN 0516            HDR(81)=128                                         CLA07380
                  C PROCESSING FLAG (1 - PROCESSED)                     CLA07390
ISN 0517            HDR(89)=1                                           CLA07400
                  C NUMBER OF CHANNELS                                  CLA07410
ISN 0518            HDR(90)=1                                           CLA07420
                  C NUMBER OF BITS PER LOGICAL*1                        CLA07430
ISN 0519            HDR(91)=8                                           CLA07440
                  C LOGICAL*1 ADD. OF START OF DATA IN SCAN             CLA07450
ISN 0520            HDR(93)=1                                           CLA07460
                  C NUMBER OF PIXELS PER SCAN                           CLA07470
ISN 0521            HDR(97)=196                                         CLA07480
                  C RECORD SIZE IN LOGICAL*1S (360)                     CLA07490
ISN 0522            HDR(100)=1                                          CLA07500
                  C   LOW ORDER LOGICAL*1S OF RECORD SIZE *              CLA07510
ISN 0523            HDR(101)=104                                        CLA07520
                  C NUMBER OF RECORDS TO MAKE DATA SET                  CLA07530
ISN 0524            HDR(104)=1                                          CLA07540
                  C LENGTH OF ANCILLARY BLOCK IN LOGICAL*1S (70)        CLA07550
ISN 0525            HDR(106)=70                                         CLA07560
                  C START PIXEL NUMBER                                  CLA07570
ISN 0526            HDR(109)=1                                          CLA07580
                  C STOP PIXEL NUMBER                                   CLA07590
ISN 0527            HDR(111)=196                                        CLA07600
                  C WORD LENGTH OF GENERATING COMPUTER (32)             CLA07610
ISN 0528            HDR(753)=32                                         CLA07620
                  C NUMBER OF DATA SETS PER RECORD                      CLA07630
ISN 0529            HDR(1778)=1                                         CLA07640
                  C NO. OF CHANNELS IN FIRST REC. OF DATA SET           CLA07650
ISN 0530            HDR(1786)=1                                         CLA07660
                  C NUMBER OF ELEMENTS PER SCAN                         CLA07670
                  C PIXEL SKIP FACTOR (PROCESS ALL PIXELS)              CLA07680
ISN 0531            HDR(1790)=1                                         CLA07690
                  C SCAN SKIP FACTOR (PROCESS ALL SCANS)                CLA07700
ISN 0532            HDR(1792)=1                                         CLA07710
                  C                                                     CLA07720
                  C  LOAD ACQUISITION DATES INTO HEADER RECORD.         CLA07730
                  C                                                     CLA07740
ISN 0533            DO 116 I=1,5                                        CLA07750
                  C ACQ. DATE FOR FIRST ACQ                             CLA07760
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ISN 0534            HDR(2248+I)=LACQDT(I)                                    CLA07770
                C ACQ. DATE FOR SECOND ACQ.                                  CLA07780
ISN 0535            HDR(2256+I)=LACQDT(8+I)                                  CLA07790
                C ACQ. DATE FOR THIRD ACQ.                                   CLA07800
ISN 0536            HDR(2264+I)=LACQDT(16+I)                                 CLA07810
                C ACQ. DATE FOR FOURTH ACQ.                                  CLA07820
ISN 0537            HDR(2272+I)=LACQDT(24+I)                                 CLA07830
                C ACQ. DATE FOR FIFTH ACQ.                                   CLA07840
ISN 0538          116 HDR(2280+I)=LACQDT(32+I)                               CLA07850
                C                                                            CLA07860
                C  LOAD DATA FOR PRODUCTION FILM CONVERTER.                  CLA07870
                C                                                            CLA07880
                C N*1000 SCAN LINES PER FRAME                                CLA07890
ISN 0539            HDR(2759)=1                                              CLA07900
ISN 0540            DO 117 I=2760,2789                                       CLA07910
ISN 0541          117 HDR(I)=KBLANK                                          CLA07920
                C JOB ID   (LOGICAL*1S 2260 - 2789)                          CLA07930
ISN 0542            HDR(2760)=KA                                             CLA07940
ISN 0543            HDR(2761)=KA                                             CLA07950
ISN 0544            HDR(2763)=KC                                             CLA07960
ISN 0545            HDR(2764)=KL                                             CLA07970
ISN 0546            HDR(2765)=KA                                             CLA07980
ISN 0547            HDR(2766)=KS                                             CLA07990
ISN 0548            HDR(2767)=KS                                             CLA08000
ISN 0549            HDR(2769)=KF                                             CLA08010
ISN 0550            HDR(2770)=KO                                             CLA08020
ISN 0551            HDR(2771)=KR                                             CLA08030
ISN 0552            DO 118 I=1,4                                             CLA08040
                C CROP OF INTEREST FROM INPUT DATA                           CLA08050
ISN 0553          118 HDR(2772+I)=ICROP(I)                                   CLA08060
                C DATE OF PROCESSING                                         CLA08070
                C SCAN TYPE (1 - SMOOTHED)                                   CLA08080
ISN 0554            HDR(2795)=1                                              CLA08090
                C CAMERA TYPE (1 - 5 INCH)                                   CLA08100
ISN 0555            HDR(2797)=1                                              CLA08110
                C TRUNCATION (2 - NO TRUNCATION)                             CLA08120
ISN 0556            HDR(2799)=2                                              CLA08130
                C CHANNELS REQUIRED (10000000)                               CLA08140
ISN 0557            HDR(2800)=128                                            CLA08150
                C REPEAT OF PIXELS IN SCAN                                   CLA08160
ISN 0558            HDR(2876)=6                                              CLA08170
                C REPEAT OF SCANS                                            CLA08180
ISN 0559            HDR(2877)=8                                              CLA08190
                C                                                            CLA08200
                C  LOAD USER SUPPLIED DATA INTO HEADER RECORD.  THE DATA IS  CLA08210
                C  THE VERTICES OF THE FIELD USED TO TRAIN THE CLASSIFIER.   CLA08220
                C                                                            CLA08230
ISN 0560            HDR(2941)=KT                                             CLA08240
ISN 0561            HDR(2942)=KR                                             CLA08250
ISN 0562            HDR(2943)=KBLANK                                         CLA08260
ISN 0563            HDR(2944)=KF                                             CLA08270
ISN 0564            HDR(2945)=KL                                             CLA08280
ISN 0565            HDR(2946)=KO                                             CLA08290
ISN 0566            HDR(2947)=KBLANK                                         CLA08300
ISN 0567            HDR(2948)=KEQUAL                                         CLA08310
ISN 0568            REWIND 30                                                CLA08320
ISN 0569         4022 FORMAT(4('(',F4.0,',',F4.0,');'))                      CLA08330
ISN 0570            WRITE (30,4022) (XFD(I),YFD(I),I=1,4)                    CLA08340
ISN 0571            REWIND 30                                                CLA08350
ISN 0572            READ (30,4023) (HDR(I),I=2949,2995)                      CLA08360
ISN 0573       4023 FORMAT (48A1)                                            CLA08370
                C                                                            CLA08380
                C  WRITE HEADER RECORD TO OUTPUT FILE                        CLA08390
ISN 0574            WRITE( 8,1111 ) (HDR(I),I=1,3060)                        CLA08400
ISN 0575       1111 FORMAT (17(1A0A1))                                       CLA08410
                C                                                            CLA08420
                C ***********************************************************CLA08430
                C ***********************************************************CLA08440
                C                                                            CLA08450
                C  SECTION 4--                                               CLA08460
                C                                                            CLA08470
                C  CLEAR OUTPUT ARRAY FOR DATA - HDR                         CLA08480
ISN 0576            DO 105 I=1,360                                           CLA08490
ISN 0577          105 HDR(I)=0                                               CLA08500
                C                                                            CLA08510
                C  *                                                    *    CLA08520
                C  ************************************************************CLA08530
                C                                                            CLA08540
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                C  NORMAL PROCESING FOR THE WHOLE SEGMENT                                  CLA08550
                C                                                                          CLA08560
                C     **********  PROCESS EACH LINE IN TEST FIELD  **********              CLA08570
                C                                                                          CLA08580
                C  POSITION TAPE AND READ VERTICES FOR TEST FIELD                          CLA08590
    ISN 0578       REWIND 11                                                               CLA08600
    ISN 0579       ITYPE = 1                                                               CLA08610
    ISN 0580       CALL RDFLES (ITYPE, HDR, XFD, YFD)                                      CLA08620
                C                                                                          CLA08630
                C  FIND MAX AND MIN FOR LINE                                               CLA08640
    ISN 0581       MINLNE = 117                                                            CLA08650
    ISN 0582       MAXLNE = 1                                                              CLA08660
    ISN 0583       MINPXL = 196                                                            CLA08670
    ISN 0584       MAXPXL = 1                                                              CLA08680
    ISN 0585       DO 620 I = 1,4                                                          CLA08690
    ISN 0586       IF (YFD(I) .GT. MAXLNE) MAXLNE = YFD(I)                                 CLA08700
    ISN 0588       IF (YFD(I) .LT. MINLNE) MINLNE = YFD(I)                                 CLA08710
    ISN 0590       IF (XFD(I) .GT. MAXPXL) MAXPXL = XFD(I)                                 CLA08720
    ISN 0592       IF (XFD(I) .LT. MINPXL) MINPXL = XFD(I)                                 CLA08730
    ISN 0594  620    CONTINUE                                                              CLA08740
                C                                                                          CLA08750
    ISN 0595       DO 630 LLINE = MINLNE, MAXLNE                                           CLA08760
    ISN 0596       LINENO = LLINE                                                          CLA08770
    ISN 0597       DO 601 I = 1,360                                                        CLA08780
    ISN 0598  601  HBUF(I) = KBLANK                                                        CLA08790
                C                                                                          CLA08800
                C  READ DATA FOR 1 LINE OF PIXELS                                          CLA08810
    ISN 0599       ITYPE = 2                                                               CLA08820
    ISN 0600       CALL RDFLES (ITYPE,IDATA, XFD, YFD)                                     CLA08830
                C                                                                          CLA08840
                C  MOVE RADIANCE VALUES'                                                   CLA08850
    ISN 0601       DO 610 KURACQ = 1,NFILES                                                CLA08860
    ISN 0602       KK = KURACQ                                                             CLA08870
    ISN 0603       IF (KK .GT. NOACQ) KK = NOACQ                                           CLA08880
    ISN 0605       DO 610 KURCHN = 1,4                                                     CLA08890
    ISN 0606       INCRE = (KURCHN -1) * 196                                               CLA08900
    ISN 0607       DO 605 KURPXL = MINPXL,MAXPXL                                           CLA08910
    ISN 0608       LOC = INCRE + KURPXL + 72                                               CLA08920
    ISN 0609       IHOLD1(4) = IDATA(LOC,KURACQ)                                           CLA08930
    ISN 0610       CHV(KURPXL,KURCHN,KURACQ) = IHOLD4                                      CLA08940
    ISN 0611  605  CONTINUE                                                                CLA08950
    ISN 0612  610  CONTINUE                                                                CLA08960
                C                                                                          CLA08970
                C  ******  PROCCESS PIXEL IPP FOR ALL THE CROPS  *****                     CLA08980
                C                                                                          CLA08990
    ISN 0613       DO 790 IPP = MINPXL,MAXPXL                                              CLA09000
                C  REMOVE THE SCREEN FACTOR ADDED TO THE PIXEL IF NECESSARY.               CLA09010
    ISN 0614       DO 432 KURACQ = 1,5                                                     CLA09020
    ISN 0615       IF (CHV(IPP,4,KURACQ).GT.127) CHV(IPP,4,KURACQ)=CHV(IPP,4,KURACQ)-     CLA09030
                  1 128                                                                    CLA09040
    ISN 0617  432  CONTINUE                                                                CLA09050
                C                                                                          CLA09060
                C                                                                          CLA09070
                C  PUT CHANNEL DATA IN FOUR VECTOR IN ORDER OF DAYS FOR CHANNELS 1 - 4     CLA09080
                C                                                                          CLA09090
    ISN 0618       DO 570 KURACQ = 1,5                                                     CLA09100
    ISN 0619       INDEX = LANDST(KURACQ) - 1                                              CLA09110
    ISN 0620       DO 570 KURCHN = 1,2                                                     CLA09120
    ISN 0621       XCH(KURCHN,KURACQ) = CHV(IPP,KURCHN,KURACQ)*CLNDST(INDEX,KURCHN)        CLA09130
    ISN 0622       XCH(3,KURACQ)=CHV(IPP,3,KURACQ)*CLNDST(INDEX,3)                         CLA09140
    ISN 0623       XCH(4,KURACQ)=2.0*CHV(IPP,4,KURACQ)*CLNDST(INDEX,4)                     CLA09150
    ISN 0624  570  CONTINUE                                                                CLA09160
                C                                                                          CLA09170
                C   **********PROCESS PIXEL IPP FOR ALL THE CROPS  **********             CLA09180
    ISN 0625       DO 780 KURCRP = 1,NOCROP                                                CLA09190
                C                                                                          CLA09200
                C  PROCESS CHANNELS IN REQUESTED ORDER                                     CLA09210
    ISN 0626       DO 1500 ICHAN = 1,4                                                     CLA09220
    ISN 0627       KURCHN = IORDRC(ICHAN)                                                  CLA09230
    ISN 0628       GO TO (1100, 1200, 1300, 1400), KURCHN                                  CLA09240
                C                                                                          CLA09250
                C  PROCESS CHANNEL 2                                                       CLA09260
    ISN 0629  1200 CONTINUE                                                                CLA09270
    ISN 0630       DO 12 M=1,NFILES                                                        CLA09280
    ISN 0631       XR=XCH(2,M)                                                             CLA09290
                C  PIXEL CANNOT BE PROCESSED IF ZERO RADIANCE VALUE                        CLA09300
    ISN 0632       IF (XR .LE. 1) GO TO 785                                                CLA09310
    ISN 0634       SNX=SQRT(.07*XR)                                                        CLA09320
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ISN 0635            IF(SNX.GT.SGMX(M,KURCRP)) SNX=.9*SGMX(M,KURCRP)                    CLA09330
ISN 0637            T2X=.04*XR+SNX*SNX                                                 CLA09340
ISN 0638            T2=SQRT(T2X)                                                       CLA09350
ISN 0639            XMEAN(M)=ALOG(XR)                                                  CLA09360
ISN 0640            SGM2(M)=SGMX(M,KURCRP)/XR                                          CLA09370
ISN 0641            IF(SGMX(M,KURCRP).LT.T2) SGM2(M)=T2/XR                             CLA09380
ISN 0643            IF(M.EQ.IDUPDT) SGM2(M)=20.*SGM2(M-1)                              CLA09390
ISN 0645     12       CONTINUE                                                        CLA09400
ISN 0646            XCHIN=200.                                                         CLA09410
ISN 0647            XLAMDA=1.E-03                                                      CLA09420
ISN 0648            ZA(1)= T02(KURCRP)                                                 CLA09430
                    C                                                                  CLA09440
ISN 0649            DO 822 I = 1,NFILES                                                CLA09450
ISN 0650     822    WEIGHT(I) = 1. / (SGM2(I) * SGM2(I))                               CLA09460
ISN 0651            DO 13 LA = 1,LIMIT                                                 CLA09470
ISN 0652            CALL CHNFIT(XDAY,XMEAN,SGM2,NFILES,NTERMS,MODE,ZA,QTA,SGA,         CLA09480
                   1 XLAMDA,XFIT,XISQR,A2(KURCRP),ALPH2(KURCRP),BETA2(KURCRP),WEIGHT)  CLA09490
ISN 0653            XDIF=XCHIN-XISQR                                                   CLA09500
ISN 0654            IF(ABS(XDIF).LE.XTOL) GO TO 14                                     CLA09510
ISN 0656            XCHIN=XISQR                                                        CLA09520
ISN 0657     13     CONTINUE                                                           CLA09530
                    C                                                                  CLA09540
                    C  CHECK TO SEE IF IT SATISFIES THE CROP CRITERIAN                 CLA09550
ISN 0658     14       IF( XISQR.GT.THRCHI(2,KURCRP).OR. ZA(1).GT.TRTOUP(2,KURCRP).OR.  CLA09560
                      * ZA(1).LT.TRTOLW(2,KURCRP) ) GO TO 80                           CLA09570
ISN 0660              GO TO 1500                                                       CLA09580
                    C                                                                  CLA09590
                    C  CUT BY CHANNEL 2                                                CLA09600
ISN 0661     80       ICUT(2,KURCRP)=ICUT(2,KURCRP)+1                                 CLA09610
ISN 0662              NOTCRP(KURCRP) = NOTCRP(KURCRP) + 1                              CLA09620
ISN 0663              GO TO 780                                                        CLA09630
                    C                                                                  CLA09640
                    C                                                                  CLA09650
                    C  PROCESS CHANNEL 3                                               CLA09660
ISN 0664     1300   CONTINUE                                                          CLA09670
ISN 0665            DO 11 KURACQ=1,NFILES                                              CLA09680
ISN 0666            YR=XCH(3,KURACQ)                                                   CLA09690
ISN 0667            IF(YR.LE.1.) GO TO 785                                             CLA09700
ISN 0669            SNY=SQRT(.06*YR)                                                   CLA09710
ISN 0670            IF(SNY.GT.SGMY(KURACQ,KURCRP)) SNY=.9*SGMY(KURACQ,KURCRP)         CLA09720
ISN 0672            T3X=.116*YR+SNY*SNY                                                CLA09730
ISN 0673            T3=SQRT(T3X)                                                       CLA09740
ISN 0674            YMEAN(KURACQ)=ALOG(YR)                                             CLA09750
ISN 0675            SGM3(KURACQ)=SGMY(KURACQ,KURCRP)/YR                                CLA09760
ISN 0676            IF(SGMY(KURACQ,KURCRP).LT.T3) SGM3(KURACQ)=T3/YR                   CLA09770
ISN 0678            IF(KURACQ.EQ.IDUPDT) SGM3(KURACQ)=20.*SGM3(KURACQ-1)               CLA09780
ISN 0680     11       CONTINUE                                                        CLA09790
ISN 0681            XLAMDA=1.E-03                                                      CLA09800
ISN 0682            XCHIN=200.                                                         CLA09810
ISN 0683            ZB(1)= T03(KURCRP)                                                 CLA09820
ISN 0684            DO 823 I = 1,NFILES                                                CLA09830
ISN 0685     823    WEIGHT(I) = 1. / (SGM3(I) * SGM3(I))                               CLA09840
ISN 0686            DO 3 LA = 1,LIMIT                                                  CLA09850
ISN 0687            CALL CHNFIT(XDAY,YMEAN,SGM3,NFILES,NTERMS,MODE,ZB,QTB,SGB,         CLA09860
                   1 XLAMDA,YFT,YISQR,A3(KURCRP),ALPH3(KURCRP),BETA3(KURCRP),WEIGHT)   CLA09870
ISN 0688            XDIF=XCHIN-YISQR                                                   CLA09880
ISN 0689            IF(ABS(XDIF).LE.XTOL) GO TO 4                                      CLA09890
ISN 0691            XCHIN=YISQR                                                        CLA09900
ISN 0692     3      CONTINUE                                                          CLA09910
                    C                                                                  CLA09920
                    C                                                                  CLA09930
                    C  CHECK TO SEE IF IT SATISFIES THE CROP CRITERION FOR CHANNEL 3   CLA09940
ISN 0693     4        IF(YISQR.GT.THRCHI(3,KURCRP) .OR. ZB(1).GT.TRTOUP(3,KURCRP) .OR.  CLA09950
                      *  ZB(1).LT.TRTOLW(3,KURCRP) ) GO TO 82                         CLA09960
ISN 0695              GO TO 1500                                                       CLA09970
                    C                                                                  CLA09980
                    C  CUT BY CHANNEL 3                                                CLA09990
ISN 0696     82       ICUT(3,KURCRP)=ICUT(3,KURCRP)+1                                 CLA10000
ISN 0697              NOTCRP(KURCRP) = NOTCRP(KURCRP) + 1                              CLA10010
ISN 0698              GO TO 780                                                        CLA10020
                    C                                                                  CLA10030
                    C  CH4 DATA FIT                                                    CLA10040
                    C                                                                  CLA10050
ISN 0699     1400   CONTINUE                                                          CLA10060
ISN 0700            DO 66 J=1,NFILES                                                   CLA10070
ISN 0701            ZR=XCH(4,J)                                                        CLA10080
ISN 0702            IF(ZR.LE.1.) GO TO 785                                             CLA10090
ISN 0704            SNZ=SQRT(.05*ZR)                                                   CLA10100
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ISN 0705            IF(SNZ.GT.SGMZ(J,KURCRP)) SNZ=.9*SGMZ(J,KURCRP)                    CLA10110
ISN 0707            T4X=1.21*SNZ*SNZ                                                   CLA10120
ISN 0708            T4=SQRT(T4X)                                                       CLA10130
ISN 0709            ZMEAN(J)=ALOG(ZR)                                                  CLA10140
ISN 0710            SGM4(J)=SGMZ(J,KURCRP)/ZR                                          CLA10150
ISN 0711            IF(SGMZ(J,KURCRP).LT.T4) SGM4(J)=T4/ZR                             CLA10160
ISN 0713            IF(J.EQ.IDUPDT) SGM4(J)=20.*SGM4(J-1)                              CLA10170
ISN 0715      66      CONTINUE                                                         CLA10180
ISN 0716             XLAMDA = 1.E-03                                                   CLA10190
                    C                                                                  CLA10200
ISN 0717            XCHIN=200.                                                         CLA10210
ISN 0718            ZB(1)= T04(KURCRP)                                                 CLA10220
ISN 0719            DO 824 I = 1,NFILES                                                CLA10230
ISN 0720      824   WEIGHT(I) = 1. / (SGM4(I) * SGM4(I))                              CLA10240
ISN 0721            DO 67 LA = 1,LIMIT                                                 CLA10250
ISN 0722            CALL CHNFIT (XDAY,ZMEAN,SGM4,NFILES,NTERMS,MODE,ZB,QTB,SGB,        CLA10260
                   1 XLAMDA,YFT,ZISQR,A4(KURCRP),ALPH4(KURCRP),BETA4(KURCRP),WEIGHT)   CLA10270
ISN 0723            XDIF=XCHIN-ZISQR                                                   CLA10280
ISN 0724            IF(ABS(XDIF).LE.XTOL) GO TO 68                                     CLA10290
ISN 0726            XCHIN=ZISQR                                                        CLA10300
ISN 0727      67    CONTINUE                                                           CLA10310
                    C                                                                  CLA10320
                    CC                                                                 CLA10330
                    C  DETERMINE IF THE CHISQR'S SATISFY THE THRESHOLDS CALCULATED     CLA10340
                    C  FROM THE TEST FIELD FOR CHAN 4                                  CLA10350
ISN 0728      68    IF( ZISQR.LE.THRCHI(4,KURCRP).AND. ZB(1).LE.TRTOUP(4,KURCRP).AND.  CLA10360
                   * ZB(1).GE.TRTOLW(4,KURCRP) ) GO TO 1500                            CLA10370
                    C                                                                  CLA10380
                    C  CUT BY CHANNEL 4                                                CLA10390
ISN 0730            ICUT(4,KURCRP)=ICUT(4,KURCRP)+1                                    CLA10400
ISN 0731            NOTCRP(KURCRP) = NOTCRP(KURCRP) + 1                                CLA10410
ISN 0732            GO TO 780                                                          CLA10420
                    C                                                                  CLA10430
                    C  CH1 FITS                                                        CLA10440
ISN 0733      1100  CONTINUE                                                           CLA10450
ISN 0734            DO 3040 J=1,NFILES                                                 CLA10460
ISN 0735            QR=XCH(1,J)                                                        CLA10470
ISN 0736            IF(QR.LE.1.) GO TO 785                                             CLA10480
ISN 0738            SNQ=SQRT(.07*QR)                                                   CLA10490
ISN 0739            IF(SNQ.GT.SGMQ(J,KURCRP)) SNQ=.9*SGMQ(J,KURCRP)                    CLA10500
ISN 0741            T1X=.036)*QR+SNQ*SNQ                                               CLA10510
ISN 0742            T1=SQRT(T1X)                                                       CLA10520
ISN 0743            QMEAN(J)=ALOG(QR)                                                  CLA10530
ISN 0744            SGM1(J)=SGMQ(J,KURCRP)/QR                                          CLA10540
ISN 0745            IF(SGMQ(J,KURCRP).LT.T1) SGM1(J)=T1/QR                             CLA10550
ISN 0747            IF(J.EQ.IDUPDT) SGM1(J)=20.*SGM1(J-1)                              CLA10560
ISN 0749      3040  CONTINUE                                                           CLA10570
ISN 0750            XLAMDA=1.E-03                                                      CLA10580
ISN 0751            XCHIN=200.                                                         CLA10590
ISN 0752            ZB(1) = T01(KURCRP)                                                CLA10600
ISN 0753            DO 821 I = 1,NFILES                                                CLA10610
ISN 0754      821   WEIGHT(I) = 1. /(SGM1(I) * SGM1(I))                               CLA10620
ISN 0755            DO 3041 LA = 1,LIMIT                                               CLA10630
ISN 0756            CALL CHNFIT(XDAY,QMEAN,SGM1,NFILES,NTERMS,MODE,ZB,QTB,SGB,         CLA10640
                   1 XLAMDA,YFT,QISQR,A1(KURCRP),ALPH1(KURCRP),BETA1(KURCRP),WEIGHT)   CLA10650
ISN 0757            XDIF=XCHIN-QISQR                                                   CLA10660
ISN 0758            IF(ABS(XDIF).LE.XTOL) GO TO 3042                                   CLA10670
ISN 0760            XCHIN=QISQR                                                        CLA10680
ISN 0761      3041  CONTINUE                                                           CLA10690
                    C                                                                  CLA10700
ISN 0762      3042  IF(QISQR.LE.THRCHI(1,KURCRP)) GO TO 1500                          CLA10710
ISN 0764            ICUT(1,KURCRP) = ICUT(1,KURCRP) + 1                                CLA10720
ISN 0765            NOTCRP(KURCRP) = NOTCRP(KURCRP) + 1                                CLA10730
ISN 0766            GO TO 780                                                          CLA10740
                    C                                                                  CLA10750
                    C  END OF CHANNEL PROCESSING LOOP FOR 1 PIXEL, ALL 4 CHANNELS      CLA10760
ISN 0767      1500  CONTINUE                                                           CLA10770
ISN 0768            HBUF(IPP) = ISYMBL(KURCRP)                                         CLA10780
ISN 0769            KROP(KURCRP) = KROP(KURCRP) + 1                                    CLA10790
ISN 0770            GO TO 790                                                          CLA10800
                    C                                                                  CLA10810
                    CC                                                                 CLA10820
                    C  ****  END OF PROCESSING FOR ALL CROPS FOR 1 PIXEL               CLA10830
ISN 0771      780   CONTINUE                                                           CLA10840
ISN 0772            NOTANY = NOTANY + 1                                                CLA10850
                    C                                                                  CLA10860
                    C  ZERO RADIANCE VALUE OR ALL CROPS CHECKED AND NONE CLASSIFIED    CLA10870
ISN 0773      785   HBUF(IPP)=KUNCLS                                                   CLA10880
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ISN 0774            ITOTUN=ITOTUN+1                                          CLA10890
                    C                                                        CLA10900
                    C  ****  END OF PROCESSING FOR ALL PIXELS FOR 1 LINE     CLA10910
ISN 0775           799   CONTINUE                                            CLA10920
                    C                                                        CLA10930
                    C                                                        CLA10940
                    C  ************************************************      CLA10950
                    C  *                                              *      CLA10960
                    C                                                        CLA10970
                    C  WRITE LINE OF CLASSIFIED PIXELS TO OUTPUT FILE.       CLA10980
ISN 0776               WRITE( 8,1111 ) (HDR(I),I=1,360)                      CLA10990
                    C                                                        CLA11000
                    C  *                                              *      CLA11010
                    C  ************************************************      CLA11020
                    C                                                        CLA11030
                    C                                                        CLA11040
                    C  END OF LINE DO LOOP                                   CLA11050
ISN 0777           630 CONTINUE                                              CLA11060
                    C                                                        CLA11070
                    C  WHEN THE LAST LINE HAS BEEN PROCESSED,  WRITE END OF REPORT  CLA11080
ISN 0778               WRITE (6,6008)                                        CLA11090
ISN 0779            6008 FORMAT(1H0,'CHISQ THRESHOLD -  CHANNEL',6X,'1',6X,  CLA11100
                       *'3',6X,'4'  )                                        CLA11110
                    C                                                        CLA11120
ISN 0780               DO 6029 KURCRP = 1,NOCROP                             CLA11130
ISN 0781               WRITE(6,6018)  (KURCRP, (THRCHI(I,KURCRP),I=1,4))     CLA11140
ISN 0782            6018  FORMAT ( /,1X, 'THRESHOLD FOR CROP', I2, 2X, 4F7.2, /)  CLA11150
                    C                                                        CLA11160
                    C  ****WARNING  REPORT TO BE DESIGNED                    CLA11170
ISN 0783               WRITE(6,6009)  ICROP(KURCRP),  KROP(KURCRP),  ICROP(KURCRP),  CLA11180
                      1  NOTCRP(KURCRP)                                      CLA11190
ISN 0784            6009 FORMAT('0   CLASSIFICATION RESULTS - PIXELS CLASSIFIED ',A4,' - ',CLA11200
                      1  I9, /, 29X,'PIXELS CLASSIFIED NON',A4,' - ', I6)    CLA11210
ISN 0785               WRITE (6,6019)  (ICUT(J,KURCRP),J=1,4)                CLA11220
ISN 0786            6019  FORMAT (44X,'CUT BY CH1 - ',I6,/,44X,'CUT BY CH2 - ',I6,/  CLA11230
                      1  ,44X,'CUT BY CH3 - ',I6,/,44X,'CUT BY CH4 - ',I6)   CLA11240
                    C                                                        CLA11250
                    C  SKIP LINES                                            CLA11260
ISN 0787               WRITE (6,6666)                                        CLA11270
                    C                                                        CLA11280
ISN 0788           6029  CONTINUE                                            CLA11290
                    C                                                        CLA11300
ISN 0789               WRITE (6,6039) NOTANY                                 CLA11310
ISN 0790           6039  FORMAT ('0 UNCLASSIFIED PIXELS -',I6)               CLA11320
                    C                                                        CLA11330
                    C  READ CLOCK FOR ELAPSED TIME                           CLA11340
ISN 0791               CALL CPTIME (TODAY, NTIME, NCPTIM, NVCPTM)             CLA11350
ISN 0792               XDIFTM = (NCPTIM - ICPTIM) / 6000.                    CLA11360
ISN 0793               XDIFVT = (NVCPTM - IVCPTM) / 6000.                    CLA11370
ISN 0794               WRITE (6,6010) XDIFTM, XDIFVT                         CLA11380
ISN 0795           6010  FORMAT('0 END OF RUN, ELAPSED TIME =',F8.2,'  ELAPSED VIRTUAL TIME  CLA11390
                      1 = ', F8.2)                                           CLA11400
ISN 0796               STOP                                                  CLA11410
ISN 0797               END                                                   CLA11420
```

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

SYMBOL	INTERNAL STATEMENT NUMBERS																		
I	0054	0055	0055	0062	0062	0238	0239	0239	0240	0240	0241	0241	0242	0242	0383	0384	0384	0384	
	0397	0398	0398	0398	0411	0412	0412	0412	0425	0426	0426	0426	0471	0472	0497	0498	0500	0501	0533
	0534	0534	0535	0535	0536	0536	0537	0537	0538	0538	0540	0541	0552	0553	0553	0570	0570	0570	0570
	0572	0572	0572	0574	0574	0574	0576	0577	0585	0586	0586	0588	0588	0588	0590	0590	0592	0592	0597	0598
	0649	0650	0650	0650	0684	0685	0685	0685	0719	0720	0720	0720	0753	0754	0754	0754	0776	0776	0776
	0781	0781	0781																
J	0077	0078	0079	0244	0244	0244	0700	0701	0705	0705	0709	0710	0710	0711	0711	0713	0713	0713	0734
	0735	0739	0739	0743	0744	0744	0745	0745	0747	0747	0747	0785	0785	0785					
K	0268	0268	0268	0285	0285	0285													
L	0302	0302	0302	0318	0318	0318	0337	0339	0340	0341	0342	0392	0393	0406	0407	0420	0421	0433	0434
M	0338	0339	0340	0341	0342	0347	0347	0349	0349	0351	0351	0353	0353	0363	0364	0364	0365	0366	0366
	0367	0367	0369	0369	0371	0372	0372	0373	0373	0375	0376	0376	0377	0377	0630	0631	0635	0635	0639
	0640	0640	0641	0641	0643	0643	0643												
A1	0016	0321	0424	0756															
A2	0016	0329	0400	0652															
A3	0016	0325	0386	0687															
A4	0016	0333	0414	0722															
II	0075	0075	0075																
JM	0082	0083	0083	0083	0093	0094	0095												
KA	0037	0044	0473	0474	0478	0489	0542	0543	0546										

*****FORTRAN CROSS REFERENCE LISTING*****

SYMBOL	INTERNAL	STATEMENT NUMBERS
KB	0037	0044
KC	0037	0044 0481 0484 0487 0544
KD	0037	0044 0565
KE	0037	0044 0483 0495
KF	0037	0044 0493 0549 0563
KG	0037	0044
KH	0037	0045 0482
KI	0037	0045 0492 0494
KJ	0037	0045
KK	0045	0112 0113 0121 0246 0246 0246 0247 0247 0247 0248 0248 0248 0249 0249 0249 0485 0602 0603
	0603	
KL	0037	0045 0479 0488 0545 0564
KM	0037	0045
KN	0037	0045
KO	0037	0046 0550
KP	0037	0046
KQ	0037	0046 0476
KR	0037	0046 0496 0551 0561
KS	0037	0046 0490 0491 0547 0548
KT	0038	0046 0560
KU	0038	0477
KV	0038	0046 0047
KW	0038	0047
KX	0038	0047
KY	0038	0047
KZ	0038	0047
K1	0048	0246 0253
K2	0048	0247 0269
K3	0048	0248 0287
K4	0048	0249 0303
LA	0266	0277 0294 0310 0385 0399 0413 0427 0651 0686 0721 0755
OR	0255	0256 0257 0339 0343 0355 0363 0364 0367 0735 0736 0738 0741 0743 0744 0745
SQ	0166	0168 0216 0221 0221 0229 0436
ST	0458	0459 0460 0461
SX	0169	0171 0217 0223 0223 0231 0438
SY	0172	0174 0218 0225 0225 0233 0437
SZ	0175	0177 0219 0227 0227 0235 0439
T1	0359	0367 0367 0742 0745 0745
T2	0360	0369 0369 0638 0641 0641
T3	0361	0373 0373 0673 0676 0676
T4	0362	0377 0377 0708 0711 0711
XR	0272	0273 0274 0340 0344 0356 0365 0366 0369 0631 0632 0634 0637 0639 0640 0641
YR	0289	0290 0291 0341 0345 0357 0371 0372 0373 0666 0667 0669 0672 0674 0675 0676
ZA	0028	0394 0400 0407 0648 0652 0658 0658
ZB	0028	0380 0386 0393 0408 0414 0421 0422 0428 0434 0683 0687 0693 0693 0718 0722 0728 0726 0752
	0756	
ZQ	0005	0239
ZR	0305	0306 0307 0342 0346 0375 0376 0377 0701 0702 0704 0709 0710 0711
ZX	0005	0240
ZY	0005	0241
ZZ	0005	0242
ARS	0263	0280 0297 0313 0388 0402 0416 0430 0654 0689 0724 0758
CHV	0013	0121 0133 0137 0140 0616 0615 0615 0615 0621 0622 0623
HDR	0033	0036 0088 0472 0473 0474 0475 0476 0477 0478 0479 0480 0481 0482 0483 0484 0485 0486 0487
	0488	0489 0490 0491 0492 0493 0494 0495 0496 0498 0499 0501 0502 0503 0504 0505 0512 0513 0514
	0515	0516 0517 0518 0519 0520 0521 0522 0523 0524 0525 0526 0527 0528 0529 0530 0531 0532 0534
	0535	0536 0537 0538 0539 0541 0542 0543 0544 0545 0546 0547 0548 0549 0550 0551 0553 0554 0555
	0556	0557 0558 0559 0560 0561 0562 0563 0564 0565 0566 0567 0572 0574 0577 0580 0776
IPP	0094	0100 0100 0102 0102 0124 0128 0133 0137 0140 0613 0615 0615 0615 0621 0622 0623 0768 0773
LOC	0119	0120 0608 0609
OPT	0021	0162 0166 0211 0216
QTA	0028	0400 0652
QTB	0028	0386 0414 0428 0687 0722 0756
SGA	0028	0400 0652
SGB	0028	0386 0414 0428 0687 0722 0756
SNQ	0343	0347 0347 0355 0355 0738 0739 0739 0741 0741
SNX	0344	0349 0349 0356 0356 0634 0635 0635 0637 0637
SNY	0345	0351 0351 0357 0357 0669 0670 0670 0672 0672
SNZ	0346	0353 0353 0358 0358 0704 0705 0705 0707 0707
T01	0015	0124 0422 0752
T02	0015	0332 0394 0649
T03	0015	0328 0683
T04	0015	0336 0408 0718
T1X	0355	0359 0741 0742
T2X	0356	0360 0637 0638

*****FORTRAN CROSS REFERENCE LISTING*****

SYMBOL	INTERNAL	STATEMENT NUMBERS																
T3X	0357	0361	0672	0673														
T4X	0358	0362	0707	0708														
XCH	0021	0137	0140	0141	0145	0146	0147	0148	0621	0622	0623	0631	0666	0701	0735			
XFD	0030	0088	0094	0109	0129	0570	0580	0590	0591	0592	0592	0600						
XH1	0020	0182	0192															
XH2	0020	0184	0194															
XH3	0020	0186	0196															
XH4	0020	0188	0198															
XL1	0020	0181	0192															
XL2	0020	0183	0194															
XL3	0020	0185	0196															
XL4	0020	0187	0198															
XPT	0030	0164	0169	0212	0217													
XTJ	0078	0079																
YFD	0030	0088	0095	0109	0129	0570	0580	0586	0586	0588	0588	0600						
YFT	0013	0386	0414	0428	0687	0722	0756											
YPT	0030	0165	0172	0213	0218													
ZFL	0127	0129																
ZFP	0128	0129																
ZPT	0031	0163	0175	0214	0219													
ALOG	0256	0273	0290	0306	0363	0365	0371	0375	0639	0674	0709	0743						
BSEG	0069	0010	0512	0513	0514	0515												
HBUF	0035	0036	0599	0768	0773													
ICOP	0129	0130																
ICUT	0032	0661	0661	0696	0696	0730	0730	0764	0764	0785								
IDAY	0067	0502																
IMON	0067	0503																
KROP	0032	0769	0769	0783														
MODE	0049	0261	0278	0295	0311	0386	0400	0414	0428	0652	0687	0722	0756					
NMAX	0005	0150																
QCHI	0022	0433	0436															
QDAT	0021	0145	0162	0192	0192	0203	0203	0211	0339									
QFTX	0023	0261	0278															
QFTY	0023	0295	0311															
QMAX	0446	0450	0450															
RFCT	0129																	
SDEV	0166	0169	0172	0175	0216	0217	0218	0219	0436	0437	0438	0439	0458	0459	0460	0461		
SGMQ	0025	0168	0181	0182	0229	0246	0257	0347	0347	0364	0367	0739	0739	0744	0745			
SGMX	0025	0171	0183	0184	0231	0247	0274	0349	0349	0366	0369	0635	0635	0640	0641			
SGMY	0025	0174	0185	0186	0233	0248	0291	0351	0351	0372	0373	0670	0670	0675	0676			
SGM7	0025	0177	0187	0188	0235	0249	0307	0353	0353	0376	0377	0705	0705	0710	0711			
SGM1	0029	0257	0261	0364	0367	0426	0426	0428	0744	0745	0747	0747	0754	0754	0756			
SGM2	0029	0274	0278	0366	0369	0398	0398	0400	0640	0641	0643	0643	0650	0650	0652			
SGM3	0029	0291	0295	0372	0373	0384	0384	0386	0675	0676	0678	0678	0685	0685	0687			
SGM4	0029	0307	0311	0376	0377	0412	0412	0414	0710	0711	0713	0713	0720	0720	0722			
SQRT	0343	0344	0345	0346	0359	0360	0361	0362	0634	0638	0669	0673	0704	0708	0738	0742		
TCUT	0051	0440	0442	0443	0444	0445	0446	0447	0448	0449								
XCHI	0022	0406	0438															
XDAT	0030	0146	0164	0194	0194	0204	0204	0212	0340									
XDAY	0013	0079	0261	0278	0295	0311	0386	0400	0414	0428	0652	0687	0722	0756				
XDIF	0262	0263	0279	0280	0296	0297	0312	0313	0387	0388	0401	0402	0415	0416	0429	0430	0653	0654	0688
	0689	0723	0724	0757	0758													
XFIT	0013	0400	0652															
XMAX	0447	0452	0452															
XTOL	0049	0263	0280	0297	0313	0388	0402	0416	0430	0654	0689	0724	0758					
XXXX	0141																	
YCHI	0022	0392	0437															
YDAT	0030	0147	0165	0196	0196	0205	0205	0213	0341									
YMAX	0448	0454	0454															
ZCHI	0022	0420	0439															
ZDAT	0031	0148	0163	0198	0198	0206	0206	0214	0342									
ZMAX	0449	0456	0456															
ACODT	0007	0008	0011	0072	0244													
ALPH1	0017	0322	0428	0756														
ALPH2	0017	0330	0400	0652														
ALPH3	0017	0326	0386	0687														
ALPH4	0017	0334	0414	0722														
BETA1	0018	0323	0428	0756														
BETA2	0018	0331	0400	0652														
BETA3	0018	0327	0386	0687														
BETA4	0018	0335	0414	0722														
CTIME	0034	0053	0062	0062														
ICHAN	0626	0627																
ICROP	0005	0062	0553	0783	0783													
ICUTT	0032																	

*****FORTRAN CROSS REFERENCE LISTING*****

SYMBOL	INTERNAL STATEMENT NUMBERS
IDATA	0002 0003 0109 0120 0600 0609
INCRE	0117 0119 0606 0608
INDEX	0135 0137 0140 0619 0621 0622 0623
ITYPE	0087 0088 0108 0109 0110 0579 0580 0599 0600
IYEAR	0067 0504
JSEGM	0010 0509
KSEGM	0007 0062 0507
LIMIT	0049 0385 0399 0413 0427 0651 0686 0721 0755
LLINE	0106 0107 0595 0596
NOACQ	0007 0060 0114 0114 0603 0603
NOPIX	0179 0201 0201 0203 0204 0205 0206 0210 0216 0217 0218 0219 0237
NTIME	0791
PELTA	0029 0261 0278 0295 0311
QISQR	0261 0262 0265 0268 0428 0429 0433 0756 0757 0760 0762
QMEAN	0024 0167 0181 0182 0220 0246 0255 0256 0261 0363 0428 0743 0756
SIGMA	0029 0261 0278 0295 0311
TODAY	0012 0053 0062 0065 0791
XCHIN	0259 0262 0265 0276 0279 0282 0293 0296 0299 0309 0312 0315 0382 0387 0390 0396 0401 0404 0410 0415 0418 0424 0429 0646 0653 0656 0682 0688 0691 0717 0723 0726 0751 0757 0760
XISQR	0278 0279 0282 0285 0400 0401 0404 0406 0652 0653 0656 0658
XMEAN	0024 0170 0183 0184 0230 0247 0272 0273 0278 0365 0400 0639 0652
XXDAT	0030 0075 0078 0083 0083
XXTOL	0267 0268 0284 0285 0301 0302 0317 0318
YISQR	0295 0296 0299 0302 0386 0387 0390 0392 0687 0688 0691 0693
YMEAN	0024 0173 0185 0186 0232 0248 0289 0290 0295 0371 0386 0674 0687
ZISQR	0311 0312 0315 0318 0414 0415 0418 0420 0722 0723 0726 0728
ZMEAN	0024 0176 0187 0188 0234 0249 0305 0306 0311 0375 0414 0709 0722
CHNFIT	0386 0400 0414 0428 0652 0687 0722 0756
CLNDST	0013 0040 0040 0040 0041 0042 0042 0042 0043 0137 0140 0621 0622 0623
CPTIME	0053 0791
CROPTM	0056
ICPTIM	0053 0792
IDUPDT	0081 0083 0221 0223 0225 0227 0440 0643 0678 0713 0747
IERROR	0056 0057
IHOLD1	0003 0004 0120 0609
IHOLD4	0004 0121 0610
IORDRC	0005 0627
ISYMBL	0005 0006 0055 0768
ITOTUN	0774 0774
IVCPTM	0053 0793
JSYMBL	0006 0050 0055
KBLANK	0039 0048 0475 0480 0486 0498 0501 0541 0562 0566 0598
KEQUAL	0039 0047 0567
KUNCLS	0039 0048 0773
KURACQ	0113 0114 0114 0120 0132 0133 0135 0137 0137 0140 0140 0141 0144 0145 0145 0146 0146 0147 0147 0148 0148 0160 0162 0163 0164 0165 0167 0168 0170 0171 0173 0174 0176 0177 0180 0181 0181 0181 0182 0182 0182 0183 0183 0184 0184 0184 0185 0185 0185 0186 0186 0186 0187 0187 0187 0188 0188 0188 0191 0192 0192 0192 0194 0194 0194 0194 0196 0196 0196 0198 0198 0198 0198 0202 0203 0203 0204 0204 0205 0205 0206 0206 0209 0211 0212 0213 0214 0220 0221 0223 0225 0227 0229 0230 0231 0232 0233 0234 0235 0254 0255 0256 0257 0257 0271 0272 0273 0274 0274 0288 0289 0290 0291 0291 0304 0305 0306 0307 0307 0601 0602 0609 0610 0614 0615 0615 0615 0618 0619 0621 0621 0622 0622 0623 0623 0665 0666 0670 0670 0674 0675 0675 0676 0676 0678 0678 0678
KURCHN	0116 0117 0121 0136 0137 0137 0137 0605 0606 0610 0620 0621 0621 0621 0627 0628
KURCRP	0086 0168 0171 0174 0177 0181 0182 0183 0184 0185 0186 0187 0188 0229 0231 0233 0235 0239 0240 0241 0242 0246 0247 0248 0249 0257 0274 0291 0307 0321 0322 0323 0324 0325 0326 0327 0328 0329 0330 0331 0332 0333 0334 0335 0336 0347 0347 0349 0349 0351 0351 0353 0353 0364 0366 0367 0369 0372 0373 0376 0377 0386 0386 0386 0394 0400 0400 0400 0408 0414 0414 0414 0422 0428 0428 0428 0442 0443 0444 0445 0450 0450 0452 0452 0454 0454 0456 0456 0462 0463 0464 0465 0466 0467 0468 0469 0625 0635 0635 0640 0641 0648 0652 0652 0652 0658 0658 0658 0661 0661 0662 0662 0670 0670 0675 0676 0683 0687 0687 0687 0693 0693 0693 0696 0696 0697 0697 0705 0705 0710 0711 0718 0722 0722 0722 0728 0728 0728 0730 0730 0731 0731 0739 0739 0744 0745 0752 0756 0756 0756 0762 0764 0764 0765 0765 0768 0769 0769 0780 0781 0781 0783 0783 0783 0783 0785
KURPIX	0161 0162 0162 0163 0163 0164 0164 0165 0165 0190 0192 0192 0194 0194 0196 0196 0198 0198 0203 0204 0205 0206 0210 0211 0211 0212 0212 0213 0213 0214 0214
KURPXL	0118 0119 0121 0607 0608 0610
LACQDT	0009 0011 0534 0535 0536 0537 0538
LANDST	0007 0135 0619
LINENO	0002 0095 0096 0096 0098 0098 0107 0127 0596
MAXLNE	0089 0096 0096 0106 0582 0586 0586 0595
MAXPIX	0092 0100 0100 0118 0124 0125
MAXPXL	0584 0590 0590 0607 0613
MINLNE	0090 0098 0098 0106 0581 0588 0588 0595
MINPIX	0091 0102 0102 0118 0124 0125
MINPXL	0583 0592 0592 0607 0613
NCPTIM	0791 0792

```
                              *****F O R T R A N   C R O S S   R E F E R E N C E   L I S T I N G*****
SYMBOL   INTERNAL STATEMENT NUMBERS
NFILES.  0052 0077 0082 0144 0160 0180 0191 0202 0209 0244 0254 0261 0271 0278 0288 0295 0304 0311 0338
         0383 0386 0397 0400 0411 0414 0425 0428 0601 0630 0649 0652 0665 0684 0687 0700 0719 0722 0734
         0753 0756
NOACOS   0002 0060
NOCROP   0005 0062 0086 0625 0780
NOTANY   0772 0772 0789
NOTCRP   0032 0662 0662 0697 0697 0731 0731 0765 0765 0783
NPTSTF   0105 0143 0143 0145 0146 0147 0148 0150 0154 0156 0157 0161 0166 0169 0172 0175 0190 0237 0244
         0337 0436 0437 0438 0439 0458 0459 0460 0461
NTERMS   0049 0386 0400 0414 0428 0652 0687 0722 0756
NVCPTM   0791 0793
NXTLNE   0002
QCOFFS   0014 0239 0253 0261 0268 0321 0322 0323 0324
QMEANN   0166 0167 0216 0220 0436 0442
RDEXCT   0059
RDFLES   0088 0109 0580 0600
THRCHI   0019 0442 0443 0444 0445 0450 0450 0452 0452 0454 0454 0456 0456 0658 0693 0728 0762 0781
TRJFIT   0261 0278 0295 0311
TRPT01   0027 0434 0458
TRPT02   0027 0407 0459
TRPT03   0027 0393 0460
TRPT04   0027 0421 0461
TRTOLW   0019 0462 0467 0468 0469 0658 0693 0728
TRTOUP   0019 0463 0464 0465 0466 0658 0693 0728
TRT01M   0458 0462 0463
TRT02M   0459 0464 0467
TRT03M   0460 0465 0468
TRT04M   0461 0466 0469
WEIGHT   0026 0384 0386 0398 0400 0412 0414 0426 0428 0650 0652 0685 0687 0720 0722 0754 0756
XCOEFS   0014 0240 0269 0278 0285 0329 0330 0331 0332
XDIFTM   0792 0794
XDIFVT   0793 0794
XLAMDA   0258 0261 0267 0275 0278 0284 0292 0295 0301 0308 0311 0317 0381 0386 0395 0400 0409 0414 0423
         0428 0647 0652 0681 0687 0716 0722 0750 0756
XMEANN   0169 0170 0217 0230 0438 0443
YCOEFS   0014 0241 0287 0295 0302 0325 0326 0327 0328 0380
YMEANN   0172 0173 0218 0232 0437 0444
ZCOEFS   0014 0242 0303 0311 0318 0333 0334 0335 0336
ZMEANN   0175 0176 0219 0234 0439 0445

                              *****F O R T R A N   C R O S S   R E F E R E N C E   L I S T I N G*****
  LABEL    DEFINED     REFERENCES
     1     0085        0082
     2     0055        0054
     3     0692        0686
     4     0693        0689
     5     0073        0072
     6     0076        0075
     7     0080        0077
    10     0104        0093
    11     0680        0665
    12     0645        0630
    13     0657        0651
    14     0658        0654
    28     0154        0110
    29     0178        0160
    31     0165        0161
    32     0274        0271
    33     0283        0277
    34     0284        0290
    35     0291        0288
    36     0300        0294
    37     0301        0297
    38     0435        0337
    39     0379        0338
    40     0391        0385
    41     0392        0388
    42     0405        0399
    43     0406        0402
    45     0316        0310
    46     0317        0313
    47     0307        0304
    48     0160        0150 0154
    49     0122        0118
```

ORIGINAL PAGE IS
OF POOR QUALITY

*****FORTRAN CROSS REFERENCE LISTING*****

LABEL	DEFINED	REFERENCES				
50	0123	0112	0116			
64	0419	0413				
65	0420	0416				
66	0715	0700				
67	0727	0721				
68	0728	0724				
80	0661	0658				
82	0696	0693				
104	0472	0471				
105	0577	0576				
114	0498	0497				
115	0501	0500				
116	0538	0533				
117	0541	0540				
118	0553	0552				
125	0189	0180				
126	0200	0191				
128	0207	0202				
129	0208	0190	0192	0194	0196	0198
130	0215	0210				
140	0236	0209				
432	0617	0614				
501	0132	0125				
505	0139	0136				
510	0142	0132				
515	0149	0144				
520	0152	0124	0130	0133		
530	0153	0106				
570	0624	0618	0620			
601	0598	0597				
605	0611	0607				
610	0612	0601	0605			
620	0594	0585				
630	0777	0595				
780	0771	0625	0663	0698	0732	0766
785	0773	0632	0667	0702	0736	
790	0775	0613	0770			
811	0426	0425				
812	0398	0397				
813	0384	0383				
814	0412	0411				
821	0754	0753				
822	0650	0649				
823	0685	0684				
824	0720	0719				
900	0470	0086				
950	0158	0156	0157			
1000	0510	0507				
1001	0511	0509				
1100	0733	0628				
1111	0575	0574	0776			
1200	0629	0628				
1300	0664	0628				
1400	0699	0628				
1500	0767	0626	0660	0695	0728	0762
2999	0243	0238				
3000	0257	0254				
3001	0266	0260				
3002	0267	0263				
3030	0432	0427				
3031	0433	0430				
3040	0749	0734				
3041	0761	0755				
3042	0762	0758				
4022	0569	0570				
4023	0573	0572				
6000	0061	0062				
6001	0068	0065				
6002	0069	0067				
6003	0245	0244				
6004	0250	0246	0247	0248	0249	
6005	0252	0251				
6006	0270	0253	0269	0287	0303	
6007	0286	0268	0285	0302	0318	
6008	0779	0778				

*****FORTRAN CROSS REFERENCE LISTING*****

LABEL	DEFINED	REFERENCES
6009	0784	0783
6010	0795	0794
6018	0782	0781
6019	0786	0785
6029	0788	0780
6039	0790	0789
6666	0320	0319 0787
9992	0061	
9999	0138	

/ MAIN / SIZE OF PROGRAM 00C280 HEXADECIMAL BYTES

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
I	SF	I*4	000A9C	J	SF	I*4	000AA0	K	F	I*4	000AA4	L	SF	I*4	000AA8
M	SF	I*4	000AAC	A1	SFA	R*4	000C44	A2	SFA	R*4	000C6C	A3	SFA	R*4	000C94
A4	SFA	R*4	000CBC	II	F	I*4	000AB0	JM	SF	I*4	000AB4	KA	F	L*1	000A80
KB		L*1	000A81	KC	F	L*1	000A82	KD	F	L*1	000A83	KE	F	L*1	000A84
KF	F	L*1	000A85	KG		L*1	000A86	KH	F	L*1	000A87	KI	F	L*1	000A88
KJ		L*1	000A89	KK	SF	I*4	000A88	KL	F	L*1	000A8A	KM		L*1	000A8B
KN		L*1	000A8C	KO	F	L*1	000A8D	KP		L*1	000A8E	KQ	F	L*1	000A8F
KR	F	L*1	000A90	KS	F	L*1	000A91	KT	F	L*1	000A92	KU	F	L*1	000A93
KV		L*1	000A94	KW		L*1	000A95	KX		L*1	000A96	KY		L*1	000A97
KZ		L*1	000A98	K1	F	I*4	000ABC	K2	F	I*4	000AC0	K3	F	I*4	000AC4
K4	F	I*4	000AC8	L1	SF	I*4	000ACC	OR	SFA	R*4	000AD0	SQ	SFA	R*4	000AD4
ST	SFA	R*4	000AD8	SX	SFA	R*4	000ADC	SY	SFA	R*4	000AE0	SZ	SFA	R*4	000AE4
T1	SF	R*4	000AF8	T2	SF	R*4	000AEC	T3	SF	R*4	000AF0	T4	SF	R*4	000AF4
XR	SFA	R*4	000AF8	YR	SFA	R*4	000AFC	ZA	SFA	R*4	000CE4	ZB	SFA	R*4	000CE8
ZQ	F C	R*4	000028	ZR	SFA	R*4	000B00	ZX	F C	R*4	0000C8	ZY	F C	R*4	000168
ZZ	F C	R*4	000208	CHV	SF	R*4	003F18	HDR	SFA E	L*1	007C68	IPP	SF	I*4	000B04
LOC	SF	I*4	000408	OPT	SFA	R*4	000CEC	QTA	SFA	R*4	000E54	QTB	SFA	R*4	000E58
SGA	SFA	R*4	000F5C	SGB	SFA	R*4	000E60	SNQ	SF	R*4	000B0C	SNX	SF	R*4	000B10
SNY	SF	R*4	000B14	SNZ	SF	R*4	000B18	T01	SF	R*4	000F64	T02	SF	R*4	000E84
T03	SF	R*4	000EA4	T04	SF	R*4	000EC4	T1X	SFA	R*4	000B1C	T2X	SFA	R*4	000B20
T3X	SFA	R*4	000B24	T4X	SFA	R*4	000B28	XCH	SF	R*4	000EE4	XFD	SFA	R*4	000F34
XH1	S	R*4	000F44	XH2	S	R*4	000F58	XH3	S	R*4	000F6C	XH4	S	R*4	000F80
XL1	S	R*4	000F94	XL2	S	R*4	000FA8	XL3	S	R*4	000FBC	XL4	S	R*4	000FD0
XPT	SFA	R*4	000FE4	XTJ	SF	R*4	000B2C	YFD	SFA	R*4	00114C	YFT	SFA	R*4	00115C
YPT	SFA	R*4	001160	ZFL	SFA	R*4	000B30	ZFP	SFA	R*4	000B34	ZPT	SFA	R*4	0012C8
ALOG	F XF	R*4	000000	BSEG	F E	L*1	007C60	HRUF	S E	L*1	007CB0	ICOR	SFA	I*4	000B38
ICUT	SF	I*4	001430	IDAY	SF	I*4	000B3C	IMON	SF	I*4	000B40	KROP	SF	I*4	0014D4
MODE	SFA	I*4	000B44	NMAX	C	I*4	0002A8	QCHI	SFA	R*4	0014FC	QDAT	SF	R*4	001510
QFTX	SFA	R*4	001C18	QFTY	SFA	R*4	001C2C	QMAX	SF	R*4	000B48	RECT	SF XF		000000
SDEV	SF XF		000000	SGMQ	SF	R*4	001C40	SGMX	SF	R*4	001D08	SGMY	SF	R*4	0010D0
SGMZ	SF	R*4	001E98	SGM1	SFA	R*4	001F60	SGM2	SFA	R*4	001F74	SGM3	SFA	R*4	001F88
SGM4	SFA	R*4	001F9C	SQRT	F XF	R*4	000000	TCUT	SF	R*4	000B4C	XCHI	SFA	R*4	001FB0
XDAT	SF	R*4	001FC4	XDAY	SFA	R*4	0026CC	XDIF	S A	R*4	000B50	XFIT	SFA	R*4	0026E0
XMAX	SF	R*4	000B54	XTOL		R*4	000B58	XXXX	S	R*4	000B5C	YCHI	SFA	R*4	0026E4
YDAT	SF	R*4	0026F8	YMAX	SF	R*4	000B60	ZCHI	SFA	R*4	002E00	ZDAT	SF	R*4	002E14
ZMAX	SF	R*4	000B64	ACQDT	F CE	R*8	000008	ALPH1	SFA	R*4	00351C	ALPH2	SFA	R*4	003544
ALPH3	SFA	R*4	00356C	ALPH4	SFA	R*4	003594	BETA1	SFA	R*4	0035BC	BETA2	SFA	R*4	0035E4
BETA3	SFA	R*4	00360C	BETA4	SFA	R*4	003634	CTIME	SFA	I*2	000C3A	ICHAN	SF	I*4	000B68
ICROP	F C	I*4	000000	ICUTT		I*4	NR	IDATA	SFA C	L*1	000008	INCRE	SF	I*4	000B6C
INDEX	SF	I*4	000B70	ITYPE	SFA	I*4	000B74	IYEAR	SF	I*4	000B78	JSEGM	S E	I*4	007C60
KSEGM	F CE	I*4	000030	LIMIT	F	I*4	000B7C	LLINE	SF	I*4	000B80	NOACQ	F C	I*4	000000
NOPIX	SFA	I*4	000B84	NTIME	SFA	I*4	000B88	PELTA	SFA	R*4	00365C	QISQR	SFA	R*4	000B8C
QMEAN	SFA	R*4	003670	SIGMA	SFA	R*4	003684	TODAY	SFA	R*8	000C28	XCHIN	SF	R*4	000B90
XISQR	SFA	R*4	000B94	XMEAN	SFA	R*4	003698	XXDAT	SF	R*4	0036AC	XXTOL	SF	R*4	000B98
YISQR	SFA	R*4	000B9C	YMEAN	SFA	R*4	0036C0	ZISQR	SFA	R*4	000BA0	ZMEAN	SFA	R*4	0036D4
CHNFIT	SF XF		000000	CLNOST	F	R*4	0036E8	CPTIME	SF XF		000000	CROPTN	SF XF		000000
IRCOM#	XF	I*4	000000	ICPTIM	SFA	I*4	000BA4	IDUPDT	S	I*4	000BA8	IERROR	SFA	I*4	000BAC
IHOLD1	S E	L*1	007C58	IHOLD4	F E	L*1	007C58	IORDRC	F C	I*4	0002AC	ISYMBL	SF C	L*1	0002C0
ITOTUN	SF	I*4	000BB0	IVCPTM	SFA	I*4	000BB4	JSYMBL	F	L*1	000C30	KBLANK	F	L*1	000A99
KEQUAL	F	L*1	000A9A	KUNCLS	F	L*1	000A9B	KURACQ	SF	I*4	000BB8	KURCHN	SF	I*4	000BBC
KURCRP	SFA	I*4	000BC0	KURPIX	SF	I*4	000BC4	KURPXL	SF	I*4	000BC8	LACQDT	F CE	L*1	000008
LANDST	F CE	I*4	000034	LINENO	SF C	I*4	000004	MAXLNE	SF	I*4	000BCC	MAXPIX	SF	I*4	000BD0
MAXPXL	SF	I*4	000BD4	MINLNE	SF	I*4	000BD8	MINPIX	SF	I*4	000BDC	MINPXL	SF	I*4	000BE0
NCPTIM	SFA	I*4	000BE4	NFILES	SFA	I*4	000BE8	NOACQS	S C	I*4	001AC8	NOCROP	F C	I*4	0002BC
NOTANY	SF	I*4	000BEC	NOTCRP	SF	I*4	003708	NPTSTF	SFA	I*4	000BF0	NTERMS	SFA	I*4	000BF4
NVCPTM	SFA	I*4	000BF8	NXTLNE	C	I*4	NR	QCOEFS	SFA	R*4	003730	QMEANN	SFA	R*4	000BFC
PDFXCT	SF XF		000000	RNFLES	SF XF		000000	THRCHI	SF	R*4	003740	TRJFIT	SF XF		000000
TRPT01	SFA	R*4	0037E0	TRPT02	SFA	R*4	003948	TRPT03	SFA	R*4	003AB0	TRPT04	SFA	R*4	003C18
TRTOLW	S	R*4	003D80	TRTOUP	S	R*4	003E20	TRT01M	SFA	R*4	000C00	TRT02M	SFA	R*4	000C04
TRT03M	SFA	R*4	000C08	TRT04M	SFA	R*4	000C0C	WEIGHT	SFA	R*8	003FF0	XCOEFS	SFA	R*4	003EC0
XDIFTM	SF	R*4	000C10	XDIFVT	SF	R*4	000C14	XLAMDA	SFA	R*4	000C18	XMEANN	SFA	R*4	000C1C

YCOEFS SFA R*4 003F00 YMEANN SFA R*4 000C20 ZCOEFS SFA R*4 003EE0 ZMEANN SFA R*4 000C24

***** COMMON INFORMATION *****

NAME OF COMMON BLOCK * LINES* SIZE OF BLOCK 0014CC HEXADECIMAL BYTES

VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.
NXTLNE	I*4	000000 NP	LINENO	I*4	000004	IDATA	L*1	000008	NOACQS	I*4	001AC8

NAME OF COMMON BLOCK * USFP* SIZE OF BLOCK 0002CA HEXADECIMAL BYTES

VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.
ICROP	I*4	000000	ZU	K*4	000028	ZX	R*4	0000C8	ZY	R*4	000168
ZZ	R*4	000208	NMAX	I*4	0002A8	IORDRC	I*4	0002AC	NOCROP	I*4	0002BC
ISYMBL	L*1	0002C0									

NAME OF COMMON BLOCK * MISC* SIZE OF BLOCK 000062 HEXADECIMAL BYTES

VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.
NOACQ	I*4	000000	ACODT	R*8	000008	KSEGM	I*4	000030	LANDST	I*4	000034

EQUIVALENCED VARIABLES WITHIN THIS COMMON BLOCK

VARIABLE	OFFSET	VARIABLE	OFFSET	VARIABLE	OFFSET	VARIABLE	OFFSET
LACODT	000008						

SOURCE STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
2	55	008BD6	7	80	008A88	1	85	008AD0	10	104	008BAE
49	122	008CAE	50	123	008CC2	501	132	008D54	505	139	008DF4
510	142	008F56	515	149	008F0A	520	152	008F2E	530	153	008F42
28	154	008F56	48	160	008FAA	31	165	009024	29	178	00913E
125	189	009316	126	200	00947A	128	207	009556	129	208	00956A
130	215	009616	140	236	00976A	2999	243	009836	3000	257	009A12
3001	266	009A90	3002	267	009AA4	32	274	009B5A	33	283	009BD8
34	284	009BEC	35	291	009CA2	36	300	009D20	37	301	009D34
47	307	009DF2	45	316	009E70	46	317	009E84	39	379	00A456
813	384	00A4BE	40	391	00A53A	41	392	00A54E	812	398	00A59A
42	405	00A646	43	406	00A65A	814	412	00A6AA	64	419	00A756
65	420	00A76A	811	426	00A7D6	3030	432	00A85A	3031	433	00A86E
38	435	00A896	900	470	00AAC6	104	472	00AAF6	114	498	00AC04
115	501	00AC3E	116	538	00ADE8	117	541	00AE26	118	553	00AE8C
105	577	00B038	620	594	00B1AE	601	598	00B1DE	605	611	00B2C6
610	612	00B2DA	432	617	00B3B8	570	624	00B46A	1200	629	00B4CC
12	645	00B60A	822	650	00B646	13	657	00B6F2	14	658	00B706
80	661	00B752	1300	664	00B792	11	680	00B800	823	685	00B90C
3	692	00B988	4	693	00B9CC	82	696	00BA18	1400	699	00BA58
66	715	00BB94	824	720	00BB00	67	727	00BC7C	68	728	00BC90
1100	733	00BD18	3040	749	00BE56	821	754	00BE92	3041	761	00BF3E
3042	764	00BF52	1500	767	00BFAA	780	771	00BFFC	785	773	00C020
790	775	00C03E	630	777	00C080	6029	788	00C194			

COMPILER GENERATED LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
100000	1	008988	100001	56	008BFC	100002	58	008910	100003	59	00891E
100008	78	008A64	100009	81	008A9C	100010	83	008AAC	100011	84	008AC8
100012	86	008AE4	100013	87	008AEC	100014	94	008B1E	100015	97	008B66
100016	98	008B6A	100017	99	008B7A	100018	100	008B86	100019	101	008B92
100020	102	008B9A	100021	103	008BA6	100022	105	008BC2	100023	107	008BD2
100024	112	008BFE	100025	113	008C06	100026	115	008C1A	100027	116	008C26
100028	117	008C2E	100029	119	008C48	100031	124	008CD6	100032	124	008CEA
100033	125	008CF2	200001	126	008CFE	100034	127	00ADDA	100035	133	008D5C
100036	135	008D7E	100037	137	008D9E	100038	140	008E0B	100039	143	008E6A
100040	145	008E7E	100041	150	008F1E	100044	156	008F62	100045	161	008F82
100046	162	008F8A	100047	166	009054	100048	179	009152	100049	181	009162
100050	190	00932A	100051	191	009332	100052	192	00933A	200002	193	009364
100053	194	00938E	200003	195	0093B8	100054	196	0093E2	200004	197	009408
100055	198	00942E	200005	199	009454	100056	201	00948E	100057	203	0094A2
100059	209	00957E	100060	210	0095B6	100061	211	0095BE	100062	216	00962E
100063	222	009672	100064	223	00967E	100065	224	00968A	100066	225	009696
100067	226	0096A2	100068	227	0096AE	100069	228	0096BA	100070	229	0096C6

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100071  237  00077F    100072  239  00078F    100073  244  009848    100074  255  0099EC
100085  258  009A50    100086  261  009A68    100087  265  009A88    100089  268  009AC8
100090  268  009AF8    100091  272  009B34    100092  275  009B98    100093  278  009B80
100094  282  009BD0    100096  285  009C10    100097  285  009C40    100098  289  009C7C
100099  292  009CE0    100100  295  009CF8    100101  299  009D18    100103  302  009D58
100104  302  009D88    100105  305  009DC4    100106  308  009E30    100107  311  009E48
100108  315  009F68    100110  318  009FA8    100111  318  009ED8    100112  338  00A004
100113  339  00A00C    100114  348  00A0FE    100115  349  00A120    100116  350  00A142
100117  351  00A164    100118  352  00A186    100119  353  00A1A8    100120  354  00A1CA
100121  355  00A1EC    100122  368  00A314    100123  369  00A32C    100124  370  00A34E
100125  371  00A366    100126  374  00A3C4    100127  375  00A3DC    100128  378  00A43E
100129  380  00A46A    100130  385  00A4DA    100131  386  00A4E2    100132  390  00A532
100134  399  00A5E6    100135  400  00A5EE    100136  404  00A63E    100138  413  00A6F6
100139  414  00A6FE    100140  418  00A74E    100142  427  00A802    100143  428  00A80A
100145  436  00A8AA    100146  441  00A8DE    100147  442  00A8E6    100148  451  00A962
100149  452  00A976    100150  453  00A98E    100151  454  00A9A2    100152  455  00A9BA
100153  456  00A9CE    100154  457  00A9E6    100155  458  00A9FA    100156  471  00AADE
100157  473  00A80A    100158  499  00AC2A    100159  502  00AC64    100160  534  00AD9C
100161  539  00AF12    100162  542  00AE4C    100163  554  00AEEC    100164  570  00AF94
100165  570  00AFCA    100170  578  00B05C    100171  586  00B09E    100172  587  00B0C4
100173  588  00B0E2    100174  589  00B108    100175  590  00B126    100176  591  00B14C
100177  592  00B16A    100178  593  00B190    100179  595  00B1C2    100180  596  00B1CA
100181  599  00B204    100182  602  00B21E    100183  604  00B232    100184  605  00B23E
100185  606  00B246    100186  608  00B260    100188  613  00B2EE    100189  613  00B302
100190  614  00B30A    100191  615  00B312    100192  616  00B334    100193  618  00337C
100194  619  00B3B4    100195  621  00B3A4    100196  625  00B47E    100197  625  00B492
100198  626  00B49A    100199  627  00B4A2    100201  631  00B4D4    100202  634  00B4EC
100203  636  00B522    100204  637  00B544    100205  642  00B5C6    100206  643  00B50E
100207  644  00B5EA    100208  646  00B61E    100209  651  00B692    100210  652  00B69A
100211  656  00B6EA    200006  659  00B71E    200007  659  00B736    100213  660  00374E
100214  666  00B79A    100215  669  00B7B2    100216  671  00B7F8    100217  672  00B80A
100218  677  00B88C    100219  678  00B8A4    100220  679  00B8B0    100221  681  00B8E4
100222  686  00B95A    100223  687  00B960    100224  691  00B9B0    200008  694  00B9E4
200009  694  00B9FC    100226  695  00BA14    100227  701  00BA60    100228  704  00BA78
100229  706  00BAAE    100230  707  00BAD0    100231  712  00BB50    100232  713  00BB68
100233  714  00BB74    100234  716  00BBA8    100235  721  00BC1C    100236  722  00BC24
100237  726  00BC74    200010  729  00BCA8    200011  729  00BCC0    100239  730  00BCD8
100240  735  00BD20    100241  738  00BD38    100242  740  00BD6E    100243  741  00B090
100244  746  00BE12    100245  747  00BE2A    100246  748  00BE36    100247  750  00BE6A
100248  755  00BFDF    100249  756  00BFE6    100250  760  00BF36    100252  764  00BF6A
100253  768  00BFAF    100254  772  00C014    100255  776  00C052    100258  778  00C094
100259  781  00C0B0    100264  789  00C1AC
```

FORMAT STATEMENT LABELS

```
LABEL  ISN   ADDR        LABEL  ISN   ADDR        LABEL  ISN   ADDR        LABEL  ISN   ADDR
 9992   61  000028 NR     6000   63  000038      6001   68  0000D9      6002   69  0000DD
    5   73  0000E9           6   76  0000EF      9999  138  0000FB NR    950  158  00013E
 6003  245  0001C5      6004  250  000254      6005  252  00027F      6006  270  0002D9
 6007  286  0002F5      6666  320  000317      1000  510  00031A      1001  511  00031E
 4022  569  000322      4023  573  000337      1111  575  00033D      6008  779  000346
 6018  782  00037B      6009  784  00039E      6019  786  0003F0      6039  790  00044E
 6010  795  000468
```

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)

*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

STATISTICS SOURCE STATEMENTS = 796, PROGRAM SIZE = 49792, SUBPROGRAM NAME = MAIN

STATISTICS NO DIAGNOSTICS GENERATED

****** END OF COMPILATION ****** 116K BYTES OF CORE NOT USED

REQUESTED OPTIONS: NOTERM

OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(60) SIZE(MAX) AUTODBL(NONE)
SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

```
ISN 0002            SUBROUTINE CROPTH (IERROR)                                          CR000010
                    C                                                                   CR000020
ISN 0003            IMPLICIT INTEGER (A-W)                                              CR000030
                    C                                                                   CR000040
                    C  PURPOSE:  READ AND ANALYZE LINES DESCRIBING THE FOLLOWING--      CR000050
                    C  IORDRC  ORDER TO USE IN CHECKING CHANNELS FOR CLASSIFICATION     CR000060
                    C  CROP    CROP TO BE EVALUATED  (A4)                               CR000070
                    C  ZQ      INITIAL VALUES FOR A, ALPHA, BETA AND TO FOR CHANNEL 1.  CR000080
                    C  ZX      INITIAL VALUES FOR A, ALPHA, BETA AND TO FOR CHANNEL 2.  CR000090
                    C  ZY      INITIAL VALUES FOR A, ALPHA, BETA AND TO FOR CHANNEL 3.  CR000100
                    C  QZ      INITIAL VALUES FOR A, ALPHA, BETA AND TO FOR CHANNEL 4.  CR000110
                    C                                                                   CR000120
ISN 0004            COMMON /USER/ICROP(10),ZQ(4,10),ZX(4,10),ZY(4,10),QZ(4,10),MAXPTS,CR000130
                   1    IORDRC(4), NOCROP, ISYMBL(10)                                   CR000140
ISN 0005            LOGICAL*1 ISYMBL, IHOLD1(4)                                         CR000150
ISN 0006            EQUIVALENCE (IHOLD1(1),IHOLD4)                                      CR000160
ISN 0007            REAL*4 ZQ,ZX,ZY,QZ                                                  CR000170
                    C                                                                   CR000180
ISN 0008            DIMENSION LINE(80), ITEMP(64), XHOLD(4)                             CR000190
                    C                                                                   CR000200
                    C                                                                   CR000210
ISN 0009            DIMENSION ITYPES(15)                                                CR000220
                    C                    1     2     3     4     5     6     7          CR000230
ISN 0010            DATA ITYPES/'CROP','CHAN','XXXX','SYMB','XXXX','DATF','XXXX',      CR000240
                   1 ,'COMM', 'Q IN', 'X IN', 'Y IN','Z IN','MAXP','    ','*END'/      CR000250
                    C                     8     9    10    11    12    13    14    15  CR000260
ISN 0011            DATA IBLANK/' '/                                                    CR000270
                    C                                                                   CR000280
                    C     *****  INITIALIZE ERROR SWITCH  *****                         CR000290
ISN 0012            IERROR = 0                                                          CR000300
                    C     *******  INITIALIZE VARIABLES SET FROM USER PARAMETER FILE  ***** CR000310
ISN 0013            MAXPTS = 40                                                         CR000320
ISN 0014            IORDRC(1) = 2                                                       CR000330
ISN 0015            IORDRC(2) = 3                                                       CR000340
ISN 0016            IORDRC(3) = 4                                                       CR000350
ISN 0017            IORDRC(4) = 1                                                       CR000360
ISN 0018            NOCROP = 0                                                          CR000370
ISN 0019            NDEXQ = 0                                                           CR000380
ISN 0020            NDEXX = 0                                                           CR000390
ISN 0021            NDEXY = 0                                                           CR000400
ISN 0022            NDEXZ = 0                                                           CR000410
                    C                                                                   CR000420
                    C                                                                   CR000430
ISN 0023            DO 3 I = 1,10                                                       CR000440
ISN 0024            ICROP(I) = IBLANK                                                   CR000450
                    C                                                                   CR000460
ISN 0025            DO 3 J = 1,4                                                        CR000470
ISN 0026            ZQ(J,I) = 0.                                                        CR000480
ISN 0027            ZX(J,I) = 0.                                                        CR000490
ISN 0028            ZY(J,I) = 0.                                                        CR000500
ISN 0029            QZ(J,I) = 0.                                                        CR000510
ISN 0030          3 CONTINUE                                                            CR000520
                    C                                                                   CR000530
                    C                                                                   CR000540
                    C                                                                   CR000550
                    C  ********  WRITE HEADING FOR INPUT SUMMARY  **********            CR000560
ISN 0031            WRITE(6,630)                                                        CR000570
ISN 0032          630 FORMAT(' INPUT SUMMARY' , /,' TYPE   DATA', /)                    CR000580
                    C                                                                   CR000590
                    C     ******** READ LINE, PRINT CARD ON SUMMARY  ********           CR000600
ISN 0033          4 READ(21,1000) KRDTYP,(LINE(II),II=11,80)                            CR000610
ISN 0034       1000 FORMAT(A4, 6X, 70A1)                                                CR000620
                    C                                                                   CR000630
                    C  WRITE INPUT LINE ON SUMMARY REPORT                               CR000640
ISN 0035            WRITE (6,1001)  KRDTYP, (LINE(II),II=11,80)                         CR000650
ISN 0036       1001 FORMAT (1X,A4,2X,70A1)                                              CR000660
                    C                                                                   CR000670
                    C   *************  ANALYZE LINE  *************                      CR000680
                    C  DETERMINE LINE TYPE                                              CR000690
ISN 0037            DO 5 I= 1, 15                                                       CR000700
ISN 0038            IF (KRDTYP.EQ.ITYPES(I) ) GO TO (10, 20,  8, 40,  8, 60,  8, 80,   CR000710
                   1  90, 100, 110, 120, 130, 4, 150), I                                CR000720
ISN 0040          5 CONTINUE                                                            CR000730
```

```
                      C                                                                 CR000740
                      C  INVALID LINE TYPE                                              CR000750
ISN 0041                8   WRITE(6,490)                                                CR000760
ISN 0042                490 FORMAT(' INVALID USER DATA--PROGRAM WILL ABORT AFTER READING ALL  CR000770
                           1 USER DATA')                                                CR000780
ISN 0043                    IERROR = 1                                                  CR000790
ISN 0044                    GO TO 4                                                     CR000800
                      C                                                                 CR000810
                      C   ************  VALID LINE TYPES, PROCESS DATA  ***********     CR000820
                      C  CROP LINE                                                      CR000830
ISN 0045               10   NOCROP = MOVSYM (LINE, ITEMP)                             CR000840
ISN 0046                    DO 11 I = 1,NOCROP                                          CR000850
ISN 0047                    NDEX = (I-1) * 2 + 1                                        CR000860
ISN 0048               11   ICROP(I) = ITEMP(NDEX)                                    CR000870
ISN 0049                    GO TO 4                                                     CR000880
                      C                                                                 CR000890
                      C  CHANNEL ORDER PROCESSING LINE                                  CR000900
ISN 0050               20   KOUNT = NUMBR(LINE, IORDRC)                               CR000910
ISN 0051                    GO TO 4                                                     CR000920
                      C                                                                 CR000930
                      C  ACQUISITION DATE LINE (MOVED TO EXEC*FILE)                     CR000940
ISN 0052               30   GO TO 4                                                   CR000950
                      C                                                                 CR000960
                      C  SYMBOL LINE, SYMBOLS ENTERED AS BASED 10 NUMBERS,              CR000970
                      C  SYMBOLS DO NOT NEED TO BE VALID CHARACTERS                     CR000980
ISN 0053               40   CONTINUE                                                  CR000990
ISN 0054                    NOSYM  = NUMBR (LINE, ITEMP)                              CR001000
ISN 0055                    DO 41 I = 1,NOSYM                                         CR001010
ISN 0056                    IHOLD4 = ITEMP(I)                                         CR001020
ISN 0057                    ISYMBL(I) = IHOLD1(4)                                     CR001030
ISN 0058               41   CONTINUE                                                  CR001040
ISN 0059                    GO TO 4                                                   CR001050
                      C                                                               CR001060
                      C  LANDSAT LINE-- 2 OR 3 FOR LANDSAT 2 OR LANDSAT 3  (MOVED TO EXEC FILECR001070
ISN 0060               50   GO TO 4                                                  CR001080
                      C                                                               CR001090
                      C  DATE CURRENTLY READ FROM COMPUTER CLOCK                      CR001100
ISN 0061               60   GO TO 4                                                  CR001110
                      C                                                               CR001120
                      C SEGM LINE (MOVED TO EXEC FILE)                                CR001130
ISN 0062               70   GO TO 4                                                  CR001140
                      C                                                               CR001150
                      C  COMMENT LINE, IT HAS ALREADY BEEN PRINTED, GO TO NEXT LINE   CR001160
ISN 0063               80    GO TO 4                                                  CR001170
                      C                                                               CR001180
                      C  Q INITIAL GUESS                                              CR001190
ISN 0064               90   NOINT = NUMBFL(LINE,XHOLD)                               CR001200
ISN 0065                    NDEXQ = NDEXQ + 1                                         CR001210
ISN 0066                    DO 91 I = 1,4                                             CR001220
ISN 0067               91   ZQ(I,NDEXQ) = XHOLD(I)                                   CR001230
ISN 0068                    IF (NOINT .NE. 4) GO TO 125                               CR001240
ISN 0070                    GO TO 4                                                   CR001250
                      C                                                               CR001260
                      C  X INITIAL GUESS LINE                                         CR001270
ISN 0071              100   NOINT = NUMBFL(LINE,XHOLD)                                CR001280
ISN 0072                    NDEXX = NDEXX + 1                                         CR001290
ISN 0073                    DO 101 I = 1,4                                            CR001300
ISN 0074               101  ZX(I,NDEXX) = XHOLD(I)                                   CR001310
ISN 0075                    IF (NOINT .NE. 4) GO TO 125                               CR001320
ISN 0077                    GO TO 4                                                   CR001330
                      C                                                               CR001340
                      C  Y INITIAL GUESS LINE                                         CR001350
ISN 0078              110   CONTINUE                                                  CR001360
ISN 0079                    NOINT = NUMBFL(LINE,XHOLD)                                CR001370
ISN 0080                    NDEXY = NDEXY + 1                                         CR001380
ISN 0081                    DO 111 I = 1,4                                            CR001390
ISN 0082              111   ZY(I,NDEXY) = XHOLD(I)                                    CR001400
ISN 0083                    IF (NOINT .NE. 4) GO TO 125                               CR001410
ISN 0085                    GO TO 4                                                   CR001420
                      C                                                               CR001430
                      C  Z INITIAL GUESS LINE                                         CR001440
ISN 0086              120   NOINT = NUMBFL(LINE,XHOLD)                                CR001450
ISN 0087                    NDEXZ = NDEXZ + 1                                         CR001460
ISN 0088                    DO 121 I = 1,4                                            CR001470
ISN 0089               121  QZ(I,NDEXZ) = XHOLD(I)                                   CR001480
ISN 0090                    IF (NOINT .NE. 4) GO TO 125                               CR001490
ISN 0092                    GO TO 4                                                   CR001500
                      C                                                               CR001510
```

```
                C  ERROR ON INITIAL GUESS LINE                                          CR001520
   ISN 0093     125   WRITE (6,126)                                                    CR001530
   ISN 0094     126   FORMAT(' ERROR ON INITIAL GUESS LINE', /,                        CR001540
                     1' THERE MUST BE A, ALPHA, BETA AND TO GUESSES FOR EACH OF THE 4 CHCR001550
                     2ANNELS', /,' A TOTAL OF 16 INITIAL GUESSES FOR EACH CROP',/)    CR001560
   ISN 0095           IERROR = 1                                                       CR001570
   ISN 0096           GO TO 4                                                          CR001580
                C                                                                     CR001590
                C  MAX POINTS LINE                                                    CR001600
   ISN 0097     130  KOUNT = NUMBR(LINE, MAXPTS)                                      CR001610
   ISN 0098           GO TO 4                                                        CR001620
                C                                                                     CR001630
                C   *END* LINE                                                       CR001640
   ISN 0099     150 CONTINUE                                                         CR001650
                C                                                                     CR001660
   ISN 0100           IF (NOCROP.EQ.NDEXQ .AND. NOCROP.EQ.NDEXX .AND. NOCROP.EQ.NDEXY CR001670
                     1   .AND. NOCROP.EQ.NDEXZ) RETURN                               CR001680
   ISN 0102           WRITE (6,192) NOCROP, NDEXQ, NDEXX, NDEXY, NDEXZ               CR001690
   ISN 0103     192   FORMAT (' NUMBER CROP NAMES IS ',I4, /,                        CR001700
                     1   ' NUMBER OF INITIAL GUESSES FOR THE 4 CHANNELS ARE',4(I4,1X)) CR001710
   ISN 0104           RETURN                                                         CR001720
   ISN 0105           END                                                            CR001730
```

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

SYMBOL	INTERNAL STATEMENT NUMBERS																		
I	0023	0024	0026	0027	0028	0029	0037	0038	0038	0046	0047	0048	0055	0056	0057	0066	0067	0067	0073
	0074	0074	0081	0082	0082	0089	0089	0089											
J	0025	0026	0027	0028	0029														
II	0033	0033	0033	0035	0035														
QZ	0004	0007	0029	0089															
ZQ	0004	0007	0026	0067															
ZX	0004	0007	0027	0074															
ZY	0004	0007	0028	0082															
LINE	0008	0033	0035	0045	0050	0054	0064	0071	0079	0086	0097								
NDEX	0047	0048																	
ICROP	0004	0024	0048																
ITEMP	0008	0045	0048	0054	0056														
KOUNT	0050	0097																	
NDEXQ	0019	0065	0065	0067	0100	0102													
NDEXX	0020	0072	0072	0074	0100	0102													
NDEXY	0021	0080	0080	0082	0100	0102													
NDEXZ	0022	0087	0087	0089	0100	0102													
NOINT	0064	0068	0071	0075	0079	0083	0086	0090											
NOSYM	0054	0055																	
NUMBR	0050	0054	0097																
XHOLD	0068	0064	0067	0071	0074	0079	0082	0086	0089										
CROPTM	0002																		
IBLANK	0011	0024																	
IERROR	0002	0012	0043	0095															
IHOLD1	0005	0006	0057																
IHOLD4	0006	0056																	
IOPORC	0004	0014	0015	0016	0017	0050													
ISYMBL	0004	0005	0057																
ITYPES	0009	0010	0038																
KRDTYP	0033	0035	0038																
MAXPTS	0004	0013	0097																
MOVSYM	0045																		
NOCROP	0004	0018	0045	0046	0100	0100	0100	0100	0102										
NUMBFL	0064	0071	0079	0086															

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

LABEL	DEFINED	REFERENCES															
3	0030	0023	0025														
4	0033	0038	0044	0049	0051	0052	0059	0060	0061	0062	0063	0070	0077	0085	0092	0096	0098
5	0040	0037															
8	0041	0038	0038	0038													
10	0045	0038															
11	0048	0046															
20	0050	0034															
30	0052																
40	0053	0038															
41	0058	0055															
50	0060																
60	0061	0039															
70	0062																
80	0063	0038															

***** F O R T R A N C R O S S R E F E R E N C E L I S T I N G *****

LABEL	DEFINED	REFERENCES
90	0064	0038
91	0067	0066
100	0071	0038
101	0074	0073
110	0078	0038
111	0082	0081
120	0086	0038
121	0089	0088
125	0093	0068 0075 0083 0090
126	0094	0093
130	0097	0038
150	0099	0038
192	0103	0102
490	0042	0041
630	0032	0031
1000	0034	0033
1001	0036	0035

/ CROPTN / SIZE OF PROGRAM 000A28 HEXADECIMAL BYTES

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
I	SF	I*4	000288	J	SF	I*4	00028C	II	F	I*4	000290	OZ	S C	R*4	000208
ZO	S C	R*4	000028	ZX	S C	R*4	0000C8	ZY	S C	R*4	000168	LINE	SFA	I*4	0002C4
NDEX	SF	I*4	000294	ICROP	S C	I*4	000000	ITEMP	FA	I*4	000404	KOUNT	S	I*4	000298
NDEXO	SF	I*4	00029C	NDEXX	SF	I*4	0002A0	NDEXY	SF	I*4	0002A4	NDEXZ	SF	I*4	0002A8
NOINT	S	I*4	0002AC	NOSYM	SF	I*4	0002B0	NUMRR	F XF	I*4	000000	XHOLD	FA	R*4	000504
CROPTM		I*4	0002B4	IHCOM#	F XF	I*4	000000	IBLANK	F	I*4	0002B8	IERROR	S	I*4	00028C
IHOLD1	F E	L*1	000550	IHOL04	S E	I*4	000550	IORDRC	SFA C	I*4	0002AC	ISYMBL	S C	L*1	0002C0
ITYPES		I*4	000514	KROTYP	SF	I*4	0002C0	MAXPTS	SFA C	I*4	0002A8	MOVSYM	F XF	I*4	000000

***** COMMON INFORMATION *****

NAME OF COMMON BLOCK * USER* SIZE OF BLOCK 0002CA HEXADECIMAL BYTES

VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.
ICROP	I*4	000000	ZO	R*4	000028	ZX	R*4	0000C8	ZY	R*4	000168
OZ	R*4	000208	MAXPTS	I*4	0002A8	IORDRC	I*4	0002AC	NOCROP	I*4	0002BC
ISYMBL	L*1	0002C0									

SOURCE STATEMENT LABELS

LABEL	ISN	ADDR		LABEL	ISN	ADDR		LABEL	ISN	ADDR		LABEL	ISN	ADDR	
3	30	000634		4	33	000664		5	40	0006F4		8	41	000706	
10	45	000722		11	48	000744		20	50	00076E		30	52	000780	NR
40	53	000784		41	58	0007B4		50	60	0007CA	NR	60	61	0007CE	
70	62	0007D2	NR	80	63	0007D6		90	64	0007DA		91	67	0007F4	
100	71	000830		101	74	000844		110	78	000886		111	82	0008A0	
120	86	000800		121	89	0008F6		125	93	000932		130	97	00094E	
150	99	000960													

COMPILER GENERATED LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
100001	2	00056C	100002	24	0005C2	100003	26	0005D4	100004	31	00063C
100005	31	00064E	100010	38	0006C8	100011	39	0006DC	100014	47	000734
100015	49	00076A	100016	56	000796	100017	59	0007C6	100018	68	000826
100019	70	000820	100020	75	00087C	100021	77	000882	100022	83	0008D2
100023	85	000908	100024	90	000928	100025	92	00092E	200001	101	00096C
200002	101	000978	200003	101	000984	100026	101	000990	100027	102	0009A4

FORMAT STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
630	32	000028	1000	34	0000*A	1001	36	000054	490	42	000060
126	94	0000A8	192	103	000142						

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)

*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

STATISTICS SOURCE STATEMENTS = 104, PROGRAM SIZE = 2600, SUBPROGRAM NAME =CROPTN

```
*LEVEL 2.3.0 (JUNE 78)          CROPTM          OS/360  FORTRAN H EXTENDED          DATE 81.139/13.20.49          PAGE   5
*STATISTICS*  NO  DIAGNOSTICS GENERATED
****** END OF COMPILATION ******                                    276K BYTES OF CORE NOT USED
```

ORIGINAL PAGE IS
OF POOR QUALITY

```
REQUESTED OPTIONS: NOTERM
OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(60) SIZE(MAX) AUTODBL(NONE)
                   SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

   ISN 0002            FUNCTION MOVSYM (CARD, ITEMP)                                          NUM00650
                     C                                                                        NUM00660
                     C  PURPOSE:  DECODE CARD OF FORM   SYMBOL1, SYMBOL2, ... SYMBOLN         NUM00670
                     C                                                                        NUM00680
   ISN 0003            REAL*8 ITEMP(30), IHOLD8                                               NUM00690
   ISN 0004            LOGICAL*1 ICHAR(1), IHOLD(8), IBLNK1                                   NUM00700
   ISN 0005            INTEGER*4 CARD(1)                                                      NUM00710
   ISN 0006            EQUIVALENCE (ICHAR(1), ICHAR4), (IHOLD(1),IHOLD8)                      NUM00720
                     C                                                                        NUM00730
   ISN 0007            DATA IBLNK1/' '/, ICHAR4/' '/, IBLANK/' '/, ICOMMA/','/                NUM00740
                     C                                                                        NUM00750
   ISN 0008            DO 2 I = 1,8                                                           NUM00760
   ISN 0009          2 IHOLD(I) = IBLNK1                                                      NUM00770
                     C                                                                        NUM00780
   ISN 0010            NDEX = 0                                                               NUM00790
   ISN 0011            KOUNT = 0                                                              NUM00800
                     C                                                                        NUM00810
   ISN 0012            DO 100 KOL = 11,80                                                     NUM00820
   ISN 0013            ICHAR4 = CARD(KOL)                                                     NUM00830
   ISN 0014            IF (ICHAR4 .NE. IBLANK) GO TO 10                                       NUM00840
                     C                                                                        NUM00850
                     C  BLANK                                                                 NUM00860
   ISN 0016            IF (KOL .EQ. 80 .AND. NDEX .NE. 0) GO TO 80                            NUM00870
   ISN 0018            GO TO 100                                                              NUM00880
                     C                                                                        NUM00890
                     C  NOT BLANK                                                             NUM00900
   ISN 0019       10   IF (ICHAR4 .EQ. ICOMMA) GO TO 80                                       NUM00910
                     C                                                                        NUM00920
                     C  STORE CHARACTER IN WORD DESCRIBING SYMBOL, MAX OF 8 CHARACTERS        NUM00930
   ISN 0021            NDEX = NDEX + 1                                                        NUM00940
   ISN 0022            IF (NDEX .GT. 8) GO TO 100                                             NUM00950
   ISN 0024            IHOLD(NDEX) = ICHAR(1)                                                 NUM00960
   ISN 0025            IF (KOL .EQ. 80) GO TO 80                                              NUM00970
   ISN 0027            GO TO 100                                                              NUM00980
                     C                                                                        NUM00990
                     C  END OF SYMBOL                                                         NUM01000
   ISN 0028       80   KOUNT = KOUNT + 1                                                      NUM01010
   ISN 0029            ITEMP(KOUNT) = IHOLD8                                                  NUM01020
   ISN 0030            NDEX = 0                                                               NUM01030
   ISN 0031            DO 81 II = 1,8                                                         NUM01040
   ISN 0032         81 IHOLD(II) = IBLNK1                                                     NUM01050
                     C                                                                        NUM01060
   ISN 0033       100  CONTINUE                                                             NUM01070
                     C                                                                        NUM01080
   ISN 0034            MOVSYM = KOUNT                                                         NUM01090
   ISN 0035            RETURN                                                                 NUM01100
   ISN 0036            END                                                                    NUM01110
```

*******F O R T R A N C R O S S R E F E R E N C E L I S T I N G*******

SYMBOL	INTERNAL STATEMENT NUMBERS						
I	0008	0009					
II	0031	0032					
KOL	0012	0013	0016	0025			
CARD	0002	0005	0013				
NDEX	0010	0016	0021	0021	0022	0024	0030
ICHAR	0005	0006	0024				
IHOLD	0004	0006	0009	0024	0032		
ITEMP	0002	0003	0029				
KOUNT	0011	0028	0028	0029	0034		
IBLANK	0007	0014					
IBLNK1	0004	0007	0009	0032			
ICHAR4	0006	0007	0013	0014	0019		
ICOMMA	0007	0019					
IHOLD8	0003	0006	0029				
MOVSYM	0002	0034					

*******F O R T R A N C R O S S R E F E R E N C E L I S T I N G*******

LABEL	DEFINED	REFERENCES		
2	0009	0008		
10	0019	0014		
80	0029	0016	0019	0025

***** FORTRAN CROSS REFERENCE LISTING *****

LABEL	DEFINED	REFERENCES
81	0032	0031
100	0033	0012 0018 0022 0027

/ MOVSYM / SIZE OF PROGRAM 00021B HEXADECIMAL BYTES

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
I	SF	I*4	000098	II	SF	I*4	00009C	KOL	SF	I*4	0000A0	CARD	F XR	I*4	000000
NDEX	SF	I*4	0000A4	ICHAR	F F	L*1	0000C0	IHOLD	S E	L*1	0000C8	ITEMP	S XR	R*8	000000
KOUNT	SF	I*4	0000A8	IBLANK		I*4	0000AC	IBLNK1	F	L*1	000094	ICHAR4	S E	I*4	0000C0
ICOMMA		I*4	000080	IHOLD8	F E	R*8	0000C8	MOVSYM	S	I*4	0000B4				

SOURCE STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
2	9	00010A	10	19	000156	80	28	00017E	81	32	000198
100	33	0001AA									

COMPILER GENERATED LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
100001	2	0000E8	100002	10	00011C	100003	13	000128	100004	16	000146
200001	17	00014C	100005	18	000152	100006	21	000162	100007	24	00016A
100008	27	000174	100010	34	000182						

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)

*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

STATISTICS SOURCE STATEMENTS = 35, PROGRAM SIZE = 536, SUBPROGRAM NAME =MOVSYM

STATISTICS NO DIAGNOSTICS GENERATED

****** END OF COMPILATION ****** 284K BYTES OF CORE NOT USED

REQUESTED OPTIONS: NOTERM

OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(60) SIZE(MAX) AUTODBL(NONE)
SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

```
ISN 0002            FUNCTION NUMBR (CARD, NUMVEC)                                  NUM00010
                    C                                                              NUM00020
                    C  SIMPLIFIED VERSION OF NUMBER                                NUM00030
                    C  MOVES NUMBERS FROM CARD TO ARRAY NUMVEC,                    NUM00040
                    C  STORES COUNT OF NUMBERS IN NUMB                             NUM00050
                    C                                                              NUM00060
ISN 0003            IMPLICIT INTEGER (A-Z)                                         NUM0007C
                    C                                                              NUM00080
ISN 0004            DIMENSION CARD(1),NUMVEC(1)                                    NUM00090
ISN 0005            DATA    BLANK/' '/,COMMA/','/                                  NUM00100
ISN 0006            DATA MINUS /'-'/                                               NUM00110
ISN 0007            DATA IZERO/'0'/,NINE/'9'/                                      NUM00120
                    C                                                              NUM00130
                    C  ITRIG = SWITCH FOR NUMBER COLLECTED AND NOT STORED          NUM00140
ISN 0008            ITRIG = 0                                                      NUM00150
ISN 0009            INEG = 1                                                       NUM00160
ISN 0010            NUM = 0                                                        NUM00170
ISN 0011            NDEX = 0                                                       NUM00180
                    C                                                              NUM00190
ISN 0012            DO 60  COL=11,80                                               NUM00200
ISN 0013            IF (CARD(COL).EQ.MINUS) GO TO 40                               NUM00210
ISN 0015            IF (CARD(COL).EQ.BLANK) GO TO 60                               NUM00220
ISN 0017            IF (CARD(COL).EQ.COMMA) GO TO 50                               NUM00230
ISN 0019            IF(CARD(COL).LT.IZERO.OR.CARD(COL).GT.NINE) GO TO 90           NUM00240
ISN 0021            CALL I4A1BN(CARD(COL),1,NWORD)                                 NUM00250
ISN 0022            NUM = 10 * NUM + NWORD                                         NUM00260
ISN 0023            ITRIG=1                                                        NUM00270
ISN 0024            GO TO 60                                                       NUM00280
                    C                                                              NUM00290
                    C  MINUS SIGN                                                  NUM00300
ISN 0025        40      INEG = -1                                                  NUM00310
ISN 0026                GO TO 60                                                   NUM00320
                    C                                                              NUM00330
                    C  END OF NUMBER, INEG IS SET TO 1 OR -1                       NUM00340
ISN 0027        50      NDEX = NDEX + 1                                            NUM00350
ISN 0028                NUMVEC(NDEX) = NUM * INEG                                  NUM00360
ISN 0029                INEG = 1                                                   NUM00370
ISN 0030                ITRIG = 0                                                  NUM00380
ISN 0031                NUM = 0                                                    NUM00390
ISN 0032            60  CONTINUE                                                   NUM00400
                    C                                                              NUM00410
ISN 0033            90  IF(ITRIG.EQ.0)GO TO 100                                   NUM00420
ISN 0035                NDEX = NDEX + 1                                            NUM00430
ISN 0036                NUMVEC(NDEX) = NUM * INEG                                  NUM00440
                    C                                                              NUM00450
ISN 0037        100     NUMBR = NDEX                                               NUM00460
ISN 0038                RETURN                                                     NUM00470
ISN 0039                END                                                        NUM00480
```

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

SYMBOL	INTERNAL	STATEMENT NUMBERS					
COL	0012	0013	0015	0017	0019	0019	0021
NUM	0010	0022	0022	0028	0031	0036	
CARD	0002	0004	0013	0015	0017	0019	0019	0021
INEG	0009	0025	0028	0029	0036			
NDEX	0011	0027	0027	0028	0035	0035	0036	0037
NINE	0007	0019						
BLANK	0005	0015						
COMMA	0005	0017						
ITRIG	0008	0023	0030	0033				
IZERO	0007	0019						
MINUS	0006	0013						
NUMBR	0002	0037						
NWORD	0021	0022						
I4A1BN	0021							
NUMVEC	0002	0004	0028	0036				

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

LABEL	DEFINED	REFERENCES
40	0025	0013
50	0027	0017

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

LABEL	DEFINED	REFERENCES
60	0032	0012 0015 0024 0026
90	0033	0019
100	0037	0033

/ NUMBR / SIZE OF PROGRAM 000252 HEXADECIMAL BYTES

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
COL	SFA	I*4	00009C	NUM	SF	I*4	0000A0	CARD	SFA XR	I*4	000000	INEG	SF	I*4	0000A4
NDEX	SF	I*4	0000A8	NINE		I*4	0000AC	BLANK		I*4	0000B0	COMMA	S	I*4	0000B4
ITRIG	S	I*4	0000B8	IZERO		I*4	0000BC	MINUS		I*4	0000C0	NUMBR	S	I*4	0000C4
NWORD	SFA	I*4	0000C8	I4A1BN	SF XF		000000	NUMVEC	S XR	I*4	000000				

SOURCE STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
40	25	00019C	50	27	0001A6	60	32	0001C4	90	33	0001D0
100	37	0001EC									

COMPILER GENERATED LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
100001	2	0000EC	100002	13	000116	100003	15	000128	100004	17	00013A
100005	19	00014C	100001	20	00015E	100006	21	000170	100008	35	0001D6

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)

*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

STATISTICS SOURCE STATEMENTS = 38, PROGRAM SIZE = 594, SUBPROGRAM NAME = NUMBR

STATISTICS NO DIAGNOSTICS GENERATED

****** END OF COMPILATION ****** 284K BYTES OF CORE NOT USED

```
REQUESTED OPTIONS: NOTERM
OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
                   SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

   ISN 0002            FUNCTION NXTCHR(CARD,COL)                                                  NXT00010
                C                                                                                 NXT00020
                C                                                                                 NXT00030
                C                                                                                 NXT00040
                C      CALL       J=NXTCHR(CARD,COL)                                              NXT00050
                C                                                                                 NXT00060
                C      ARGS       CARD  - HCD BUFFER                                              NXT00070
                C                 COL   - PTR TO POSITION IN 'CARD'                               NXT00080
                C                                                                                 NXT00090
                C      PURPOSE    LOCATES THE NEXT NON BLANK SYMBOL IN 'CARD'                     NXT00100
                C                                                                                 NXT00110
                C      RETURNS    J     - LOCATED CHARACTER (BLANK IF EOC)                        NXT00120
                C                 COL   - PTS AT CHARACTER                                        NXT00130
                C                                                                                 NXT00140
   ISN 0003             IMPLICIT INTEGER (A-Z)                                                    NXT00150
   ISN 0004             DIMENSION CARD(1)                                                         NXT00160
   ISN 0005             DATA CRDSIZ/62/,BLANK/' '/                                                NXT00170
   ISN 0006             L = COL+1                                                                 NXT00180
   ISN 0007             IF (L.GT.CRDSIZ) GO TO 40                                                 NXT00190
   ISN 0009             DO 30 COL=L,CRDSIZ                                                        NXT00200
   ISN 0010             NXTCHR = CARD(COL)                                                        NXT00210
   ISN 0011             IF(NXTCHR.NE.BLANK) GO TO 50                                              NXT00220
   ISN 0013          30 CONTINUE                                                                  NXT00230
   ISN 0014             COL=CRDSIZ-1                                                              NXT00240
   ISN 0015          40 NXTCHR = BLANK                                                            NXT00250
   ISN 0016          50 CONTINUE                                                                  NXT00260
                C     WRITE (6,104) (CARD(K),K=1,62),COL,NXTCHR                                   NXT00270
   ISN 0017         104 FORMAT(' NXTCHR ENTERED'/' ',62A1,I10/' ',A4)                            NXT00280
   ISN 0018             RETURN                                                                    NXT00290
   ISN 0019             END                                                                       NXT00300

                        *****F O R T R A N    C R O S S    R E F E R E N C E    L I S T I N G*****
SYMBOL   INTERNAL STATEMENT NUMBERS
L        0006  0007  0009
COL      0002  0006  0009  0010  0014
CARD     0002  0004  0010
BLANK    0005  0011  0015
CRDSIZ   0005  0007  0009  0014
NXTCHR   0002  0010  0011  0015

                        *****F O R T R A N    C R O S S    R E F E R E N C E    L I S T I N G*****
 LABEL   DEFINED   REFERENCES
    30     0013    0009
    40     0015    0007
    50     0016    0011
   104     0017

                                                    / NXTCHR /     SIZE OF PROGRAM 000180 HEXADECIMAL BYTES

      NAME     TAG   TYPE  ADD.      NAME     TAG   TYPE  ADD.      NAME     TAG   TYPE  ADD.      NAME     TAG   TYPE  ADD.
         L  SF        I*4   0000AC       COL  SF        I*4   0000B0       CARD  F  XR   I*4   000000       BLANK  F        I*4   0000B4
     CRDSIZ  F        I*4   0000B8    NXTCHR  S        I*4   0000BC

  SOURCE STATEMENT LABELS

    LABEL  ISN   ADDR          LABEL  ISN   ADDR          LABEL  ISN   ADDR          LABEL  ISN   ADDR
       30   13  00010A            40   15  000116            50   16  00011A

  COMPILER GENERATED LABELS

    LABEL  ISN   ADDR          LABEL  ISN   ADDR          LABEL  ISN   ADDR          LABEL  ISN   ADDR
   100001    2  0000D0       100002    9  0000F2       100003   10  0000F4       100004   14  000112

  FORMAT STATEMENT LABELS

    LABEL  ISN   ADDR          LABEL  ISN   ADDR          LABEL  ISN   ADDR          LABEL  ISN   ADDR
      104   17  000028 NR

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
```

```
*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)
*STATISTICS*     SOURCE STATEMENTS =      18, PROGRAM SIZE =     384, SUBPROGRAM NAME =NXTCHR
*STATISTICS*  NO  DIAGNOSTICS GENERATED
****** END OF COMPILATION ******                                  2H4K BYTES OF CORE NOT USED
```

```
REQUESTED OPTIONS: NOTERM
OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
                   SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

    ISN 0002            FUNCTION NUMREL (CARD,XNMVEC)                                          NUM00010
                        C                                                                      NUM00020
                        C  MOVES FLOATING POINT NUMBERS FROM CARD TO ARRAY XNMVEC.             NUM00030
                        C  STORES COUNT OF NUMBERS IN NUMBR                                    NUM00040
                        C                                                                      NUM00050
    ISN 0003            IMPLICIT INTEGER (A-C)                                                 NUM00060
                        C                                                                      NUM00070
    ISN 0004            DIMENSION CARD(1),XNMVEC(1)                                            NUM00080
    ISN 0005            DATA    BLANK/' '/,COMMA/','/                                          NUM00090
    ISN 0006            DATA MINUS /'-'/                                                       NUM00100
    ISN 0007            DATA IZERO/'0'/,NINE/'9'/, KDOT/'.'/                                   NUM00110
                        C                                                                      NUM00120
                        C  ITRIG = SWITCH FOR NUMBER COLLECTED AND NOT STORED                  NUM00130
    ISN 0008            ITRIG = 0                                                              NUM00140
    ISN 0009            INEG = 1                                                               NUM00150
    ISN 0010            XNUM = 0.                                                              NUM00160
    ISN 0011            NDEX = 0                                                               NUM00170
    ISN 0012            IDEC = 0                                                               NUM00180
                        C                                                                      NUM00190
    ISN 0013            DO 66  COL=11,80                                                       NUM00200
    ISN 0014            IF (CARD(COL) .EQ. KDOT) GO TO 20                                      NUM00210
    ISN 0016            IF (CARD(COL) .EQ. MINUS) GO TO 40                                     NUM00220
    ISN 0018            IF (CARD(COL) .EQ. BLANK) GO TO 60                                     NUM00230
    ISN 0020            IF (CARD(COL) .EQ. COMMA) GO TO 50                                     NUM00240
    ISN 0022            IF(CARD(COL) .LT. IZERO .OR. CARD(COL) .GT. NINE) GO TO 90             NUM00250
    ISN 0024            CALL I4AIBN(CARD(COL),1,NWORD)                                         NUM00260
    ISN 0025            ITRIG=1                                                                NUM00270
    ISN 0026            IF (IDEC .EQ. 1) GO TO 10                                              NUM00280
    ISN 0028            XNUM = 10 * XNUM + NWORD                                               NUM00290
    ISN 0029            GO TO 60                                                               NUM00300
                        C                                                                      NUM00310
                        C DECIMAL FRACTION                                                     NUM00320
    ISN 0030        10      XWORD = NWORD                                                      NUM00330
    ISN 0031            XNUM = XNUM + XWORD/IPOWER                                             NUM00340
    ISN 0032            IPOWER = IPOWER * 10                                                   NUM00350
    ISN 0033            GO TO 60                                                               NUM00360
                        C                                                                      NUM00370
                        C  DECIMAL                                                             NUM00380
    ISN 0034        20      IDEC = 1                                                           NUM00390
    ISN 0035            IPOWER = 10                                                            NUM00400
    ISN 0036            GO TO 60                                                               NUM00410
                        C                                                                      NUM00420
                        C                                                                      NUM00430
                        C  MINUS SIGN                                                          NUM00440
    ISN 0037        40      INEG = -1                                                          NUM00450
    ISN 0038            GO TO 60                                                               NUM00460
                        C                                                                      NUM00470
                        C  END OF NUMBER. INEG IS SET TO 1 OR -1                               NUM00480
    ISN 0039        50      NDEX = NDEX + 1                                                    NUM00490
    ISN 0040            XNMVEC(NDEX) = XNUM * INEG                                             NUM00500
    ISN 0041            INEG = 1                                                               NUM00510
    ISN 0042            IDEC = 0                                                               NUM00520
    ISN 0043            ITRIG = 0                                                              NUM00530
    ISN 0044            XNUM = 0.                                                              NUM00540
    ISN 0045        60      CONTINUE                                                           NUM00550
    ISN 0046        66      CONTINUE                                                           NUM00560
                        C                                                                      NUM00570
    ISN 0047            90 IF(ITRIG.EQ.0)GO TO 100                                             NUM00580
    ISN 0049            NDEX = NDEX + 1                                                        NUM00590
    ISN 0050            XNMVEC(NDEX) = XNUM * INEG                                             NUM00600
                        C                                                                      NUM00610
    ISN 0051        100     NUMREL = NDEX                                                      NUM00620
    ISN 0052            RETURN                                                                 NUM00630
    ISN 0053            END                                                                    NUM00640

                        *****F O R T R A N   C R O S S   R E F E R E N C E   L I S T I N G*****
SYMBOL  INTERNAL STATEMENT NUMBERS
COL     0013  0014  0016  0018  0020  0022  0022  0024
CARD    0002  0004  0014  0016  0018  0020  0022  0022  0024
IDEC    0012  0026  0034  0042
INEG    0009  0037  0040  0041  0050
KDOT    0007  0014
```

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

SYMBOL	INTERNAL	STATEMENT NUMBERS					
NDEX	0011	0039	0040	0049	0049	0050	0051
NINE	0007	0022					
XNUM	0010	0028	0028	0031	0031	0040	0044	0050
BLANK	0005	0018					
COMMA	0005	0020					
ITRIG	0008	0025	0043	0047			
IZERO	0007	0022					
MINUS	0006	0016					
NWORD	0024	0029	0030				
XWORD	0030	0031					
IPOWER	0031	0032	0032	0035			
I4A1BN	0024						
NUMBFL	0002	0051					
XNMVEC	0002	0004	0040	0050			

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

LABEL	DEFINED	REFERENCES				
10	0030	0026				
20	0034	0014				
40	0037	0016				
50	0039	0020				
60	0045	0018	0029	0033	0036	0038
66	0046	0013				
90	0047	0022				
100	0051	0047				

/ NUMBFL / SIZE OF PROGRAM 00032E HEXADECIMAL BYTES

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
COL	SFA	I*4	000084	CARD	SFA XR	I*4	000000	IDEC	S	I*4	0000B8	INEG	SF	I*4	0000BC
KDOT		I*4	0000C0	NDEX	SF	I*4	0000C4	NINE		I*4	0000C8	XNUM	SF	R*4	0000CC
BLANK		I*4	0000D0	COMMA		I*4	0000D4	ITRIG	S	I*4	0000D8	IZERO		I*4	0000DC
MINUS		I*4	0000E0	NWORD	SFA	I*4	0000E4	XWORD	SF	R*4	0000E8	IPOWER	SF	I*4	0000EC
I4A1BN	SF XF		000000	NUMBFL	S	I*4	0000F0	XNMVEC	S XR	R*4	000000				

SOURCE STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
10	30	000204	20	34	000248	40	37	000254	50	39	00025E
60	45	000292	66	46	000292	90	47	00029E	100	51	0002C8

COMPILER GENERATED LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
100001	2	000114	100002	14	00014F	100003	16	000160	100004	18	000172
100005	20	000184	100006	22	000196	200001	23	0001A8	100007	24	0001BA
100008	25	0001DE	100010	49	0002A4						

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)

*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

STATISTICS SOURCE STATEMENTS = 52, PROGRAM SIZE = 814, SUBPROGRAM NAME =NUMBFL

STATISTICS NO DIAGNOSTICS GENERATED

****** END OF COMPILATION ****** 284K BYTES OF CORE NOT USED

```
REQUESTED OPTIONS: NOTERM
OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
                   SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

ISN 0002            SUBROUTINE I4A1BN(IFLD,NCHFLD,NCVTED)                                  I4A00010
                C   DAVID LEE SMITH  9 SEPTEMBER 1977.                                    I4A00020
                C   THIS SUBROUTINE ACCEPTS AN ARRAY OF EBCDIC CHARACTERS AND CONVERTS     I4A00030
                C   EBCDIC DIGITS TO A BINARY INTEGER.                                     I4A00040
                C                                                                          I4A00050
                C   CALLING SEQUENCE:                                                      I4A00060
                C      CALL I4A1BN( FIELD, LENGTH, OUTPUT )                               I4A00070
                C   "WHERE  FIELD IS THE FIRST WORD OF AN ARRAY OF EBCDIC CHARACTERS       I4A00080
                C                 TO BE CONVERTED TO BINARY.  CHARACTERS STORED ONE PER    I4A00090
                C                 WORD, LEFT JUSTIFIED, AS BY AN A1 FORMAT.                I4A00100
                C          LENGTH IS THE NUMBER OF CHARACTERS IN THE FIELD,                I4A00110
                C    AND   OUTPUT IS THE ONE WORD RESULT.                                  I4A00120
ISN 0003               INTEGER * 4  IDUM(2), IFLD(20)                                      I4A00130
ISN 0004               LOGICAL * 1 L(8)                                                    I4A00140
ISN 0005               EQUIVALENCE (L(1),IDUM(1)),(ILCH,IDUM(1)),(ICHAR,IDUM(2))           I4A00150
ISN 0006               DATA ICHAR / 0 /                                                    I4A00160
ISN 0007               DATA IR0 / 240 /                                                    I4A00170
ISN 0008               DATA IR9 / 249 /                                                    I4A00180
ISN 0009               DATA IRBL / 64 /                                                    I4A00190
ISN 0010               DATA IRPL / 78 /                                                    I4A00200
ISN 0011               DATA IRMI / 96 /                                                    I4A00210
ISN 0012               NCVTED = 0                                                          I4A00220
ISN 0013               IERFLG = 0                                                          I4A00230
ISN 0014               MINUS = 1                                                           I4A00240
ISN 0015               DO 30 I = 1, NCHFLD                                                 I4A00250
ISN 0016               ILCH = IFLD( I )                                                    I4A00260
ISN 0017               L(8) = L(1)                                                         I4A00270
ISN 0018               IF ( ICHAR .LT. IR0 ) GO TO 10                                      I4A00280
ISN 0020               IF ( ICHAR .GT. IR9 ) GO TO 10                                      I4A00290
ISN 0022               JDIG = I                                                            I4A00300
ISN 0023               GO TO 200                                                           I4A00310
ISN 0024        10     NEXT = I + 1                                                        I4A00320
ISN 0025               IF ( ICHAR .EQ. IRBL ) GO TO 30                                     I4A00330
ISN 0027               IF ( ICHAR .EQ. IRPL ) GO TO 100                                    I4A00340
ISN 0029               IF ( ICHAR .NE. IRMI ) GO TO 20                                     I4A00350
ISN 0031               MINUS = - MINUS                                                     I4A00360
ISN 0032               GO TO 100                                                           I4A00370
ISN 0033        20     IERFLG = I                                                          I4A00380
ISN 0034        30     CONTINUE                                                            I4A00390
ISN 0035               IERFLG = NCHFLD + 1                                                 I4A00400
ISN 0036               GO TO 240                                                           I4A00410
ISN 0037        100    IF ( NEXT .GT. NCHFLD ) GO TO 130                                   I4A00420
ISN 0039               DO 120 I = NEXT, NCHFLD                                             I4A00430
ISN 0040               ILCH = IFLD( I )                                                    I4A00440
ISN 0041               L(8) = L(1)                                                         I4A00450
ISN 0042               IF (ICHAR .LT. IR0 ) GO TO 110                                      I4A00460
ISN 0044               IF (ICHAR .GT. IR9 ) GO TO 110                                      I4A00470
ISN 0046               JDIG = I                                                            I4A00480
ISN 0047               GO TO 200                                                           I4A00490
ISN 0048        110    IF ( ICHAR .EQ. IRBL ) GO TO 120                                    I4A00500
ISN 0050               IERFLG = I                                                          I4A00510
ISN 0051        120    CONTINUE                                                            I4A00520
ISN 0052        130    IERFLG = NCHFLD + 1                                                 I4A00530
ISN 0053               GO TO 240                                                           I4A00540
ISN 0054        200    DO 230 I = JDIG, NCHFLD                                             I4A00550
ISN 0055               ILCH = IFLD( I )                                                    I4A00560
ISN 0056               L(8) = L(1)                                                         I4A00570
ISN 0057               IF ( ICHAR .LT. IR0 ) GO TO 210                                     I4A00580
ISN 0059               IF ( ICHAR .LE. IR9) GO TO 220                                      I4A00590
ISN 0061        210    IF (ICHAR .NE. IRBL ) IERFLG = I                                    I4A00600
ISN 0063               ICHAR = IR0                                                         I4A00610
ISN 0064        220    IVAL = ICHAR - IR0                                                  I4A00620
ISN 0065               NCVTED = NCVTED * 10  -  IVAL                                       I4A00630
ISN 0066        230    CONTINUE                                                            I4A00640
ISN 0067               IF ( MINUS .EQ. 1 ) NCVTED = - NCVTED                               I4A00650
ISN 0069        240    IF ( IERFLG .EQ. 0 ) GO TO 250                                      I4A00660
ISN 0071               NCH = NCHFLD                                                        I4A00670
ISN 0072               IF ( NCH .GT. 80 ) NCH = 80                                         I4A00680
ISN 0074               WRITE ( 6, 1000 ) IERFLG, NCHFLD, (IFLD(K), K = 1, NCH )            I4A00690
ISN 0075        1000   FORMAT(' EBCDIC TO BINARY INTEGER CONVERSION ERROR',I2,' AT CHARACTERI4A00700
                      1 ',I5,' OF ',I5,' CHARACTER FIELD:'/1X,80A1)                        I4A00710
ISN 0076        250    RETURN                                                              I4A00720
ISN 0077               END                                                                 I4A00730
```

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

SYMBOL	INTERNAL STATEMENT NUMBERS											
I	0015	0016	0022	0024	0033	0039	0040	0046	0050	0054	0055	0061
K	0074	0074	0074									
L	0004	0005	0017	0017	0041	0041	0056	0056				
IR0	0007	0018	0042	0057	0063	0064						
IR9	0008	0020	0044	0059								
NCH	0071	0072	0072	0074								
IDUM	0003	0005	0005	0005								
IFLD	0002	0003	0016	0040	0055	0074						
ILCH	0005	0016	0040	0055								
IRBL	0009	0025	0048	0061								
IRMI	0011	0029										
IRPL	0010	0027										
IVAL	0064	0065										
JDIG	0022	0046	0054									
NEXT	0024	0037	0039									
ICHAR	0005	0006	0018	0020	0025	0027	0029	0042	0044	0048	0057	0059	0061	0063	0064
MINUS	0014	0031	0031	0067								
IERFLG	0013	0033	0035	0050	0052	0061	0069	0074				
I4A1BN	0002											
NCHFLD	0002	0015	0035	0037	0039	0052	0054	0071	0074			
NCVTED	0002	0012	0065	0065	0067	0067						

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

LABEL	DEFINED	REFERENCES	
10	0024	0018	0020
20	0033	0029	
30	0034	0015	0025
100	0037	0027	0032
110	0048	0042	0044
120	0051	0039	0048
130	0052	0037	
200	0054	0023	0047
210	0061	0057	
220	0064	0059	
230	0066	0054	
240	0069	0036	0053
250	0076	0069	
1000	0075	0074	

/ I4A1BN / SIZE OF PROGRAM 0003B2 HEXADECIMAL BYTES

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
I	SF	I*4	0000FC	K	F	I*4	000100	L	SF E	L*1	000148	IR0	F	I*4	000104
IR9		I*4	000108	NCH	SF	I*4	00010C	IDUM	E	I*4	000148	IFLD	F XR	I*4	000090
ILCH	S E	I*4	000148	IRBL		I*4	000110	IRMI		I*4	000114	IRPL		I*4	000118
IVAL	SF	I*4	00011C	JDIG	SF	I*4	000120	NEXT	SF	I*4	000124	ICHAR	SF E	I*4	00014C
MINUS	SF	I*4	000128	IBCOM#	F XF	I*4	000000	IERFLG	SF	I*4	00012C	I4A1BN		I*4	000130
NCHFLD	F	I*4	000134	NCVTED	SF	I*4	000138								

SOURCE STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
10	24	0001C0	20	33	0001F2	30	34	0001F6	100	37	00020E
110	48	000252	120	51	000262	130	52	00026C	200	54	00027A
210	61	0002AA	220	64	0002BE	230	66	0002D2	240	69	0002E4
250	76	000348									

COMPILER GENERATED LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
100001	2	000164	100002	16	00018C	100003	20	0001AC	100004	22	000188
100005	27	0001D4	100006	29	0001E0	100007	31	0001FC	100008	35	000200
100009	39	00021A	100010	40	00021E	100011	44	00023E	100012	46	00024A
100013	50	00025E	100015	55	00027F	100016	59	00029E	100017	62	0002B6
100018	63	0002BA	100019	67	0002DC	100020	68	0002E2	100021	71	0002EE
100022	73	0002FE	100023	74	000306						

FORMAT STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
1000	75	000028									

```
*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)
*STATISTICS*      SOURCE STATEMENTS =      76, PROGRAM SIZE =      946, SUBPROGRAM NAME =I4A1BN
*STATISTICS*  NO  DIAGNOSTICS GENERATED
****** END OF COMPILATION ******                    280K BYTES OF CORE NOT USED
```

```
REQUESTED OPTIONS: NOTERM

OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
                   SOURCE ENDDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

   ISN 0002            SUBROUTINE RDEXCT                                                    RDE00010
                    C                                                                       RDE00020
   ISN 0003            IMPLICIT INTEGER (A-X)                                               RDE00030
                    C                                                                       RDE00040
                    C  PURPOSE:  READ INFORMATION FROM THE EXEC FILE AND THE LARS DIRECTORY RDE00050
                    C            INFORMATION WRITTEN ON FILE 7 BY THE   PROGRAM           RDE00060
                    C                 SEGMENT NUMBER                                      RDE00070
                    C                 NUMBER OF ACQUISITONS                               RDE00080
                    C                 ACQUISITION DATES                                   RDE00090
                    C                 SUN ANGLES                                          RDE00100
                    C                 LANDSAT NUMBERS                                     RDE00110
                    C                                                                     RDE00120
                    C                                                                     RDE00130
   ISN 0004            COMMON /USER/ ICROP(4),ZX(4),SUNANG(5)                             RDE00140
   ISN 0005            REAL*4 ZX                                                          RDE00150
   ISN 0006            COMMON /MISC/ NOACQ, ACQDT(5), KSEGM, LANDST(5)                    RDE00160
   ISN 0007            REAL * 8 ACQDT                                                     RDE00170
                    C                                                                     RDE00180
                    C  READ SEGMENT NUMBER                                                RDE00190
   ISN 0008             WRITE (6,9999)                                                    RDE00200
   ISN 0009         9999  FORMAT (' ENTERING RDEXCT')                                     RDE00210
   ISN 0010               READ (7,1000) KSEGM                                            RDE00220
   ISN 0011         1000  FORMAT (2044)                                                   RDE00230
                    C                                                                     RDE00240
                    C  SET NUMBER OF ACQUISITIONS                                         RDE00250
   ISN 0012               NOACQ = 5                                                      RDE00260
                    C                                                                     RDE00270
                    C  READ ACQUISITION DATE                                              RDE00280
   ISN 0013               READ (7,700) ACQDT                                             RDE00290
   ISN 0014         700   FORMAT (5(2X,A5))                                              RDE00300
   ISN 0015               WRITE (6,700) ACQDT                                            RDE00310
                    C                                                                     RDE00320
                    C  READ LANDSAT NUMBERS                                               RDE00330
   ISN 0016               READ (7,400) LANDST                                            RDE00340
   ISN 0017         400   FORMAT (20I4)                                                  RDE00350
                    C                                                                     RDE00360
   ISN 0018               WRITE (6,9998)LANDST                                           RDE00370
   ISN 0019         9998  FORMAT (' LANDST=',5I5)                                       RDE00380
   ISN 0020               RETURN                                                         RDE00390
   ISN 0021               END                                                            RDE00400

                          *****F O R T R A N   C R O S S   R E F E R E N C E   L I S T I N G*****
SYMBOL   INTERNAL STATEMENT NUMBERS
ZX       0004   0005
ACQDT    0006   0007   0013   0015
ICROP    0004
KSEGM    0006   0010
NOACQ    0006   0012
LANDST   0006   0016   0018
RDEXCT   0002
SUNANG   0004

                          *****F O R T R A N   C R O S S   R E F E R E N C E   L I S T I N G*****
 LABEL   DEFINED   REFERENCES
   400     0017      0016
   700     0014      0013   0015
  1000     0011      0010
  9998     0019      0018
  9999     0009      0008

                                                  /  RDEXCT /     SIZE OF PROGRAM 0001BF HEXADECIMAL BYTES

      NAME    TAG   TYPE  ADD.       NAME    TAG   TYPE  ADD.       NAME    TAG   TYPE  ADD.       NAME    TAG   TYPE  ADD.
        ZX      C   R*4     NR   ACQDT SF   C   R*8   000008   ICROP     C   I*4     NR   KSEGM S   C   I*4   000030
    NOACQ S     C   I*4   000000   IRC04# F  XF   I*4   000000   LANDST SF   C   I*4   000034   RDEXCT      I*4   0000C4
    SUNANG      C   I*4     NR

                                  -*****  COMMON INFORMATION   *****
```

D-40

NAME OF COMMON BLOCK * USE** SIZE OF BLOCK 000034 HEXADECIMAL BYTES

VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.
ICROP	I*4	000000 NR	ZX	R*4	000010 NR	SUNANG	I*4	000020 NR			

NAME OF COMMON BLOCK * MISC* SIZE OF BLOCK 000049 HEXADECIMAL BYTES

VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.
NOACQ	I*4	000000	ACQDT	R*8	000008	KSEGM	I*4	000030	LANDST	I*4	000034

COMPILER GENERATED LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
100001	2	0000DC									

FORMAT STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
9999	9	000028	1000	11	00003C	700	14	000042	400	17	000048
9998	19	000051									

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)

*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

STATISTICS SOURCE STATEMENTS = 20, PROGRAM SIZE = 446, SUBPROGRAM NAME =RDFXCT

STATISTICS NO DIAGNOSTICS GENERATED

****** END OF COMPILATION ****** 288K BYTES OF CORE NOT USED

```
*LEVEL 2.3.0 (JUNE 78)          OS/360  FORTRAN H EXTENDED          DATE 81.139/13.28.54       PAGE   1
REQUESTED OPTIONS: NOTER1
OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
                   SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

    ISN 0002            SUBROUTINE RDFLES (ITYPE, HDR, VERTPX, VERTLN, IERROR)                  RDF00010
                C   PURPOSE: MOVE DATA FROM A UNIVERSAL FORMAT TAPE TO  IDATA                    RDF00020
                C        MOVE MULTIPLE CHANNELS OF DATA                                         RDF00030
                C                                                                               RDF00040
                C        **********    INPUT    **********                                      RDF00050
                C   DATA FILES ON UNITS 11 - 18                                                RDF00060
                C                                                                               RDF00070
                C        **********    OUTPUT   **********                                      RDF00080
                C   ITYPE = 1  READ HEADER RECORDS AND POSITION TAPE FOR 1ST FILE               RDF00090
                C   ITYPE = 2  READ A LINE OF PIXELS INTO IDATA                                 RDF00100
                C                 RADIANCE VALUES (196 X NUMBER OF CHANNELS)                    RDF00110
                C                                                                               RDF00120
    ISN 0003            IMPLICIT INTEGER (A-Z)                                                  RDF00130
                C                                                                               RDF00140
    ISN 0004            LOGICAL*1 HDR(1)                                                        RDF00150
    ISN 0005            REAL*4 VERTPX(4), VERTLN(4)                                             RDF00160
                C                                                                               RDF00170
                C                                                                               RDF00180
                C    IDATA HAS (72 + 4*196) CHARACTERS FOR A MAX OF 8 ACQUISITIONS              RDF00190
    ISN 0006            COMMON /LINES/ NXTLNE, LINENO, IDATA(856,8), NOACQS                     RDF00200
    ISN 0007            LOGICAL*1 IDATA                                                         RDF00210
                C                                                                               RDF00220
                C                                                                               RDF00230
                C   ITYPE=1, READ HEADER;  ITYPE=2, READ DATA                                  RDF00240
    ISN 0008            IERROR = 0                                                              RDF00250
    ISN 0009        10  IF (ITYPE .EQ. 2) GO TO 100                                             RDF00260
                C                                                                               RDF00270
                C   SKIP OVER HEADER RECORDS                                                    RDF00280
    ISN 0011            DO 15 I = 1,NOACQS                                                      RDF00290
    ISN 0012            ITAPE = 10 + I                                                          RDF00300
    ISN 0013            REWIND ITAPE                                                            RDF00310
    ISN 0014            READ (ITAPE, 1111, END = 901) HDR                                       RDF00320
    ISN 0015        1111  FORMAT (17(160A1))                                                    RDF00330
    ISN 0016        15    CONTINUE                                                              RDF00340
                C                                                                               RDF00350
    ISN 0017            NOFLD=0                                                                 RDF00360
                C*                                                                              RDF00370
                C   READ FIELD DEFINITION                                                       RDF00380
    ISN 0018        20  CALL RDVERT ( VERTPX,.VERTLN, IERROR)                                   RDF00390
    ISN 0019            SAMINC = 1                                                              RDF00400
    ISN 0020            LININC = 1                                                              RDF00410
    ISN 0021            WRITE (6,1600) SAMINC, LININC, (VERTPX(I), VERTLN(I),I=1,4)             RDF00420
    ISN 0022        1600  FORMAT(//, ' PIXEL SKIP FACTOR = ',I4, ' LINE SKIP FACTOR = ',I4,     RDF00430
                       1 /, ' VERTICES (PIXEL, LINE)=',5('(',F4.0,',',F4.0,')',1X)  )           RDF00440
                C*                                                                              RDF00450
                C    SET NEXT LINE NUMBER                                                       RDF00460
    ISN 0023            NXTLNE = 1                                                              RDF00470
    ISN 0024            RETURN                                                                  RDF00480
                C                                                                               RDF00490
                C  NO FILE                                                                      RDF00500
    ISN 0025        901 IDISK = ITAPE - 10                                                      RDF00510
    ISN 0026            WRITE (6,902) IDISK                                                     RDF00520
    ISN 0027            WRITE (3,902) IDISK                                                     RDF00530
    ISN 0028        902   FORMAT (' DISK FILE HEADER RECORD FOR FILE ',I2, ' IS MISSING.',      RDF00540
                       1  /, ' RUN WILL TERMINATE')                                            RDF00550
    ISN 0029            IERROR = 1                                                              RDF00560
    ISN 0030            RETURN                                                                  RDF00570
                C                                                                               RDF00580
                C                                                                               RDF00590
                C  READ LINES FROM RADIANCE VALUE FILES                                         RDF00600
                C  SKIP OVER UNNEEDED LINES                                                     RDF00610
    ISN 0031        100 IF (NXTLNE .EQ. LINENO) GO TO 120                                       RDF00620
                C                                                                               RDF00630
    ISN 0033            ISKIP = LINENO - NXTLNE                                                 RDF00640
    ISN 0034            DO 110 J = 1,NOACQS                                                     RDF00650
    ISN 0035            ITAPE = 10 + J                                                          RDF00660
    ISN 0036            DO 110 I = 1,ISKIP                                                      RDF00670
    ISN 0037            READ (ITAPE,1111, END=910) DUMMY                                        RDF00680
    ISN 0038        110 CONTINUE                                                                RDF00690
                C                                                                               RDF00700
    ISN 0039        120 DO 130 I = 1,NOACQS                                                     RDF00710
    ISN 0040            ITAPE = 10 + I                                                          RDF00720
                C   READ (72 + 4*195) CHARACTERS                                               RDF00730
```

```
ISN 0041            READ (ITAPE,1112,END=910) ((IDATA(III,I),III=1,856)
ISN 0042      1112  FORMAT (96(100A1))
ISN 0043      130   CONTINUE
                C
ISN 0044            NXTLNE = LINENO + 1
                C
ISN 0045            RETURN
                C
                C  END OF FILE WHILE TRYING TO READ GRAY LEVEL RECORD
ISN 0046      910   IDISK = ITAPE -10
ISN 0047            WRITE (3,911) NXTLNE, IDISK
ISN 0048            WRITE (6,911) NXTLNE, IDISK
ISN 0049      911   FORMAT (' END OF FILE WHILE TRYING TO READ RECORD',I4,
                   1  ' ON DISK FILE ', I4, /, ' RUN WILL TERMINATE')
ISN 0050            IERROR = 1
ISN 0051             RETURN
                C
ISN 0052            END
```

RDF00740 RDF00750 RDF00760 RDF00770 RDF00780 RDF00790 RDF00800 RDF00810 RDF00820 RDF00830 RDF00840 RDF00850 RDF00860 RDF00870 RDF00880 RDF00890 RDF00900 RDF00910

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

SYMBOL	INTERNAL STATEMENT NUMBERS								
I	0011	0012	0021	0021	0021	0021	0036	0039	0040	0041
J	0034	0035								
HDR	0002	0004	0014							
III	0041	0041	0041							
DUMMY	0037									
IDATA	0006	0007	0041							
IDISK	0025	0026	0027	0046	0047	0048				
ISKIP	0033	0036								
ITAPE	0012	0013	0014	0025	0035	0037	0040	0041	0046	
ITYPE	0002	0009								
NOFLD	0017									
IERROR	0002	0008	0018	0029	0050					
LINENO	0006	0031	0033	0044						
LININC	0020	0021								
NOACOS	0006	0011	0034	0039						
NXTLNE	0006	0023	0031	0033	0044	0047	0048			
RDFLES	0002									
RDVERT	0018									
SAMINC	0019	0021								
VERTLN	0002	0005	0019	0021						
VERTPX	0002	0005	0018	0021						

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

LABEL	DEFINED	REFERENCES	
10	0009		
15	0016	0011	
20	0018		
100	0031	0009	
110	0038	0034	0036
120	0039	0031	
130	0043	0039	
901	0025	0014	
902	0028	0026	0027
910	0046	0037	0041
911	0049	0047	0048
1111	0015	0014	0037
1112	0042	0041	
1600	0022	0021	

/ RDFLES / SIZE OF PROGRAM 00052A HEXADECIMAL BYTES

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
I	SF	I*4	0001BC	J	SF	I*4	0001C0	HDR	S XR	L*1	000000	III	F	I*4	0001C4
DUMMY	S	I*4	0001C8	IDATA	S C	L*1	000008	IDISK	SF	I*4	0001CC	ISKIP	SF	I*4	0001D0
ITAPE	SF	I*4	0001D4	ITYPE		I*4	0001D8	NOFLD	S	I*4	0001DC	IBCOM#	F XF	I*4	000008
IERROR	SFA	I*4	0001E0	LINENO	F C	I*4	000004	LININC	SF	I*4	0001E4	NOACOS	F C	I*4	001AC8
NXTLNE	SF C	I*4	000000	RDFLES		I*4	0001E8	RDVERT	SF XF		000000	SAMINC	SF	I*4	0001EC
VERTLN	SFA XR	R*4	000000	VERTPX	SFA XR	R*4	000000								

***** COMMON INFORMATION *****

NAME OF COMMON BLOCK * LINES* SIZE OF BLOCK 0014CC HEXADECIMAL BYTES

VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.
NXTLNE	I*4	000000	LINENO	I*4	000004	IDATA	L*1	000008	NOACQS	I*4	001AC8

SOURCE STATEMENT LABELS

LABEL	ISN	ADDR		LABEL	ISN	ADDR		LABEL	ISN	ADDR		LABEL	ISN	ADDR
10	9	000248	NR	15	16	00029C		20	18	00024E	NR	901	25	000328
100	31	000380		110	38	0003C4		120	39	0003D8		130	43	000416
910	46	00043A												

COMPILER GENERATED LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
100001	2	000228	100002	11	000254	100003	12	000256	100004	14	00026C
100005	14	000280	100006	17	0002A6	100007	21	0002F2	100008	21	000310
100009	33	00038C	100010	35	00039A	100011	37	0003A4	100012	37	0003BA
100013	39	0003CE	100015	40	0003DA	100016	41	0003E2	100017	41	0003F8
100020	44	000420									

FORMAT STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
1111	15	000028	1600	22	000031	902	28	000095	1112	42	0000E1
911	49	0000EA									

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)

*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

STATISTICS SOURCE STATEMENTS = 51, PROGRAM SIZE = 1322, SUBPROGRAM NAME =RDFLES

STATISTICS NO DIAGNOSTICS GENERATED

****** END OF COMPILATION ****** 284K BYTES OF CORE NOT USED

```
REQUESTED OPTIONS: NOTERM

OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
                   SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

    ISN 0002            SUBROUTINE NOVERT (VERTPX, VERTLN, IERROR)                                  RDF00920
                                                                                                    RDF00930
                C   PURPOSE--READ AND DECODE A CARD DESCRIBING VERTICES OF TRAINING OR            RDF00940
                C           TEST FIELD.  CARD CAN BE ABSENT INDICATING COMPLETE                     RDF00950
                C           FIELD OR CARD CAN BE IN THE FOLLOWING FORMAT:                           RDF00960
                C                                                                                   RDF00970
                C                (1,1), (X1,Y1), (X2,Y2), (X3,Y3), (X4,Y4)                          RDF00980
                C                                                                                   RDF00990
                C           WHERE X1,Y1 IS THE UPPER LEFT CORNER AND THE VERTICES                   RDF01000
                C           CONTINUE IN A CLOCKWISE DIRECTION.                                      RDF01010
                C                                                                                   RDF01020
    ISN 0003            IMPLICIT INTEGER(A-Z)                                                       RDF01030
    ISN 0004            INTEGER CARD(80)                                                            RDF01040
    ISN 0005            REAL*4 VERTPX(4), VERTLN(4)                                                 RDF01050
    ISN 0006            REAL*4 XDEFLT(4), YDEFLT(4)                                                 RDF01060
    ISN 0007            DATA BLANK/' '/, COMMA/','/,  OPNPAR/'('/,  CLSPAR/')'/                     RDF01070
    ISN 0008            DATA XDEFLT /1., 196., 196., 1./                                            RDF01080
    ISN 0009            DATA YDEFLT /1., 1., 117., 117./                                            RDF01090
                C                                                                                   RDF01100
                C  READ CARD                                                                        RDF01110
    ISN 0010            READ(2, 6, END=990) CARD                                                    RDF01120
    ISN 0011        6   FORMAT(80A1)                                                                RDF01130
                C                                                                                   RDF01140
                C  SET PROGRAM TO NO COLUMNS READ, NO VERTICES FOUND                                RDF01150
    ISN 0012            NOCOL=0                                                                     RDF01160
    ISN 0013            NOVERT = -1                                                                 RDF01170
                C                                                                                   RDF01180
                C  SET SWITCH TO NO PIXEL NUMBER READ                                               RDF01190
    ISN 0014        2   IPIXEL = 0                                                                  RDF01200
                C                                                                                   RDF01210
                C  FIRST NON-BLANK CHARACTER MUST BE A (                                            RDF01220
    ISN 0015        11  ICHAR=NXTCHR(CARD,NOCOL)                                                   RDF01230
    ISN 0016            IF(ICHAR.EQ.BLANK) GO TO 935                                                RDF01240
    ISN 0018            IF(ICHAR.NE.OPNPAR) GO TO 903                                               RDF01250
                C                                                                                   RDF01260
    ISN 0020        3   NUM=0                                                                       RDF01270
    ISN 0021        4     ICHAR = NXTCHR(CARD,NOCOL)                                                RDF01280
    ISN 0022            IF(ICHAR.EQ.BLANK) GO TO 935                                                RDF01290
                C                                                                                   RDF01300
                C  CHECK FOR COMMA SEPARATING PIXEL, LINE                                           RDF01310
    ISN 0024            IF (ICHAR .EQ. COMMA) GO TO 7                                               RDF01320
                C                                                                                   RDF01330
                C  CHECK FOR RIGHT PARENTHESIS FINISHING PIXEL,LINE COUPLET                         RDF01340
    ISN 0026            IF(CARD(NOCOL).EQ.CLSPAR) GO TO 8                                           RDF01350
                C                                                                                   RDF01360
                C  CHARACTER MUST BE NUMERIC                                                        RDF01370
    ISN 0028            CALL I4A1BN(ICHAR,1,NUMCHR)                                                 RDF01380
    ISN 0029            IF((NUMCHR.LT.0).OR.(NUMCHR.GT.9)) GO TO 903                                RDF01390
                C                                                                                   RDF01400
                C  NUMERIC CHARACTER, CONVERT TO COMPUTATIONAL NUMBER AND INCLUDE IN SUM            RDF01410
    ISN 0031            NUM=10*NUM+NUMCHR                                                           RDF01420
    ISN 0032            GO TO 4                                                                     RDF01430
                C                                                                                   RDF01440
                C VERTEX PIXEL NUMBER                                                               RDF01450
    ISN 0033        7   NOVERT = NOVERT + 1                                                         RDF01460
    ISN 0034            IF (NOVERT .GT. 4) GO TO 910                                                RDF01470
    ISN 0036            IF (IPIXEL .NE. 0 ) GO TO 903                                               RDF01480
    ISN 0038            IF (NUM .EQ. 0) GO TO 903                                                   RDF01490
    ISN 0040            IF (NOVERT .GT. 0) VERTPX(NOVERT) = NUM                                     RDF01500
    ISN 0042            IPIXEL = NUM                                                                RDF01510
    ISN 0043            GO TO 3                                                                     RDF01520
                C                                                                                   RDF01530
                C VERTEX LINE NUMBER                                                                RDF01540
    ISN 0044        8   IF (IPIXEL .EQ. 0) GO TO 903                                                RDF01550
    ISN 0046            IF (NUM .EQ. 0) GO TO 903                                                   RDF01560
    ISN 0048            IF (NOVERT .GT. 0) VERTLN(NOVERT) = NUM                                     RDF01570
                C                                                                                   RDF01580
                C CHECK FOR COMMA FOLLOWING (PIXEL,LINE)                                            RDF01590
    ISN 0050        10  ICHAR=NXTCHR(CARD,NOCOL)                                                   RDF01600
    ISN 0051            IF(ICHAR.EQ.BLANK) GO TO 930                                                RDF01610
    ISN 0053            IF(ICHAR.EQ.COMMA) GO TO 2                                                  RDF01620
                C                                                                                   RDF01630
                C                                                                                   RDF01640
```

```
                C  SOMETHING WRONG WITH ORDER OF CHARACTERS                                    RDF01650
   ISN 0055       903 WRITE(6,904) CARD                                                       RDF01660
   ISN 0056           WRITE (3,904) CARD                                                      RDF01670
   ISN 0057       904   FORMAT(' ERROR IN VERTICES CARD',/,1X,80A1,/,' RUN WILL TERMINATE    RDF01680
                     1  ')                                                                   RDF01690
   ISN 0058           IERROR = 1                                                              RDF01700
   ISN 0059           RETURN                                                                  RDF01710
                C                                                                             RDF01720
                C  TOO MANY VERTICES                                                          RDF01730
   ISN 0060       910   WRITE (3,911) CARD                                                   RDF01740
   ISN 0061           WRITE (6,911) CARD                                                      RDF01750
   ISN 0062       911   FORMAT (' MAXIMUM OF 4 VERTICES ALLOWED',/,1X,80A1,/,' RUN WILL TERDF01760
                     1MINATE')                                                               RDF01770
   ISN 0063           IERROR = 1                                                              RDF01780
   ISN 0064           RETURN                                                                  RDF01790
                C                                                                             RDF01800
                C  END OF CARD                                                                RDF01810
   ISN 0065       930   IF (NOVERT .EQ. 4) RETURN                                            RDF01820
                C                                                                             RDF01830
                C  ERROR, CARD TERMINATES BEFORE 4TH VERTICES FINISHED                        RDF01840
   ISN 0067       935   WRITE (6,936) CARD                                                   RDF01850
   ISN 0068           WRITE (3,936) CARD                                                      RDF01860
   ISN 0069       936   FORMAT (' END OF CARD BEFORE END OF 4TH SET OF VERTICES'/,1X,80A1,RDF01870
                     1 /,  ' RUN WILL TERMINATE')                                            RDF01880
   ISN 0070           IERROR = 1                                                              RDF01890
   ISN 0071           RETURN                                                                  RDF01900
                C                                                                             RDF01910
                C  NO FIELD DEFINITION CARD, DEFAULT TO WHOLE SCENE                           RDF01920
   ISN 0072       990   DO 995 I = 1,4                                                       RDF01930
   ISN 0073           VERTPX(I) = XDEFLT(I)                                                   RDF01940
   ISN 0074           VERTLN(I) = YDEFLT(I)                                                   RDF01950
   ISN 0075       995   CONTINUE                                                             RDF01960
   ISN 0076           RETURN                                                                  RDF01970
                C                                                                             RDF01980
   ISN 0077           END                                                                     RDF01990
```

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

SYMBOL	INTERNAL	STATEMENT	NUMBERS									
I	0072	0073	0073	0074	0074							
NUM	0020	0031	0031	0038	0040	0042	0046	0048				
CARD	0004	0010	0015	0021	0026	0050	0055	0056	0060	0061	0067	0068
BLANK	0007	0016	0022	0051								
COMMA	0007	0024	0053									
ICHAR	0015	0016	0018	0021	0022	0024	0028	0050	0051	0053		
NOCOL	0012	0015	0021	0026	0050							
CLSPAR	0007	0026										
IERROR	0002	0058	0063	0070								
IPIXFL	0014	0036	0042	0044								
I4A1BN	0028											
NOVERT	0013	0033	0033	0034	0040	0040	0048	0048	0065			
NUMCHR	0028	0029	0029	0031								
NXTCHR	0015	0021	0025									
OPNPAR	0007	0018										
RDVERT	0002											
VERTLN	0002	0005	0048	0074								
VERTPX	0002	0005	0040	0073								
XDEFLT	0006	0009	0073									
YDEFLT	0006	0009	0074									

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

LABEL	DEFINED	REFERENCES					
2	0014	0053					
3	0020	0043					
4	0021	0032					
6	0011	0010					
7	0033	0024					
8	0044	0026					
10	0050						
11	0015						
903	0055	0018	0029	0036	0038	0044	0046
904	0057	0055	0056				
910	0060	0034					
911	0062	0060	0061				
930	0065	0051					
935	0067	0016	0022				
936	0069	0067	0068				

*****FORTRAN CROSS REFERENCE LISTING*****

LABEL	DEFINED	REFERENCES
990	0072	0010
995	0075	0072

/ RDVERT / SIZE OF PROGRAM 0006CA HEXADECIMAL BYTES

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
I	SF	I*4.	000184	NUM	SF	I*4	000188	CARD	SFA	I*4	000188	BLANK		I*4	00018C
COMMA		I*4	000190	ICHAR	SFA	I*4	000194	NOCOL	SFA	I*4	000198	CLSPAR		I*4	00019C
IRCOM#	F XF	R*4	000000	IERROR	S	I*4	0001A0	IPIXEL	S	I*4	0001A4	I4A18N	SF XF		000000
NOVERT	SF	I*4	0001A8	NUMCHR	SFA	I*4	0001AC	NXTCHR	F XF	I*4	000000	OPNPAR		I*4	000180
RDVERT		I*4	0001B4	VERTLN	S XR	R*4	000000	VERTPX	S XR	R*4	000000	XDEFLT	F	R*4	0002F8
YDEFLT	F	R*4	000308												

SOURCE STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR		LABEL	ISN	ADDR	LABEL	ISN	ADDR
2	14	0003BE	11	15	000390	NR	3	20	0003AE	4	21	0003B0
7	33	000424	8	44	000466		10	50	00049B	903	55	0004B6
910	60	00051C	930	65	000589		935	67	0005A6	990	72	00060C
995	75	000640										

COMPILER GENERATED LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
100001	2	000340	100002	10	000374	100003	18	0003A6	100004	24	0003C6
100005	26	0003CE	100006	28	0003E2	100007	31	000414	100008	36	00042E
100009	38	000434	100010	40	00043A	100011	41	000440	100012	42	000460
100013	46	000460	100014	48	000472	100015	49	000478	100016	53	0004AE
100017	66	000586	100018	73	000610	100019	76	00064A			

FORMAT STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
6	11	000328	904	57	00002E	911	62	000069	936	69	0000A8

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)

*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

STATISTICS SOURCE STATEMENTS = 76, PROGRAM SIZE = 1738, SUBPROGRAM NAME =RDVERT

STATISTICS NO DIAGNOSTICS GENERATED

****** END OF COMPILATION ****** 276K BYTES OF CORE NOT USED

STATISTICS NO DIAGNOSTICS THIS STEP

```
*LEVEL 2.3.0 (JUNE 78)          OS/360  FORTRAN H EXTENDED          DATE 81.139/13.29.02       PAGE   1
REQUESTED OPTIONS: NOTERM
OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
                   SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

    ISN 0002            SUBROUTINE RECT (P,Q,XX,XY,ICOR)                                  REC00010
                C   PURPOSE:  DETERMINE IF POINT IS IN TRAINING FIELD                      REC00020
    ISN 0003            DIMENSION XX(4),XY(4),THETA(4),AM(4),AX(4),AY(4)                  REC00030
    ISN 0004            ICOR=1                                                            REC00040
    ISN 0005            NN = 4                                                            REC00050
                C   CHECK IF POINT IF ONE OF BOUNDRY POINTS                              REC00060
    ISN 0006            DO 4 M = 1,NN                                                     REC00070
    ISN 0007            IF (P.EQ.XX(M) .AND. Q.EQ.XY(M))  GO TO 5                         REC00080
    ISN 0009        4    CONTINUE                                                         REC00090
    ISN 0010            GO TO 6                                                           REC00100
                C   POINT IN BOUNDS                                                      REC00110
    ISN 0011        5   ICOR = 0                                                         REC00120
    ISN 0012            RETURN                                                            REC00130
                C   CHECK FOR POINT INSIDE OF BOUNDS                                     REC00140
    ISN 0013        6   DO 1 I = 1,NN                                                    REC00150
    ISN 0014            AX(I) = P - XX(I)                                                 REC00160
    ISN 0015            AY(I) = Q - XY(I)                                                 REC00170
    ISN 0016            XM=AX(I)*AX(I)+AY(I)*AY(I)                                        REC00180
    ISN 0017        1    AM(I) = SQRT(XM)                                                 REC00190
                C                                                                         REC00200
    ISN 0018            DO 2 J=1,NN                                                       REC00210
    ISN 0019            K=J+1                                                             REC00220
    ISN 0020            IF (K.GT.NN) K=1                                                  REC00230
    ISN 0022            XTH=(AX(J)*AX(K)+AY(K)*AY(J))/(AM(J)*AM(K))                       REC00240
    ISN 0023        2   THETA(J) = ACOS(XTH)                                             REC00250
    ISN 0024            SUM = 0.                                                          REC00260
    ISN 0025            DO 3 L = 1,NN                                                     REC00270
    ISN 0026        3    SUM = SUM+THETA(L)                                               REC00280
    ISN 0027            DIFF = SUM - 3.14159263*2.                                        REC00290
    ISN 0028            DIFF=ABS(DIFF)                                                    REC00300
    ISN 0029            IF (DIFF.LE.1.E-04) ICOR = 0                                      REC00310
    ISN 0031            RETURN                                                            REC00320
    ISN 0032            END                                                               REC00330

                        *****F O R T R A N   C R O S S   R E F E R E N C E   L I S T I N G*****
SYMBOL  INTERNAL STATEMENT NUMBERS
I       0013  0014  0014  0015  0015  0016  0016  0016  0016  0017
J       0018  0019  0022  0022  0022  0023
K       0019  0020  0020  0022  0022  0022
L       0025  0026
M       0006  0007  0007
P       0002  0007  0014
Q       0002  0007  0015
AM      0003  0017  0022  0022
AX      0003  0014  0016  0016  0022  0022
AY      0003  0015  0016  0016  0022  0022
NN      0005  0006  0013  0018  0020  0025
XM      0016  0017
XX      0002  0003  0007  0014
XY      0002  0003  0007  0015
ABS     0028
SUM     0024  0026  0026  0027
XTH     0022  0023
ACOS    0023
DIFF    0027  0028  0028  0029
ICOR    0002  0004  0011  0029
RECT    0002
SQRT    0017
THETA   0003  0023  0026

                        *****F O R T R A N   C R O S S   R E F E R E N C E   L I S T I N G*****
 LABEL   DEFINED   REFERENCES
     1    0017     0013
     2    0023     0018
     3    0026     0025
     4    0009     0006
     5    0011     0007
     6    0013     0010

                                        /   RECT /   SIZE OF PROGRAM 000396 HEXADECIMAL BYTES
```

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
I	SF	I*4	0000A4	J	SF	I*4	0000A8	K	SF	I*4	0000AC	L	SF	I*4	0000B0
M	SF	I*4	0000B4	P	F	R*4	0000B8	Q	F	R*4	0000BC	AM	SF	R*4	0000DC
AX	SF	R*4	0000FC	AY	SF	R*4	0000FC	NN	SF	I*4	0000C0	XM	SFA	R*4	0000C4
XX	F XR	R*4	000000	XY	F XR	R*4	000000	SUN	SF	R*4	0000C8	XTH	SFA	R*4	0000CC
ACOS	F XF	R*4	000000	DIFF	SFA	R*4	000000	ICOR	S	I*4	0000D4	RECT		R*4	0000D8
SQRT	F XF	R*4	000000	THETA	SF	R*4	00010C								

SOURCE STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
4	9	000194	5	11	000140	6	13	0001C8	1	17	000230
2	23	00029E	3	26	0002C4						

COMPILER GENERATED LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
100001	2	000140	100002	7	00016B	200001	8	00017E	100003	10	00019C
100004	14	0001CA	100005	18	00024C	100006	19	000248	100007	21	000258
100008	22	000254	100009	24	0002BA	100010	27	0002DE	100011	30	0002FA
100012	31	0002FF									

```
*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)
*STATISTICS*      SOURCE STATEMENTS =      31, PROGRAM SIZE =      918, SUBPROGRAM NAME =  RFCT
*STATISTICS*  NO  DIAGNOSTICS GENERATED
****** END OF COMPILATION ******                                  288K BYTES OF CORE NOT USED
```

REQUESTED OPTIONS: NOTERM

OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

```
ISN 0002                SUBROUTINE SDEV(X,N,XB,S)                                  SDE00010
                C  CALCULATES THE MEAN AND STANDARD DEVIATION OF A VECTOR          SDE00020
                CC                                                                 SDE00030
ISN 0003                REAL*8 SS                                                  SDE00040
                C  X        VECTOR                                                 SDE00050
                C  N        NO. OF DATA POINTS                                     SDE00060
                C  XB       MEAN                                                   SDE00070
                C  S        STANDARD DEVIATION                                     SDE00080
ISN 0004                DIMENSION  X(1)                                            SDE00090
ISN 0005                XB=0.                                                      SDE00100
ISN 0006                XN=N                                                       SDE00110
                CCCC  WRITE (6,9999) (X(II),II=1,N)                                SDE00120
                CCCC 9999  FORMAT (' SDEV=',8F8.2,/,(       ',8F8.2))              SDE00130
ISN 0007                DO 1 I=1,N                                                 SDE00140
ISN 0008        1       XB=XB+X(I)                                                 SDE00150
ISN 0009                XB=XB/XN                                                   SDE00160
ISN 0010                SS=0.                                                      SDE00170
ISN 0011                DO 2 I=1,N                                                 SDE00180
ISN 0012              XDIFF = X(I) - XB                                            SDE00190
ISN 0013        2      SS = SS + XDIFF * XDIFF                                     SDE00200
ISN 0014                XN=XN-1                                                    SDE00210
ISN 0015              XX = SS/XN                                                   SDE00220
ISN 0016                S=SQRT(XX)                                                 SDE00230
ISN 0017                RETURN                                                     SDE00240
ISN 0018                END                                                        SDE00250
```

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

SYMBOL	INTERNAL	STATEMENT NUMBERS					
I	0007	0008	0011	0012			
N	0002	0006	0007	0011			
S	0002	0016					
X	0002	0004	0004	0012			
SS	0003	0010	0013	0013	0015		
XB	0002	0005	0008	0008	0009	0009	0012
XN	0006	0009	0014	0014	0015		
XX	0015	0016					
SDEV	0002						
SQRT	0016						
XDIFF	0012	0013	0013				

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

LABEL	DEFINED	REFERENCES
1	0008	0007
2	0013	0011

/ SDEV / SIZE OF PROGRAM 00020A HEXADECIMAL BYTES

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
I	SF	I*4	0000A4	N	F	I*4	0000A8	S	S	R*4	0000AC	X	F XR	R*4	000000
SS	SF	R*8	0000C8	XB	SF	R*4	0000B0	XN	SF	R*4	0000B4	XX	SFA	R*4	000088
SDEV		R*4	0000BC	SQRT	F XF	R*4	000000	XDIFF	SF	R*4	0000C0				

SOURCE STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
1	8	000114	2	13	000152						

COMPILER GENERATED LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
100001	7	0000E4	100002	9	00012E	100003	12	000140	100004	14	00016A

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)

*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

STATISTICS SOURCE STATEMENTS = 17, PROGRAM SIZE = 518, SUBPROGRAM NAME = SDEV

STATISTICS NO DIAGNOSTICS GENERATED

```
****** END OF COMPILATION ******                              288K BYTES OF CORE NOT USED
```

REQUESTED OPTIONS: NOTERM

OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

```
ISN 0002            SUBROUTINE TRJFIT (X,Y,SIGMAY,NFILES,NTERMS,MODE,COEFS,DELTAA,  TRJ00010
                   1SIGMAA,FLAMDA,YFIT,CHISQR)                                     TRJ00020
                C  MAKE A LEAST-SQUARE FIT TO A NON-LINEAR FUNCTION                TRJ00030
                C  X-ARRAY OF DATA POINTS                                          TRJ00040
                C  Y-ARRAY OF DEPENDENT VARIABLE                                   TRJ00050
                C  SIGMAY  ARRAY OF ERRORS ON Y                                    TRJ00060
                C  NFILES NO. OF DATA POINTS                                       TRJ00070
                C  MODE- DETERMINES THE METHOD OF WEIGHTING                        TRJ00080
                C  MODE=+1 WEIGHT(I)=1./SIGMAY(I)**2                              TRJ00090
                C  MODE=0 WEIGHT(I)=1.                                             TRJ00100
                C  MODE=-1 WEIGHT(I)=1./Y(I)                                       TRJ00110
                C  COEFS       ARRAY OF PARAMETERS                                 TRJ00120
                C  DELTAA ARRAY OF INCREMENTS FOR A                                TRJ00130
                C  FLAMDA PROPORTION OF GRADIENT SEARCH                            TRJ00140
                C  YFIT   ARRAY OF FITTED VALUES                                   TRJ00150
                C  CHISQR RESIDUAL CHISQ                                           TRJ00160
                C  REQUIRE THE FOLLOWING FUNCTIONS                                 TRJ00170
                C  F2NCTN(X,I,COEFS)                                               TRJ00180
                C  F2FRIV(X,I,COEFS,DELTAA,NOTRMS,DERIV)                           TRJ00190
                C  FCHISQ(Y,SIGMAY,NFILES,NFREE,MODE,YFIT)                         TRJ00200
                C  MATINV(ARRAY,NOTRMS,DET)--TO INVERT A SYMMMETRIC MATRIX         TRJ00210
                C  A MAXIMUM OF TEN PARAMETERS ALLOWED AND FLAMDA SHOULD           TRJ00220
                C  BE SET AT .001 AT THE BEGINING OF SEARCH, INTIAL VALUES         TRJ00230
                C  OF ARRAY SHOULD BE GUESSED AT AND SUPPLIED.                     TRJ00240
                C  IT IS RESPONSIBILITY OF THE MAIN PROGRAM TO DETERIME            TRJ00250
                C  CONVEGENCE OF THE FIT.                                          TRJ00260
ISN 0003            DOUBLE PRECISION ARRAY                                         TRJ00270
ISN 0004            DIMENSION X(1),Y(1),SIGMAY(1),COEFS(1),DELTAA(1),SIGMAA(1),    TRJ00280
                   1YFIT(1)                                                        TRJ00290
ISN 0005            DIMENSION WEIGHT(100),ALPHA(5,5),BETA(5),DERIV(5),             TRJ00300
                   1ARRAY(5,5),B(5)                                                TRJ00310
ISN 0006      11      NFREE=NFILES-NTERMS                                          TRJ00320
ISN 0007              IF(NFREE)13,13,20                                            TRJ00330
ISN 0008      13      CHISQR=0.                                                    TRJ00340
ISN 0009              GO TO 110                                                    TRJ00350
                C                                                                  TRJ00360
                C  EVALUTE WEIGHTS                                                 TRJ00370
                C                                                                  TRJ00380
ISN 0010      20      DO 30 I=1,NFILES                                             TRJ00390
ISN 0011      21      IF(MODE)22,27,29                                             TRJ00400
ISN 0012      22      IF(Y(I))25,27,23                                             TRJ00410
ISN 0013      23      WEIGHT(I)=1./Y(I)                                            TRJ00420
ISN 0014              GO TO 30                                                     TRJ00430
ISN 0015      25      WEIGHT(I)=1./(-Y(I))                                         TRJ00440
ISN 0016              GO TO 30                                                     TRJ00450
ISN 0017      27      WEIGHT(I)=1.                                                 TRJ00460
ISN 0018              GO TO 30                                                     TRJ00470
ISN 0019      29     SSSS = SIGMAY(I) * SIGMAY(I)                                  TRJ00480
ISN 0020             WEIGHT(I) = 1. / SSSS                                         TRJ00490
ISN 0021      30      CONTINUE                                                     TRJ00500
                C                                                                  TRJ00510
                C  EVALUTE ALPHA AND BETA MATRICES                                 TRJ00520
                C                                                                  TRJ00530
ISN 0022      31      DO 34 J=1,NTERMS                                             TRJ00540
ISN 0023              BETA(J)=0.                                                   TRJ00550
ISN 0024              DO 34 K=1,J                                                  TRJ00560
ISN 0025      34      ALPHA(J,K)=0.                                                TRJ00570
ISN 0026      41      DO 50 I=1,NFILES                                             TRJ00580
ISN 0027              CALL F2FRIV (X,I,COEFS,DELTAA,NTERMS,DERIV)                  TRJ00590
ISN 0028              DO 46 J=1,NTERMS                                             TRJ00600
ISN 0029              BETA(J)=BETA(J)+WEIGHT(I)*(Y(I)-F2NCTN(X,I,COEFS))*DERIV(J)  TRJ00610
ISN 0030              DO 46 K=1,J                                                  TRJ00620
ISN 0031      46      ALPHA(J,K)=ALPHA(J,K)+WEIGHT(I)*DERIV(J)*DERIV(K)            TRJ00630
ISN 0032      50      CONTINUE                                                     TRJ00640
ISN 0033      51      DO 53 J=1,NTERMS                                             TRJ00650
ISN 0034              DO 53 K=1,J                                                  TRJ00660
ISN 0035      53      ALPHA(K,J)=ALPHA(J,K)                                        TRJ00670
                C                                                                  TRJ00680
                C  EVALUTE CHI SQUARE AT STARTING POINT                            TRJ00690
                C                                                                  TRJ00700
ISN 0036      61      DO 62 I=1,NFILES                                             TRJ00710
ISN 0037      62      YFIT(I)=F2NCTN(X,I,COEFS)                                    TRJ00720
ISN 0038      63     CHISQ1=FCHISQ (Y,SIGMAY,NFILES,NFREE,MODE,YFIT)               TRJ00730
```

```
                C
                C  INVERT MODIFIED CURVATURE MATRIX TO FIND NEW PARAMETERS                    TRJ00740
                C                                                                            TRJ00750
                                                                                             TRJ00760
    ISN 0039    71     DO 74 J=1,NTERMS                                                      TRJ00770
    ISN 0040           DO 73 K=1,NTERMS                                                      TRJ00780
    ISN 0041               XXXX = ALPHA(J,J) * ALPHA(K,K)                                    TRJ00790
    ISN 0042    73      ARRAY(J,K)=ALPHA(J,K)/SQRT(XXXX)                                     TRJ00800
    ISN 0043    74      ARRAY(J,J)=1.+FLAMDA                                                 TRJ00810
    ISN 0044    80      CALL MATINV(ARRAY,NTERMS,DET)                                        TRJ00820
    ISN 0045    81      DO 84 J=1,NTERMS                                                     TRJ00830
    ISN 0046              B(J)=COEFS(J)                                                      TRJ00840
    ISN 0047            DO 84 K=1,NTERMS                                                     TRJ00850
    ISN 0048            XXXX = ALPHA(J,J) * ALPHA(K,K)                                       TRJ00860
    ISN 0049              B(J)=B(J)+BETA(K)*ARRAY(J,K)/SQRT(XXXX)                            TRJ00870
    ISN 0050    84      CONTINUE                                                             TRJ00880
                C                                                                            TRJ00890
                C  IF CHI SQUARE INCREASED,INCREASE FLAMDA AND TRY AGAIN                     TRJ00900
                C                                                                            TRJ00910
    ISN 0051    91        DO 92 I=1,NFILES                                                   TRJ00920
    ISN 0052    92        YFIT(I)=F2NCTN(X,I,B)                                              TRJ00930
    ISN 0053    93      CHISQR=FCHISQ(Y,SIGMAY,NFILES,NFREE,MODE,YFIT)                       TRJ00940
                C  WARNING***  STATEMENT WAS IF (CHISQ1 - CHISQR) 95, 101, 101               TRJ00950
    ISN 0054              IF ((CHISQ1 - CHISQR) .GE. -00.001) GO TO 101                      TRJ00960
                CCCC      IF (CHISQ1 - CHISQR) 95, 101, 101                                  TRJ00970
    ISN 0056    95        FLAMDA=10.*FLAMDA                                                  TRJ00980
    ISN 0057              GO TO 71                                                           TRJ00990
                C                                                                            TRJ01000
                C  EVALUTE PARAMETERS AND UNCERTAINTIES                                      TRJ01010
                C                                                                            TRJ01020
    ISN 0058    101       DO 103 J=1,NTERMS                                                  TRJ01030
    ISN 0059                COEFS(J)=B(J)                                                    TRJ01040
    ISN 0060              SIGMAA(J)=ARRAY(J,J)/ALPHA(J,J)                                    TRJ01050
    ISN 0061     103      SIGMAA(J)=SQRT(SIGMAA(J))                                          TRJ01060
    ISN 0062            FLAMDA=FLAMDA/10.                                                    TRJ01070
    ISN 0063    110       RETURN                                                             TRJ01080
    ISN 0064              END                                                                TRJ01090
```

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

SYMBOL	INTERNAL STATEMENT NUMBERS																		
B	0005	0046	0049	0049	0052	0059													
I	0010	0012	0013	0013	0015	0015	0017	0019	0019	0020	0026	0027	0029	0029	0029	0031	0036	0037	0037
	0051	0052	0052																
J	0022	0023	0024	0025	0028	0029	0029	0029	0030	0031	0031	0031	0033	0034	0035	0035	0039	0041	0041
	0042	0042	0043	0043	0045	0046	0046	0048	0048	0049	0049	0049	0058	0059	0059	0060	0060	0060	0060
	0060	0061	0061																
K	0024	0025	0030	0031	0031	0031	0034	0035	0035	0040	0041	0041	0042	0042	0047	0048	0048	0049	0049
X	0002	0004	0027	0029	0037	0052													
Y	0002	0004	0012	0013	0015	0029	0038	0053											
DET	0044																		
BETA	0005	0023	0029	0029	0049														
MODE	0002	0011	0038	0053															
SQRT	0042	0049	0061																
SSSS	0019	0020																	
XXXX	0041	0042	0048	0049															
YFIT	0002	0004	0037	0038	0052	0053													
ALPHA	0005	0025	0031	0031	0035	0035	0041	0041	0042	0048	0048	0060							
ARRAY	0003	0005	0042	0043	0044	0049	0060												
COEFS	0002	0004	0027	0029	0037	0046	0059												
DERIV	0005	0027	0029	0031	0031														
NFREE	0006	0007	0038	0053															
CHISQR	0002	0008	0053	0054															
CHISQ1	0038	0054																	
DFLTAA	0002	0004	0027																
FCHISQ	0038	0053																	
FLAMDA	0002	0043	0056	0056	0062	0062													
F2ERIV	0027																		
F2NCTN	0029	0037	0052																
MATINV	0044																		
NFILES	0002	0006	0010	0026	0036	0038	0051	0053											
NTERMS	0002	0006	0022	0027	0028	0033	0039	0040	0044	0045	0047	0058							
SIGMAA	0002	0004	0060	0061	0061														
SIGMAY	0002	0004	0019	0019	0038	0053													
TRJFIT	0002																		
WEIGHT	0005	0013	0015	0017	0020	0029	0031												

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

LABEL	DEFINED	REFERENCES
11	0006	
13	0008	0007 0007
20	0010	0007
21	0011	
22	0012	0011
23	0013	0012
25	0015	0012
27	0017	0011 0012
29	0019	0011
30	0021	0010 0014 0016 0018
31	0022	
34	0025	0022 0024
41	0026	
46	0031	0028 0030
50	0032	0026
51	0033	
53	0035	0033 0034
61	0036	
62	0037	0036
63	0038	
71	0039	0057
73	0042	0040
74	0043	0039
80	0044	
81	0045	
84	0050	0045 0047
91	0051	
92	0052	0051
93	0053	
95	0056	
101	0058	0054
103	0061	0058
110	0063	0059

ORIGINAL PAGE IS OF POOR QUALITY

/ TRJFIT / SIZE OF PROGRAM 000866 HEXADECIMAL BYTES

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
B	SFA	R*4	00012C	I	SFA	I*4	0000F4	J	SFA	I*4	0000F8	K	SF	I*4	0000FC
X	SFA XR	R*4	000000	Y	FA XR	R*4	000000	DET	SFA	R*4	000100	BETA	SF	R*4	000140
NODE	FA	I*4	000104	SQRT	F XF	R*4	000000	SSSS	SF	R*4	000108	XXXX	SFA	R*4	00010C
YFIT	SFA XR	R*4	000000	ALPHA	SF	R*4	000154	ARRAY	SFA	R*8	0003b0	COEFS	SFA XR	R*4	000000
DERIV	SFA	R*4	000188	NFREE	SFA	I*4	000110	CHISQR	S	R*4	000114	CHISQ1	S	R*4	000118
DELTAA	SFA XR	R*4	000000	FCHISQ	F XF	R*4	000000	FLAMDA	SF	R*4	00011C	F2ERIV	SF XF		000000
F2NCTN	F XF	R*4	000000	MATINV	SF XF		000000	NFILES	FA	I*4	000120	NTERMS	SFA	I*4	000124
SIGMAA	SFA XR	R*4	000000	SIGMAY	FA XR	R*4	000000	TRJFIT		R*4	000128	WEIGHT	SF	R*4	0001CC

SOURCE STATEMENT LABELS

LABEL	ISN	ADDR		LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
11	6	00048C		13	8	0004A4	20	10	0004C0	21	11	0004C4
22	12	0004D6		23	13	0004EC	25	15	00050C	27	17	00052E
29	19	000542		30	21	000574	31	22	000586	34	25	00059E
41	26	0005DA		46	31	000650	50	32	0006C2	51	33	0006D4
53	35	0006DC		61	36	000728	62	37	00072C	63	38	000754
71	39	000762		73	42	000796	74	43	0007EC	80	44	000822
81	45	00082C	NR	84	50	0008E4	91	51	000908	92	52	00090C
93	53	000934		95	56	000956	101	58	000966	103	61	0009C0
110	63	000A10										

COMPILER GENERATED LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
100003	23	00058A	100004	26	0005CA	100006	27	0005DE	100007	29	0005EC
100008	32	000680	100011	34	0006D8	100012	36	000716	100015	40	000766
100016	41	00076A	100019	46	000830	100020	48	00084C	100021	51	0008F6
100024	59	00096A	100025	62	000A04						

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)

*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

STATISTICS SOURCE STATEMENTS = 63, PROGRAM SIZE = 2918, SUBPROGRAM NAME =TRJFIT

STATISTICS NO DIAGNOSTICS GENERATED

****** END OF COMPILATION ******

272K BYTES OF CORE NOT USED

REQUESTED OPTIONS: NOTERM

OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

```
ISN 0002              SUBROUTINE F2ERIV (X,I,COEFS,DELTAA,NTERMS,DERIV)                F2F00130
ISN 0003              DIMENSION X(1),COEFS(1),DELTAA(1),DERIV(1)                       F2F00140
ISN 0004              COEFS(1)=ABS(COEFS(1))                                           F2F00150
ISN 0005              COEFS(4)=ABS(COEFS(4))                                           F2F00160
ISN 0006              XI=X(I)/COEFS(4)                                                 F2F00170
ISN 0007              IF(XI.LE.1.) GO TO 2                                             F2F00180
ISN 0009              DERIV(1)=1.                                                      F2F00190
ISN 0010              DERIV(2)=ALOG(XI)                                                F2F00200
ISN 0011              DERIV(3)=COEFS(4)*COEFS(4)*(1.-XI*XI)                            F2F00210
ISN 0012              DERIV(4)=-COEFS(2)/COEFS(4)+2.*COEFS(3)*COEFS(4)                 F2F00220
ISN 0013              IF(DERIV(4).EQ.0.) DERIV(4)=1.E-10                               F2F00230
ISN 0015              RETURN                                                           F2F00240
ISN 0016    2         DO 3 JL=1,4                                                      F2F00250
ISN 0017    3         DERIV(JL)=1.E-10                                                 F2F00260
ISN 0018              RETURN                                                           F2F00270
ISN 0019              END                                                              F2F00280
```

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

```
SYMBOL   INTERNAL STATEMENT NUMBERS
I        0002  0006
X        0002  0003  0006
JL       0016  0017
XI       0006  0007  0010  0011  0011
ABS      0004  0005
ALOG     0010
COEFS    0002  0003  0004  0004  0005  0005  0006  0011  0011  0012  0012  0012  0012
DERIV    0002  0003  0004  0010  0011  0012  0013  0013  0017
DELTAA   0002  0003
F2ERIV   0002
NTERMS   0002
```

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

```
LABEL   DEFINED   REFERENCES
    2      0016   0007
    3      0017   0016
```

/ F2ERIV / SIZE OF PROGRAM 00023C HEXADECIMAL BYTES

```
NAME      TAG   TYPE  ADD.     NAME      TAG   TYPE  ADD.     NAME      TAG   TYPE  ADD.     NAME      TAG   TYPE  ADD.
I         F     I*4   0000A0   X         F  XR R*4   000000   JL     SF     I*4   0000A4   XI     SFA    R*4   0000A8
ALOG      F  XF R*4   000000   COEFS  SFA XR R*4   000000   DERIV  S   XR R*4   000000   DELTAA    XR    R*4   000000
F2ERIV       .  R*4   0000AC   NTERMS        I*4   0000B0
```

SOURCE STATEMENT LABELS

```
LABEL  ISN   ADDR      LABEL  ISN   ADDR      LABEL  ISN   ADDR      LABEL  ISN   ADDR
    2   16  000192        3   17  000194
```

COMPILER GENERATED LABELS

```
LABEL   ISN   ADDR      LABEL   ISN   ADDR      LABEL   ISN   ADDR      LABEL   ISN   ADDR
100001    2   0000DC    100002    9   000126    100003   14   00017A    100004   15   000182
100005   18   0001AA
```

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)

*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

STATISTICS SOURCE STATEMENTS = 18, PROGRAM SIZE = 572, SUBPROGRAM NAME =F2ERIV

STATISTICS NO DIAGNOSTICS GENERATED

****** END OF COMPILATION ****** 292K BYTES OF CORE NOT USED

```
REQUESTED OPTIONS: NOTERM
OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
                   SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

   ISN 0002            FUNCTION F2NCTN (X,I,COEFS)                                          F2F00010
   ISN 0003           ,DIMENSION X(1),COEFS(1)                                              F2F00020
   ISN 0004            COEFS(4)=ABS(COEFS(4))                                               F2F00030
   ISN 0005            COEFS(1)=ABS(COEFS(1))                                               F2F00040
   ISN 0006            XI=X(I)/COEFS(4)                                                     F2F00050
   ISN 0007            IF(XI.LE.1.) GO TO 1                                                 F2F00060
   ISN 0009            F2NCTN=COEFS(1)+COEFS(2)*ALOG(XI)+COEFS(3)*COEFS(4)*COEFS(4)*        F2F00070
                      1 (1.-XI*XI)
   ISN 0010            RETURN                                                               F2F00080
   ISN 0011          1 F2NCTN=COEFS(1)                                                      F2F00090
   ISN 0012            RETURN                                                               F2F00100
   ISN 0013            END                                                                  F2F00110
                                                                                            F2F00120

                     *****F O R T R A N   C R O S S   R E F E R E N C E   L I S T I N G*****
SYMBOL  INTERNAL STATEMENT NUMBERS
I       0002  0006
X       0002  0003  0006
XI      0006  0007  0009  0009  0009
ABS     0004  0005
ALOG    0009
COEFS   0002  0003  0004  0004  0005  0005  0006  0009  0009  0009  0009  0009  0011
F2NCTN  0002  0004  0011

                     *****F O R T R A N   C R O S S   R E F E R E N C E   L I S T I N G*****
 LABEL   DEFINED   REFERENCES
    1      0011      0007

                                                  /* F2NCTN /     SIZE OF PROGRAM 000186 HEXADECIMAL BYTES

      NAME     TAG   TYPE   ADD.        NAME     TAG   TYPE   ADD.        NAME     TAG   TYPE   ADD.        NAME     TAG   TYPE   ADD.
         I   F        I*4   000094            X   F  XR   R*4   000000          XI  SFA       R*4   000098       ALOG   F  XF   R*4   000000
     COEFS  SFA  XR   R*4   000000     F2NCTN   S          R*4   00009C

  SOURCE STATEMENT LABELS

    LABEL  ISN   ADDR          LABEL  ISN   ADDR          LABEL  ISN   ADDR          LABEL  ISN   ADDR
        1   11  000150

  COMPILER GENERATED LABELS

    LABEL  ISN   ADDR          LABEL  ISN   ADDR          LABEL  ISN   ADDR          LABEL  ISN   ADDR
   100001    2  0000C4       100002    9  0000FE

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)
*STATISTICS*      SOURCE STATEMENTS =      12, PROGRAM SIZE =      438, SUBPROGRAM NAME =F2NCTN
*STATISTICS*  NO  DIAGNOSTICS GENERATED
****** END OF COMPILATION ******                                  292K BYTES OF CORE NOT USED
```

```
*LEVEL 2.3.0 (JUNE 78)          OS/360  FORTRAN H EXTENDED          DATE 81.139/13.23.28       PAGE   1
REQUESTED OPTIONS: NOTERM
OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(60) SIZE(MAX) AUTODBL(NONE)
                   SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

   ISN 0002            FUNCTION FCHISQ (Y,SIGMAY,NFILES,NFREE,MODE,YFIT)                    F2F02360
   ISN 0003              DOUBLE PRECISION CHISQ,WEIGHT,YYYY                                 F2F02370
   ISN 0004             DIMENSION Y(1),SIGMAY(1),YFIT(1)                                    F2F02380
   ISN 0005              CHISQ=0.                                                           F2F02390
   ISN 0006              IF(NFREE) 13,13,20                                                 F2F02400
   ISN 0007      13      FCHISQ=0.                                                          F2F02410
   ISN 0008              GO TO 40                                                           F2F02420
   ISN 0009      20      DO 35 I=1,NFILES                                                   F2F02430
   ISN 0010              IF(MODE)22,27,29                                                   F2F02440
   ISN 0011      22      IF(Y(I)) 25,27,23                                                  F2F02450
   ISN 0012      23      WEIGHT=1./Y(I)                                                     F2F02460
   ISN 0013              GO TO 30                                                           F2F02470
   ISN 0014      25      WEIGHT=1./(-Y(I))                                                  F2F02480
   ISN 0015              GO TO 30                                                           F2F02490
   ISN 0016      27      WEIGHT=1.                                                          F2F02500
   ISN 0017              GO TO 30                                                           F2F02510
   ISN 0018      29      WEIGHT=1./(SIGMAY(I)*SIGMAY(I))                                    F2F02520
   ISN 0019      30    YYYY = Y(I) - YFIT(I)                                                F2F02530
   ISN 0020            CHISQ = CHISQ + WEIGHT * YYYY * YYYY                               F2F02540
   ISN 0021      35    CONTINUE                                                           F2F02550
   ISN 0022              ZCHISQ=DLOG(CHISQ)                                                 F2F02560
   ISN 0023              IF(ABS(ZCHISQ).GT.10.) CHISQ=1.E10                                 F2F02570
   ISN 0025              FREE=NFREE                                                         F2F02580
   ISN 0026              FCHISQ=CHISQ/FREE                                                  F2F02590
   ISN 0027      40      RETURN                                                             F2F02600
   ISN 0028              END                                                                F2F02610

                        *****F O R T R A N   C R O S S   R E F E R E N C E   L I S T I N G*****
SYMBOL  INTERNAL STATEMENT NUMBERS
I       0009  0011  0012  0014  0018  0018  0019  0019
Y       0002  0004  0011  0012  0014  0019
ABS     0023
DLOG    0022
FREE    0025  0026
MODE    0002  0010
YFIT    0002  0004  0019
YYYY    0003  0019  0020  0020
CHISQ   0003  0005  0020  0020  0022  0023  0026
NFREE   0002  0006  0025
FCHISQ  0002  0007  0026
NFILES  0002  0009
SIGMAY  0002  0004  0018  0018
WEIGHT  0003  0012  0014  0016  0018  0020
ZCHISQ  0022  0023

                        *****F O R T R A N   C R O S S   R E F E R E N C E   L I S T I N G*****
 LABEL   DEFINED   REFERENCES
    13     0007      0006  0006
    20     0009      0006
    22     0011      0010
    23     0012      0011
    25     0014      0011
    27     0016      0010  0011
    29     0018      0010
    30     0019      0013  0015  0017
    35     0021      0009
    40     0027      0008

                                                 /  FCHISQ /     SIZE OF PROGRAM 0002E6 HEXADECIMAL BYTES

      NAME     TAG   TYPE  ADD.      NAME     TAG   TYPE  ADD.      NAME     TAG   TYPE  ADD.      NAME     TAG   TYPE  ADD.
         I  SF       I*4   0000BC       Y   F   XR  R*4   000000     DLOG  F   XF  R*8   000000     FREE  SF      R*4   0000C8
      MODE           I*4   0000C4    YFIT   F   XR  R*4   000000     YYYY  SF      R*8   0000D8    CHISQ  SFA     R*8   0000E8
     NFREE   F       I*4   0000CB  FCHISQ  S           R*4   0000CC   NFILES   F       I*4   0000D0   SIGMAY   F   XR  R*4   000000
    WEIGHT  SF       R*8   0000F8  ZCHISQ  S A         R*4   0000D4

 SOURCE STATEMENT LABELS
   LABEL   ISN   ADDR          LABEL   ISN   ADDR          LABEL   ISN   ADDR          LABEL   ISN   ADDR
```

13	7	000142	20	9	00014F	22	11	00015A	23	12	00016F
25	14	0001BA	27	16	0001AB	29	18	000184	30	19	000108
35	21	000206	40	27	000256						

COMPILER GENERATED LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
100001	2	000114	100002	10	000150	100003	22	00020F	100004	24	000228
100005	25	000230									

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)

*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

STATISTICS SOURCE STATEMENTS = 27, PROGRAM SIZE = 742, SUBPROGRAM NAME =FCHISQ

STATISTICS NO DIAGNOSTICS GENERATED

****** END OF COMPILATION ****** 292K BYTES OF CORE NOT USED

STATISTICS NO DIAGNOSTICS THIS STEP

REQUESTED OPTIONS: NOTERM

OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

```
ISN 0002              SUBROUTINE MATINV(ARRAY,NORDER,DET)                                F2F01630
ISN 0003              DOUBLE PRECISION ARRAY,AMAX,SAVE                                   F2F01640
ISN 0004              DIMENSION ARRAY(5,5),IK(5),JK(5)                                   F2F01650
ISN 0005      10      DET=1.                                                             F2F01660
ISN 0006      11      DO 100 K=1,NORDER                                                  F2F01670
                      C                                                                  F2F01680
                      C  FIND LARGEST ELEMENT ARRAY(I,J) IN REST OF MATRIX               F2F01690
                      C                                                                  F2F01700
ISN 0007              AMAX=0.                                                            F2F01710
ISN 0008      21      DO 30 I=K,NORDER                                                   F2F01720
ISN 0009              DO 30 J=K,NORDER                                                   F2F01730
ISN 0010      23      IF(DABS(AMAX)-DABS(ARRAY(I,J))) 24,24,30                           F2F01740
ISN 0011      24      AMAX=ARRAY(I,J)                                                    F2F01750
ISN 0012              IK(K)=I                                                            F2F01760
ISN 0013              JK(K)=J                                                            F2F01770
ISN 0014      30      CONTINUE                                                           F2F01780
                      C                                                                  F2F01790
                      C  INTERCHANGE ROWS AND COULOMNS TO PUT AMAX IN ARRAR(K,K)         F2F01800
                      C                                                                  F2F01810
ISN 0015      31      IF(AMAX)41,32,41                                                   F2F01820
ISN 0016      32      DET=0.                                                             F2F01830
ISN 0017              GO TO 140                                                          F2F01840
ISN 0018      41      I=IK(K)                                                            F2F01850
ISN 0019              IF(I-K)21,51,43                                                    F2F01860
ISN 0020      43      DO 50 J=1,NORDER                                                   F2F01870
ISN 0021              SAVE=ARRAY(K,J)                                                    F2F01880
ISN 0022              ARRAY(K,J)=ARRAY(I,J)                                              F2F01890
ISN 0023      50      ARRAY(I,J)=-SAVE                                                   F2F01900
ISN 0024      51      J=JK(K)                                                            F2F01910
ISN 0025              IF(J-K)21,61,53                                                    F2F01920
ISN 0026      53      DO 60 I=1,NORDER                                                   F2F01930
ISN 0027              SAVE=ARRAY(I,K)                                                    F2F01940
ISN 0028              ARRAY(I,K)=ARRAY(I,J)                                              F2F01950
ISN 0029      60      ARRAY(I,J)=-SAVE                                                   F2F01960
                      C                                                                  F2F01970
                      C  ACCMULATE ELEMENTS OF INVERSE MATRIX                            F2F01980
                      C                                                                  F2F01990
ISN 0030      61      DO 70 I=1,NORDER                                                   F2F02000
ISN 0031              IF(I-K)63,70,63                                                    F2F02010
ISN 0032      63      ARRAY(I,K)=-ARRAY(I,K)/AMAX                                        F2F02020
ISN 0033      70      CONTINUE                                                           F2F02030
ISN 0034      71      DO 80 I=1,NORDER                                                   F2F02040
ISN 0035              DO 80 J=1,NORDER                                                   F2F02050
ISN 0036              IF(I-K)74,80,74                                                    F2F02060
ISN 0037      74      IF(J-K)75,80,75                                                    F2F02070
ISN 0038      75      ARRAY(I,J)=ARRAY(I,J)+ARRAY(I,K)*ARRAY(K,J)                        F2F02080
ISN 0039      80      CONTINUE                                                           F2F02090
ISN 0040      81      DO 90 J=1,NORDER                                                   F2F02100
ISN 0041              IF(J-K)83,90,83                                                    F2F02110
ISN 0042      83      ARRAY(K,J)=ARRAY(K,J)/AMAX                                         F2F02120
ISN 0043      90      CONTINUE                                                           F2F02130
ISN 0044              ARRAY(K,K)=1./AMAX                                                 F2F02140
ISN 0045      100     DET=DET*AMAX                                                       F2F02150
                      C                                                                  F2F02160
                      C  RESTORE ORDERING OF MATRIX                                      F2F02170
                      C                                                                  F2F02180
ISN 0046      101     DO 130 L=1,NORDER                                                  F2F02190
ISN 0047              K=NORDER-L+1                                                       F2F02200
ISN 0048              J=IK(K)                                                            F2F02210
ISN 0049              IF(J-K)111,111,105                                                 F2F02220
ISN 0050      105     DO 110 I=1,NORDER                                                  F2F02230
ISN 0051              SAVE=ARRAY(I,K)                                                    F2F02240
ISN 0052              ARRAY(I,K)=-ARRAY(I,J)                                             F2F02250
ISN 0053      110     ARRAY(I,J)=SAVE                                                    F2F02260
ISN 0054      111     I=JK(K)                                                            F2F02270
ISN 0055              IF(I-K)130,130,113                                                 F2F02280
ISN 0056      113     DO 120 J=1,NORDER                                                  F2F02290
ISN 0057              SAVE=ARRAY(K,J)                                                    F2F02300
ISN 0058              ARRAY(K,J)=-ARRAY(I,J)                                             F2F02310
ISN 0059      120     ARRAY(I,J)=SAVE                                                    F2F02320
ISN 0060      130     CONTINUE                                                           F2F02330
ISN 0061      140     RETURN                                                             F2F02340
ISN 0062              END                                                                F2F02350
```

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

SYMBOL	INTERNAL STATEMENT NUMBERS																		
I	0008	0010	0011	0012	0018	0019	0022	0023	0026	0027	0028	0028	0029	0030	0031	0032	0032	0034	0036
	0038	0038	0038	0050	0051	0052	0052	0053	0054	0055	0058	0059							
J	0008	0010	0011	0013	0020	0021	0022	0022	0023	0024	0025	0028	0029	0035	0037	0038	0038	0038	0040
	0041	0042	0042	0048	0049	0052	0053	0056	0057	0058	0058	0059							
K	0006	0008	0009	0012	0013	0018	0019	0021	0022	0024	0025	0027	0028	0031	0032	0032	0036	0037	0038
	0038	0041	0042	0042	0044	0044	0047	0048	0049	0051	0052	0054	0055	0057	0058				
L	0046	0047																	
IK	0004	0012	0018	0040															
JK	0004	0013	0024	0054															
DET	0002	0005	0016	0045	0045														
AMAX	0003	0007	0010	0011	0015	0032	0042	0044	0045										
DABS	0010	0010																	
SAVE	0003	0021	0023	0027	0029	0051	0053	0057	0059										
ARRAY	0002	0003	0004	0010	0011	0021	0022	0022	0023	0027	0028	0028	0029	0032	0032	0038	0038	0038	0038
	0042	0042	0044	0051	0052	0052	0053	0057	0058	0058	0059								
MATINV	0002																		
NORDER	0002	0006	0008	0009	0020	0026	0030	0034	0035	0040	0046	0047	0050	0056					

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

LABEL	DEFINED	REFERENCES			
10	0005				
11	0006				
21	0008	0019	0025		
23	0010				
24	0011	0010	0010		
30	0014	0008	0009	0019	
31	0015				
32	0016	0015			
41	0018	0015	0015		
43	0020	0019			
50	0023	0020			
51	0024	0019			
53	0026	0025			
60	0029	0026			
61	0030	0025			
63	0032	0031	0031		
70	0033	0030	0031		
71	0034				
74	0037	0036	0036		
75	0038	0037	0037		
80	0039	0034	0035	0036	0037
81	0040				
83	0042	0041	0041		
90	0043	0040	0041		
100	0045	0006			
101	0046				
105	0050	0049			
110	0053	0050			
111	0054	0049	0049		
113	0056	0055			
120	0059	0058			
130	0060	0046	0055	0055	
140	0061	0017			

/ MATINV / SIZE OF PROGRAM 000504 HEXADECIMAL BYTES

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
I	SFA	I*4	0000A0	J	SFA	I*4	0000A4	K	SF	I*4	0000A8	L	SF	I*4	0000AC
IK	SF	I*4	000000	JK	SF	I*4	0000E4	DET	SF	R*4	0000B0	AMAX	SFA	R*8	0000C0
SAVE	SF	R*8	0000C8	ARRAY	SFA XR	R*8	000000	MATINV		I*4	0000B4	NORDER	F	I*4	0000B8

SOURCE STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR		LABEL	ISN	ADDR	LABEL	ISN	ADDR
10	5	000100	11	6	000118	NR	21	8	000124	23	10	000134
24	11	000156	30	14	0001AE		31	15	0001B2	32	16	0001C4
41	18	0001DC	43	20	0001EC		50	23	000230	51	24	000258
53	26	000274	60	29	0002B8		61	30	0002F0	63	32	0002F0
70	33	00031E	71	34	000330		74	37	000344	75	38	000350
80	39	0003A2	81	40	0003C6		83	42	0003D6	90	43	000402

```
      100   45  00042F          101   46  00044F          105   50  000474          110   53  00048A
      111   54  0004E0          113   56  0004F8          120   59  00053E          130   60  000564
      140   61  000576
```

COMPILER GENERATED LABELS

```
  LABEL  ISN   ADDR       LABEL  ISN   ADDR       LABEL  ISN   ADDR       LABEL  ISN   ADDR
 100002    7  00011C     100003    9  00012C     100004   15  000140     100006   21  0001F0
 100008   27  00027B     100010   31  0002E4     100012   35  000334     100013   36  000338
 100014   40  000384     100016   41  0003CA     100017   44  000414     100019   47  000452
 100020   51  000478     100022   57  0004FC
```

```
*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)
*STATISTICS*      SOURCE STATEMENTS =      61, PROGRAM SIZE =     1492, SUBPROGRAM NAME =MATINV
*STATISTICS*  NO  DIAGNOSTICS GENERATED
****** END OF COMPILATION ******                                  284K BYTES OF CORE NOT USED
```

REQUESTED OPTIONS: NOTERM

OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(60) SIZE(MAX) AUTODBL(NONE)
SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

```
   ISN 0002              SUBROUTINE CHNFIT (X,Y,SIGMAY,NFILES,NTERMS,MODE,COEFS,DELTAA,   F2F00290
                        1SIGMAA,FLAMDA,YFIT,CHISQR,CON,CALP,CHET)                         F2F00300
                    C   MAKE A LEAST-SQUARE FIT TO A NON-LINEAR FUNCTION                  F2F00310
                    C   X-ARRAY OF DATA POINTS                                            F2F00320
                    C   Y-ARRAY OF DEPENDENT VARIABLE                                     F2F00330
                    C   SIGMAY  ARRAY OF ERRORS ON Y                                      F2F00340
                    C   NFILES NO. OF DATA POINTS                                        F2F00350
                    C   MODE- DETERMINES THE METHOD OF WEIGHTING                         F2F00360
                    C   MODE=+1 WEIGHT(I)=1./(SIGMAY(I)*SIGMAY(I))                       F2F00370
                    C   MODE=0 WEIGHT(I)=1.                                             F2F00380
                    C   MODE=-1 WEIGHT(I)=1./Y(I)                                       F2F00390
                    C   COEFS   ARRAY OF PARAMETERS                                     F2F00400
                    C   DELTAA ARRAY OF INCREMENTS FOR COEFS                           F2F00410
                    C   FLAMDA PROPORTION OF GRADIENT SEARCH                           F2F00420
                    C   YFIT    ARRAY OF FITTED VALUES                                  F2F00430
                    C   CHISQR RESIDUAL CHISQ                                          F2F00440
                    C   REQUIRE THE FOLLOWING FUNCTIONS                               F2F00450
                    C   FGNCTN(X,I,COEFS)                                             F2F00460
                    C   FGDERIV(X,I,COEFS,DELTAA,NTERMS,DERIV)                       F2F00470
                    C   FCHISQ(Y,SIGMAY,NFILES,NFREE,MODE,YFIT)                       F2F00480
                    C   MATINV(ARRAY,NTERMS,DET)--TO INVERT A SYMMMETRIC MATRIX       F2F00490
                    C   A MAXIMUM OF TEN PARAMETERS ALLOWED AND FLAMDA SHOULD         F2F00500
                    C   BE SET AT .001 AT THE BEGINING OF SEARCH. INTIAL VALUES        F2F00510
                    C   OF ARRAY SHOULD BE GUESSED AT AND SUPPLIED.                    F2F00520
                    C   IT IS RESPONSIBILITY OF THE MAIN PROGRAM TO DETERIME           F2F00530
                    C   CONVEGENCE OF THE FIT.                                        F2F00540
   ISN 0003              DOUBLE PRECISION ARRAY, YYYY, WEIGHT, XXXX                    F2F00550
   ISN 0004              DIMENSION X(1),Y(1),SIGMAY(1),COEFS(1),DELTAA(1),SIGMAA(1),   F2F00560
                        1YFIT(1)                                                          F2F00570
   ISN 0005              DIMENSION WEIGHT(100),ALPHA(5,5),BETA(5),DERIV(5),            F2F00580
                        1ARRAY(5,5),B(5)                                                  F2F00590
   ISN 0006              COMMON/CHAN/ACH,ALP,ABET                                      F2F00600
   ISN 0007              ACH=CON                                                       F2F00610
   ISN 0008              ALP=CALP                                                      F2F00620
   ISN 0009              ABET=CHET                                                     F2F00630
   ISN 0010      11      NFREE=NFILES-NTERMS                                           F2F00640
   ISN 0011              IF(NFREE)13,13,20                                             F2F00650
   ISN 0012      13      CHISQR=0.                                                     F2F00660
   ISN 0013              GO TO 110                                                     F2F00670
                    C                                                                 F2F00680
                    C   EVALUATE WEIGHTS                                             F2F00690
                    C                                                                 F2F00700
   ISN 0014      20      DO 30 I=1,NFILES                                              F2F00710
   ISN 0015      21      IF(MODE)22,27,29                                              F2F00720
   ISN 0016      22      IF(Y(I))25,27,23                                              F2F00730
   ISN 0017      23      WEIGHT(I)=1./Y(I)                                             F2F00740
   ISN 0018              GO TO 30                                                      F2F00750
   ISN 0019      25      WEIGHT(I)=1./(-Y(I))                                          F2F00760
   ISN 0020              GO TO 30                                                      F2F00770
   ISN 0021      27      WEIGHT(I)=1.                                                  F2F00780
   ISN 0022              GO TO 30                                                      F2F00790
   ISN 0023      29      XXXX = SIGMAY(I) * SIGMAY(I)                                  F2F00800
                CCCC29          WEIGHT(I)=1./(SIGMAY(I)*SIGMAY(I))                    F2F00810
   ISN 0024                WEIGHT (I) = 1./ XXXX                                     F2F00820
   ISN 0025      30      CONTINUE                                                      F2F00830
                    C                                                                 F2F00840
                    C   EVALUATE ALPHA AND BETA MATRICES                              F2F00850
                    C                                                                 F2F00860
   ISN 0026      31      DO 34 J=1,NTERMS                                              F2F00870
   ISN 0027              BETA(J)=0.                                                    F2F00880
   ISN 0028              DO 34 K=1,J                                                   F2F00890
   ISN 0029      34      ALPHA(J,K)=0.                                                 F2F00900
   ISN 0030      41      DO 50 I=1,NFILES                                              F2F00910
   ISN 0031              CALL FGDERIV (X,I,COEFS,DELTAA,NTERMS,DERIV)                  F2F00920
   ISN 0032              DO 46 J=1,NTERMS                                              F2F00930
   ISN 0033              BETA(J)=BETA(J)+WEIGHT(I)*(Y(I)-FGNCTN(X,I,COEFS))*DERIV(J)   F2F00940
   ISN 0034              DO 46 K=1,J                                                   F2F00950
   ISN 0035      46      ALPHA(J,K)=ALPHA(J,K)+WEIGHT(I)*DERIV(J)*DERIV(K)             F2F00960
   ISN 0036      50      CONTINUE                                                      F2F00970
   ISN 0037      51       DO 53 J=1,NTERMS                                             F2F00980
   ISN 0038               DO 53 K=1,J                                                  F2F00990
   ISN 0039      53       ALPHA(K,J)=ALPHA(J,K)                                        F2F01000
                    C                                                                 F2F01010
```

```
                C  EVALUATE CHI SQUARE AT STARTING POINT                                F2F01020
                C                                                                       F2F01030
    ISN 0040    61      DO 62 I=1,NFILES                                                F2F01040
    ISN 0041    62      YFIT(I)=FCNCTN(X,I,COEFS)                                       F2F01050
    ISN 0042    63    CHISQ1=FCHISQ (Y,SIGMAY,NFILES,NFREE,MODE,YFIT)                   F2F01060
                C                                                                       F2F01070
                C  INVERT MODIFIED CURVATURE MATRIX TO FIND NEW PARAMETERS              F2F01080
                C                                                                       F2F01090
    ISN 0043    71      DO 74 J=1,NTERMS                                                F2F01100
    ISN 0044            DO 73 K=1,NTERMS                                                F2F01110
    ISN 0045            XXX = ALPHA(J,J) * ALPHA(K,K)                                   F2F01120
    ISN 0046            XXXX = SQRT(XXX)                                                F2F01130
    ISN 0047    73    ARRAY(J,K) = ALPHA(J,K) / XXXX                                    F2F01140
    ISN 0048    74      ARRAY(J,J)=1.+FLAMDA                                            F2F01150
    ISN 0049    80    CALL MATINV(ARRAY,NTERMS,DET)                                     F2F01160
    ISN 0050    81      DO 84 J=1,NTERMS                                                F2F01170
    ISN 0051              B(J)=COEFS(J)                                                 F2F01180
    ISN 0052              DO 84 K=1,NTERMS                                              F2F01190
    ISN 0053    84        B(J)=B(J)+BETA(K)*ARRAY(J,K)/SQRT(ALPHA(J,J)*ALPHA(K,K))      F2F01200
                C                                                                       F2F01210
                C  IF CHI SQUARE INCREASED,INCREASE FLAMDA AND TRY AGAIN                F2F01220
                C                                                                       F2F01230
    ISN 0054    91      DO 92 I=1,NFILES                                                F2F01240
    ISN 0055    92      YFIT(I)=FCNCTN(X,I,B)                                           F2F01250
    ISN 0056    93    CHISQR=FCHISQ(Y,SIGMAY,NFILES,NFREE,MODE,YFIT)                    F2F01260
    ISN 0057          IF ( (CHISQ1-CHISQR) .GE. -.00001) GO TO 101                      F2F01270
                CCCC  IF (CHISQ1-CHISQR) 95,101,101                                     F2F01280
    ISN 0059    95      FLAMDA=10.*FLAMDA                                               F2F01290
    ISN 0060            GO TO 71                                                        F2F01300
                C                                                                       F2F01310
                C  EVALUATE PARAMETERS AND UNCERTAINTIES                                F2F01320
                C                                                                       F2F01330
    ISN 0061    101     DO 103 J=1,NTERMS                                               F2F01340
    ISN 0062            COEFS(J)=B(J)                                                   F2F01350
    ISN 0063             YYYY = ARRAY(J,J) / ALPHA(J,J)                                 F2F01360
    ISN 0064    103     SIGMAA(J)=DSQRT(YYYY)                                           F2F01370
    ISN 0065            FLAMDA=FLAMDA/10.                                               F2F01380
    ISN 0066    110   CONTINUE                                                          F2F01390
    ISN 0067          RETURN                                                            F2F01400
    ISN 0068            END                                                             F2F01410
```

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

SYMBOL	INTERNAL	STATEMENT NUMBERS																		
B	0005	0051	0053	0053	0055	0062														
I	0014	0016	0017	0017	0019	0019	0021	0023	0023	0024	0030	0031	0033	0033	0033	0035	0040	0041	0041	
	0054	0055	0055																	
J	0026	0027	0028	0029	0032	0033	0033	0033	0034	0035	0035	0035	0037	0038	0039	0039	0043	0045	0045	
	0047	0047	0048	0048	0050	0051	0051	0053	0053	0053	0053	0053	0061	0062	0062	0063	0063	0063	0063	
	0064																			
K	0028	0029	0034	0035	0035	0035	0038	0039	0039	0044	0045	0045	0047	0047	0052	0053	0053	0053	0053	
X	0002	0004	0031	0033	0041	0055														
Y	0002	0004	0016	0017	0019	0033	0042	0056												
ACH	0006	0007																		
ALP	0006	0008																		
CON	0002	0007																		
DET	0049																			
XXX	0045	0046																		
ABET	0006	0009																		
BETA	0005	0027	0033	0033	0053															
CALP	0002	0008																		
CBET	0002	0009																		
MODE	0002	0015	0042	0056																
SQRT	0046	0053																		
XXXX	0003	0023	0024	0046	0047															
YFIT	0002	0004	0041	0042	0055	0056														
YYYY	0003	0063	0064																	
ALPHA	0005	0029	0035	0035	0039	0039	0045	0045	0047	0053	0053	0063								
ARRAY	0003	0005	0047	0048	0049	0053	0063													
COEFS	0002	0004	0031	0033	0041	0051	0062													
DERIV	0005	0031	0033	0035	0035															
DSQRT	0064																			
NFREE	0010	0011	0042	0056																
CHISQR	0002	0012	0056	0057																
CHISQ1	0042	0057																		
FCNFIT	0002																			
DELTAA	0002	0004	0031																	
FCHISQ	0042	0056																		

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

SYMBOL	INTERNAL STATEMENT NUMBERS											
FGERIV	0031											
FGNCTN	0033	0041	0055									
FLAMDA	0002	0044	0059	0059	0065	0065						
MATINV	0049											
NFILES	0002	0010	0014	0030	0040	0042	0054	0056				
NTERMS	0002	0010	0026	0031	0032	0037	0043	0044	0049	0050	0052	0061
SIGMAA	0002	0004	0064									
SIGMAY	0002	0004	0023	0023	0042	0056						
WEIGHT	0003	0005	0017	0019	0021	0024	0033	0035				

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

LABEL	DEFINED	REFERENCES			
11	0019				
13	0012	0011	0011		
20	0014	0011			
21	0015				
22	0016	0015			
23	0017	0016			
25	0019	0016			
27	0021	0015	0016		
29	0023	0015			
30	0025	0014	0018	0020	0022
31	0026				
34	0029	0026	0028		
41	0030				
46	0035	0032	0034		
50	0036	0030			
51	0037				
53	0039	0037	0038		
61	0040				
62	0041	0040			
63	0042				
71	0043	0060			
73	0047	0044			
74	0048	0043			
80	0049				
81	0050				
84	0053	0050	0052		
91	0054				
92	0055	0054			
93	0056				
95	0059				
101	0061	0057			
103	0064	0061			
110	0066	0013			

/ CHNFIT / SIZE OF PROGRAM 000CC0 HEXADECIMAL BYTES

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
B	SFA	R*4	000158	I	SFA	I*4	000104	J	SFA	I*4	000108	K	SFA	I*4	00010C
X	SFA XP	R*4	000000	Y	FA XR	R*4	000000	ACH	S C	R*4	000000	ALP	S C	R*4	000004
CON	F	R*4	000110	DET	SFA	R*4	000114	XXX	SFA	R*4	000118	ABET	S C	R*4	000008
BETA	SF	R*4	00016C	CALP	F	R*4	000110	CRET	F	R*4	000120	MODE	FA	I*4	000124
SQRT	F XF	R*4	000000	XXXX	SF	R*4	000148	YFIT	SFA XR	R*4	000000	YYYY	SFA	R*8	000150
ALPHA	SFA	R*4	000180	ARRAY	SFA	R*8	0001F8	COEFS	SFA XR	R*4	000000	DERIV	SFA	R*4	0001E4
DSQRT	F XF	R*8	000000	NFREE	SFA	I*4	000128	CHISQR	S	R*4	00012C	CHISQ1	S	R*4	000130
CHNFIT		P*4	000134	DELTAA	SFA XR	R*4	000000	FCHISQ	F XF	R*4	000000	FGERIV	SF XF		000000
FGNCTN	F XF	P*4	000000	FLAMDA	SF	R*4	000138	MATINV	SF XF		000000	NFILES	FA	I*4	00013C
NTERMS	SFA	I*4	000140	SIGMAA	S XR	R*4	000000	SIGMAY	FA XR	R*4	000000	WEIGHT	SF	R*8	0002C0

***** COMMON INFORMATION *****

NAME OF COMMON BLOCK * CHAN* SIZE OF BLOCK 00000C HEXADECIMAL BYTES

VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.
ACH	R*4	000000	ALP	R*4	000004	ABET	R*4	000008			

SOURCE STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR

11	10	000688	NR	13	12	000698	20	14	0006A4	21	15	0006A8		
22	16	0006BA		23	17	0006D0	25	19	0006F6	27	21	00071E		
29	23	001734		30	25	00076C	31	26	00077E	34	29	000790		
41	30	000766		46	35	000830	50	36	000892	51	37	0008A4		
53	39	0008A8		61	40	0008DA	62	41	0008DE	63	42	00090A		
71	43	000918		73	47	000958	74	48	000988	80	49	000982		
81	50	0009BC	NR	84	53	0009DR	91	54	000A72	92	55	000A76		
93	56	000AA2		95	59	000AC4	101	61	000AD4	103	64	000B18		
110	66	000B46												

COMPILER GENERATED LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
100001	2	000654	100003	27	000780	100004	30	0007AC	100006	31	0007BA
100007	33	0007C6	100008	36	000838	100011	38	000HA6	100012	40	0008D0
100015	44	000918	100016	45	00091C	100019	51	0009BE	100020	54	000A68
100023	62	000AD6	100024	65	000B3A						

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)

*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

STATISTICS SOURCE STATEMENTS = 67, PROGRAM SIZE = 3264, SUBPROGRAM NAME =CHNFIT

STATISTICS NO DIAGNOSTICS GENERATED

****** END OF COMPILATION ****** 276K BYTES OF CORE NOT USED

```
*LEVEL 2.3.0 (JUNE 78)                  OS/360  FORTRAN H EXTENDED          DATE 81.139/13.23.15       PAGE   1
REQUESTED OPTIONS: NOTERM
OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
                   SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

    ISN 0002              SUBROUTINE FGFRIV (X,I,COEFS,DELTAA,NTERMS,DERIV)                F2F01540
    ISN 0003              DIMENSION X(1),COEFS(1),DELTAA(1),DERIV(1)                       F2F01550
    ISN 0004              COMMON/CHAN/ACH,ALP,ABET                                         F2F01560
    ISN 0005              XI=X(I)/COEFS(1)                                                 F2F01570
    ISN 0006              DERIV(1)=-ALP/COEFS(1)+(2.*ABET*COEFS(1))                        F2F01580
    ISN 0007              IF(XI.LE.1.) DERIV(1)=0.0                                        F2F01590
    ISN 0009              IF(DERIV(1).EQ.0.) DERIV(1)=1.E-10                               F2F01600
    ISN 0011              RETURN                                                           F2F01610
    ISN 0012              END                                                              F2F01620


                        *****F O R T R A N    C R O S S    R E F E R E N C E    L I S T I N G*****
SYMBOL   INTERNAL STATEMENT NUMBERS
I        0002  0005
X        0002  0003  0005
XI       0005  0007
ACH      0004
ALP      0004  0006
ABET     0004  0006
COEFS    0002  0003  0005  0006  0006
DERIV    0002  0003  0006  0007  0009  0009
DELTAA   0002  0003
FGFRIV   0002
NTERMS   0002

                                                    /  FGFRIV /     SIZE OF PROGRAM 0001C4 HEXADECIMAL BYTES

      NAME     TAG   TYPE  ADD.      NAME     TAG   TYPE  ADD.      NAME     TAG   TYPE  ADD.      NAME     TAG   TYPE  ADD.
         I  F        I*4   000094          X  F  XR   R*4   000000       XI  S        R*4   000098       ACH      C   R*4   NR
       ALP  F   C    R*4   000004       ABET  F   C    R*4   000008    COEFS  F  XR   R*4   000000    DERIV  S  XR   R*4   000000
    DELTAA      XR   R*4   000000     FGFRIV             R*4   00009C   NTERMS             I*4   0000A0

                                        *****  COMMON INFORMATION  *****

      NAME OF COMMON BLOCK  *  CHAN*   SIZE OF BLOCK     00000C HEXADECIMAL BYTES

     VAR. NAME  TYPE  REL. ADDR.   VAR. NAME  TYPE  REL. ADDR.   VAR. NAME  TYPE  REL. ADDR.   VAR. NAME  TYPE  REL. ADDR.
          ACH   R*4    000000 NR        ALP   R*4    000004          ABET   R*4    000008

  COMPILER GENERATED LABELS

    LABEL  ISN   ADDR          LABEL  ISN   ADDR          LABEL  ISN   ADDR          LABEL  ISN   ADDR
   100001    2  0000D4       100002    8  00011C       100003    9  000124       100004   10  00012E
   100005   11  000136
*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)
*STATISTICS*     SOURCE STATEMENTS =      11, PROGRAM SIZE =      452, SUBPROGRAM NAME =FGFRIV
*STATISTICS*  NO  DIAGNOSTICS GENERATED
****** END OF COMPILATION ******                                  292K BYTES OF CORE NOT USED
```

```
*LEVEL 2.3.0 (JUNE 78)          OS/360  FORTRAN H EXTENDED          DATE 81.139/13.22.54       PAGE   1
REQUESTED OPTIONS: NOTERM
OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
                   SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)

   ISN 0002              FUNCTION FGNCTN (X,I,COEFS)                                    F2F01420
   ISN 0003              DIMENSION X(1),COEFS(1)                                        F2F01430
   ISN 0004              COMMON/CHAN/ACH,ALP,ABET                                       F2F01440
   ISN 0005              COEFS(1)=ABS(COEFS(1))                                         F2F01450
   ISN 0006              IF(COEFS(1).LE.0.0002) COEFS(1)=0.0002                         F2F01460
   ISN 0008              XI=X(I)/COEFS(1)                                               F2F01470
   ISN 0009              IF(XI.LE.1.) GO TO 1                                           F2F01480
   ISN 0011              FGNCTN=ACH+ALP*ALOG(XI)+ABET*(1.-XI*XI)*COEFS(1)*COEFS(1)      F2F01490
   ISN 0012              RETURN                                                         F2F01500
   ISN 0013    1         FGNCTN=ACH                                                     F2F01510
   ISN 0014              RETURN                                                         F2F01520
   ISN 0015              END                                                            F2F01530

                      *****F O R T R A N   C R O S S   R E F E R E N C E   L I S T I N G*****
SYMBOL   INTERNAL STATEMENT NUMBERS
I        0002  0008
X        0002  0003  0008
XI       0008  0009  0011  0011  0011
ABS      0005
ACH      0004  0011  0013
ALP      0004  0011
ABFT     0004  0011
ALOG     0011
COEFS    0002  0003  0005  0005  0006  0006  0008  0011  0011
FGNCTN   0002  0011  0013

                      *****F O R T R A N   C R O S S   R E F E R E N C E   L I S T I N G*****
 LABEL   DEFINED   REFERENCES
   1     0013      0009

                                                  /  FGNCTN /     SIZE OF PROGRAM 0001AA HEXADECIMAL BYTES

     NAME     TAG    TYPE  ADD.      NAME     TAG    TYPE  ADD.      NAME     TAG    TYPE  ADD.      NAME     TAG    TYPE  ADD.
      I  F           I*4   00008C     X  F  XR    R*4   000000       XI SFA         R*4   000090      ACH  F  C    R*4   000000
    ALP  F    C      R*4   000004    ABFT  F  C    R*4   000008     ALOG  F  XF     R*4   000000    COEFS SFA XR    R*4   000000
  FGNCTN S           R*4   000094

                                   *****  COMMON INFORMATION   *****

     NAME OF COMMON BLOCK  *  CHAN*   SIZE OF BLOCK     00000C HEXADECIMAL BYTES

   VAR. NAME  TYPE  REL. ADDR.   VAR. NAME  TYPE  REL. ADDR.   VAR. NAME  TYPE  REL. ADDR.   VAR. NAME  TYPE  REL. ADDR.
        ACH   R*4    000000          ALP   R*4    000004          ABET   R*4    000008

  SOURCE STATEMENT LABELS

    LABEL  ISN   ADDR          LABEL  ISN   ADDR          LABEL  ISN   ADDR          LABEL  ISN   ADDR
      1    13  000140

  COMPILER GENERATED LABELS

    LABEL  ISN   ADDR          LABEL  ISN   ADDR          LABEL  ISN   ADDR          LABEL  ISN   ADDR
   100001    2  0000B8       100002    7  0000DA       100003    8  0000E2       100004   11  0000FC

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(I)
*STATISTICS*     SOURCE STATEMENTS =      14, PROGRAM SIZE =     426, SUBPROGRAM NAME =FGNCTN
*STATISTICS*  NO  DIAGNOSTICS GENERATED
****** END OF COMPILATION ******                                  292K BYTES OF CORE NOT USED
```

APPENDIX E

PROGRAM INPUTS:
SEGMENT NUMBER: 992
ACQUISITIONS: 78159 78186 - 78222 78231 78267
LANDSAT NUMBERS 3 2 3 3 3

```
INPUT SUMMARY
TYPE   DATA

COMM   BADHWAP TEST RUN OF COMPLETE SYSTEM
CHAN       2,    3,    4,    1
Q IN     3.46,  -3.65,  -0.31,  1.50
Q IN     3.46,  -3.65,  -0.31,  1.50
X IN     3.64,   -9.61,  -.99,  1.5
X IN     3.64,   -9.61,  -0.99,  1.5
Y IN     3.71,   4.70,   0.70,  1.50
Y IN     3.71,   4.70,   0.70,  1.5
Z IN     3.44,   7.90,   0.96,  1.50
Z IN      3.44,  7.90,   0.96,  1.50
MAXP     40
CROP     CORN,SOYB
SYMB      195, 226
*END
ENTERING RDFXCT
 78159  78186  78222  78231  78267
LANDST=    3      2      2      1      3
```

ACCURACY ASSESSMENT QUALITY ASSURANCE CLASSIFICATION

PROCESSING DATE - 05/18/81 AT 13:33

SEGMENT NUMBER - 882 CROP(S) OF INTEREST - CORN SOYB

PIXEL SKIP FACTOR = 1 LINE SKIP FACTOR = 1
VERTICES (PIXEL, LINE)=(77., 77.) (84., 76.) (87., 81.) (80., 82.) (

MEANS AND STD. DEV. FOR TRAINING FIELD BASED ON 39 PIXELS -

CHANNEL NUMBER		ACQUISITION DATES 78159	78186	78222	78231	78267
1	MEAN	27.74	20.23	17.15	17.12	17.36
	STD. DEV.	3.21	0.93	1.16	0.99	1.06
2	MEAN	29.52	12.92	11.64	11.13	15.96
	STD. DEV.	4.57	0.84	0.74	0.49	1.37
3	MEAN	35.34	59.08	49.26	45.85	30.80
	STD. DEV.	5.29	3.05	1.63	2.02	1.31
4	MEAN	30.06	58.00	53.33	50.05	28.10
	STD. DEV.	4.71	2.55	1.32	1.94	1.92

CONSTANTS FOR MODEL -

CHANNEL NUMBER		A	ALPHA	BETA	TO	CHISQ
1	INITIAL	3.46	-3.65	-0.31	1.50	
	FINAL	3.44+- 0.00	-3.57+- 0.00	-0.31+- 0.00	1.48+- 0.00	0.23
2	INITIAL	3.64	-9.61	-0.99	1.50	
	FINAL	3.57+- 0.00	-9.54+- 0.00	-0.98+- 0.00	1.48+- 0.00	3.63
3	INITIAL	3.71	4.70	0.70	1.50	
	FINAL	3.73+- 0.00	4.62+- 0.00	0.62+- 0.00	1.48+- 0.00	6.53
4	INITIAL	3.44	7.90	0.96	1.50	
	FINAL	3.45+- 0.00	8.10+- 0.00	0.99+- 0.00	1.50+- 0.00	4.49

PIXEL SKIP FACTOR = 1 LINE SKIP FACTOR = 1
VERTICES (PIXEL, LINE)=(15., 70.) (24., 70.) (25., 75.) (18., 75.) (

MEANS AND STD. DEV. FOR TRAINING FIELD BASED ON 40 PIXELS -

CHANNEL NUMBER		ACQUISITION DATES 78159	78186	78222	78231	78267
1	MEAN	22.64	25.67	19.65	19.39	18.08
	STD. DEV.	1.72	7.45	1.85	1.51	1.41
2	MEAN	19.13	22.60	15.15	13.65	16.73
	STD. DEV.	3.64	12.92	3.96	3.05	2.65
3	MEAN	44.36	62.82	57.80	60.84	40.06
	STD. DEV.	14.34	11.89	9.15	10.65	8.71
4	MEAN	42.75	57.45	56.00	62.76	39.08
	STD. DEV.	17.11	11.48	9.25	11.54	10.77

CONSTANTS FOR MODEL -

CHANNEL NUMBER		A	ALPHA	BETA	TO	CHISQ
1	INITIAL	3.46	-3.65	-0.31	1.50	
	FINAL	3.22+- 0.00	-0.24+- 0.00	0.02+- 0.00	1.17+- 0.00	0.41
2	INITIAL	3.64	-9.61	-0.99	1.50	
	FINAL	3.26+- 0.00	-3.15+- 0.00	-0.32+- 0.00	1.35+- 0.00	0.51
3	INITIAL	3.71	4.70	0.70	1.50	
	FINAL	3.70+- 0.00	5.60+- 0.00	0.66+- 0.00	1.50+- 0.00	0.26
4	INITIAL	3.44	7.90	0.96	1.50	
	FINAL	3.52+- 0.00	5.92+- 0.00	0.68+- 0.00	1.47+- 0.00	0.41

```
PIXEL SKIP FACTOR =    1 LINE SKIP FACTOR =    1
VERTICES (PIXEL, LINE)=(  1.,  1.) (196.,  1.) (196., 20.) (  1., 20.) (

CHISQ THRESHOLD -  CHANNEL       1       2       3       4

THRESHOLD FOR CROP 1      6.23    9.49   12.52   10.57

   CLASSIFICATION RESULTS - PIXELS CLASSIFIED CORN -      1619
                            PIXELS CLASSIFIED NONCORN -   2301
                                          CUT BY CH1 -       1
                                          CUT BY CH2 -     356
                                          CUT BY CH3 -    1382
                                          CUT BY CH4 -     562


THRESHOLD FOR CROP 2      7.90    9.40    6.23    6.23

   CLASSIFICATION RESULTS - PIXELS CLASSIFIED SOYB -      2071
                            PIXELS CLASSIFIED NONSOYB -   230
                                          CUT BY CH1 -      21
                                          CUT BY CH2 -     188
                                          CUT BY CH3 -      17
                                          CUT BY CH4 -       4


 UNCLASSIFIED PIXELS -   230
 END OF RUN, ELAPSED TIME =    5.11  ELAPSED VIRTUAL TIME =      4.97
```