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FINAL DESIGN SPECIFICATION FOR LARSYS MODIFICATION/FISHER F-DISTRIBUTION THRESHOLDING

(E80-10210) FINAL DESIGN SPECIFICATION FOR LARSYS MODIFICATION/FISHER F-DISTRIBUTION THRESHOLDING (Lockheed Electronics Co.) 61 p HC A04/MF A01 CSCL 05B

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Prepared By
Lockheed Electronics Company, Inc.
Aerospace Systems Division
Houston, Texas

Contract NAS 9-15200
For
EARTH OBSERVATIONS DIVISION

National Aeronautics and Space Administration
LYNDON B. JOHNSON SPACE CENTER
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FINAL DESIGN SPECIFICATION
FOR
LARSYS MODIFICATION/FISHER
F-DISTRIBUTION THRESHOLDING

Job Order 81-127
(TIRF 76-0074)

PREPARED BY

R. M. Rodriguez

APPROVED BY

P. L. Krumm, Supervisor
Software Development Section

Prepared by

Lockheed Electronics Company, Inc.
For
Earth Observation Division

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER
HOUSTON, TEXAS

December 1976

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1. SCOPE

This specification establishes the final design of modifications to the display processor within the EOD-LARSYS system, as specified in IDSD category 1 task agreement, titled "LARSYS Modification/Fisher F-distribution Thresholding".

2. APPLICABLE DOCUMENTS

The following documents form a part of this specification:

- o User Documentation, EOD-LARSYS LEC-3984 Rev. 2
- o Task Agreement Titled: LARSYS Modification/Fisher F-distribution Thresholding
- o TIRF 76-0074

3. SYSTEM DESCRIPTION

3.1 HARDWARE DESCRIPTION

N/A

3.2 SOFTWARE DESCRIPTION

The purpose of this modification was to develop a fifth thresholding option for the DISPLAY processor of the EOD-LARSYS system. The new option uses program generated Fisher F-distribution values as the threshold to determine assignment of pixels to the null (thresholded) class.

The other thresholding options provided by the DISPLAY processor are:

- o NO THRESHOLD
- o Thresholding with user-supplied (INPUT) threshold values
- o Thresholding with "Empirical" distribution of quadratic function values (program generated).
- o Thresholding with CHI-Squared distribution values (program generated)

The modification for the Fisher F-distribution option was incorporated into the existing program logic. An additional routine, FDIST, was generated to compute the Fisher F-distribution values. The LARSYS segmentation map (LARSAA) was modified to include the FDIST routine in the display overlay. Record two of the MAPTAP file, created by CLSFY1, was modified to include the number of pixels in each training subclass (KEPPTS(NOSUB2)). The DISPLAY common block, DISPL, in the proc element CMBK10 was increased to include KEPPTS(60).

Changes were made to the following routines in the DISPLAY processor: CLSFY1, DSPLAY, REDIF3, SETUP3. These various elements will be discussed in the order of use. Appendix A contains a DISPLAY processor flowchart. The program listings are in Appendix B, in alphabetical order.

3.2.1 DSPLAY

3.2.1.1 Linkage

DSPLAY is called from the LARSYS system executive routine, MONTOR. DSPLAY calls SETUP3, DSPLY1, EMTHRS, FDIST, DSPLY2, and PRTFCT.

3.2.1.2 Interface

The DISPL common block is used as an interface among all the DISPLAY processor's routines.

3.2.1.3 Inputs

None

3.2.1.4 Outputs

Prints error message on printer - see Appendix D.

3.2.1.5 Storage Requirements

Storage used: Code = 307_8, Data = 40_8

3.2.1.6 Description

DSPLAY is the driver for the DISPLAY Processor. It was modified to enable it to test for the FISHER F-distribution thresholding option and to call subroutine FDIST to compute the threshold

values. All other processing in DSPLAY remains the same.

3.2.1.7 FLOWCHART

See Appendix A.

3.2.1.8 LISTINS

See Appendix B.

3.2.2 CLSFY1

3.2.2.1 Linkage

CLSFY1 is called from CLSFY. CLSFY1 calls RELERR, WRTFLD, THRESH, WRTMTX, MCHLSK.

3.2.2.2 Interface

N/A

3.2.2.3 Inputs

None

3.2.2.4 Outputs

CLSFY1 outputs a MAPTAP file. (See Appendix C for MAPTAP format) and outputs tabular listing on printer.

3.2.2.5 Storage Requirements

Storage used: Code = 1611_8 Data = 437_8

3.2.2.6 Description

CLSFY1 was modified to enable it to output the total number of training field pixels (KEPPTS) per subclass on the second record of the MAPTAP file.

3.2.2.7 Flowchart

N/A

3.2.2.8 LISTING

See Appendix B.

3.2.3 SETUP3

3.2.3.1 Linkage

SETUP 3 is called by DSPLAY. SETUP3 calls FIND, NUMBER, FSBSFL, REDIF3, WRTFLD.

3.2.3.2 Interface

N/A

3.2.3.3 Inputs

None

3.2.3.4 Outputs

Prints list of options selected and diagnostic messages.

3.2.3.5 Storage Requirements

Storage used: Code = 1464_8 Data = 553_8

3.2.3.6 Description

SETUP3 initializes the reading of the classification results (MAPTAP) file and the input processor control card(s). It also prints a list of the options that were selected and determines the coordinates of the rectangular areas which encompass the training or test fields required. SETUP3 was modified to enable it

to read the modified second record of the MAPTAP file, to recognize the FISHER option, and to print the message "Apply FISHER F-distribution thresholds".

3.2.3.7 Flowchart

N/A

3.2.3.8 Listing

See Appendix B.

3.2.4 REDIF3

3.2.4.1 Linkage

REDIF3 is called by SETUP3. REDIF3 calls CHIN, NXTCHR, FIND, FLTNUM, LAREAD.

3.2.4.2 Interface

N/A

3.2.4.3 Inputs

REDIF3 reads the supervisor (control) cards in the input cards and STAT data from the MAPTAP file.

3.2.4.4 Outputs

Prints diagnostic messages.

3.2.4.5 Storage Requirements

Storage used: Code = 1452_8 Data = 545_8

3.2.4.6 Description

REDIF3 reads and analyzes the input processor control cards to set processor control flags. The routine was modified to recognize the FISHER option card and in this process, the logic to test the threshold options was changed because of the increased number of options. A new feature was added to limit the threshold option to be the last one read, in case more than one threshold option was requested. The FISHER threshold option includes a test to assure that the number of pixels for each subclass is greater than the number of channels, which is required for the threshold value to be computed correctly for the given subclass.

3.2.4.7 Flowchart

N/A

3.2.4.8 Listing

See Appendix B.

3.2.5 FDIST'

3.2.5.1 Linkage

FDIST is called by DSPLAY. FDIST calls FISHIN.

3.2.5.2 Interface

N/A

3.2.5.3 Inputs

None

3.2.5.4 Outputs

None

3.2.5.5 Storage Requirements

Storage used: Code = 103_8 Data = 136_8

3.2.5.6 Description

The FDIST routine computes the threshold values for the FISHER F-distribution option. FDIST uses the FISHIN routine from the UNIVAC system's STAT-PACK library to obtain the FISHER F-distribution values. The following equations are used to arrive at the threshold value:

VAR = FISHIN(F(I),N1,N2,$1) ---value returned from FISHIN

Parameters:

F(I) = confidence level , for subclass I
N1 = No. of channels
N2 = No. of samples - No. of channels (i.e., KEPPTS(I)-N1)
$1 = overflow condition address return.

$$FK = \frac{P*(N+1)*(N-1)}{(N-P)*N}$$

where P = No. of channels
N = No. of samples

THRES = FK*VAR

The threshold values are computed for each subclass. If the FISHIN routine returns an overflow condition for a particular subclass, the threshold value will be set to 999.999 for that subclass.

3.2.5.7 Flowchart

N/A

3.2.5.8 Listing

See Appendix B.

4.0 OPERATION

The EOD-LARSYS system of processors operates on the UNIVAC EXEC2 computer system. The user is required to set-up an input deck of cards containing the processor control cards as described in the LARSYS users document and to submit the deck to the computer center.

The following processor control card is required to initiate the F-distribution threshold options. Changes were made to the DISPLAY processor operating instructions in the LARSYS user document to reflect the addition of this processor control card:

OPTIONS .	FISHER *	Compute thresholds from the FISHER F-distribution, using the confidence levels input on the threshold control card.

---

* If the threshold control card is input, one of the four options (CHI-SQUARE, FISHER, EMPIRICAL, or THRESHOLD VALUES) should be input also. If the option card is omitted and the THRESHOLD card is input, CHI-SQUARE is assumed. If more than one threshold option is input, only the last one read will be performed.

5.0 TEST PROCEDURE

Make runs on each of the threshold options including the "no threshold" option to verify the operation and performance of the new FISHER F-distribution threshold option, and test the integrity of the system. In addition the STATS, PLOT, PLT, OUTLINE and FILTER options are turned on for each run to make all runs on the same set of data.

The outputs of the five thresholding options are compared and check for accuracy. The FISHER input and output is analyzed.

6.0 TEST VERIFICATION

For LARSYS Modification/Fisher F-Distribution Thresholding

This verification is being conducted to insure that the delivered program products satisfy the requirements as originally stated by the requesting organization.

M. C. Trichel
NASA Monitor

J. C. Minter
Requestor

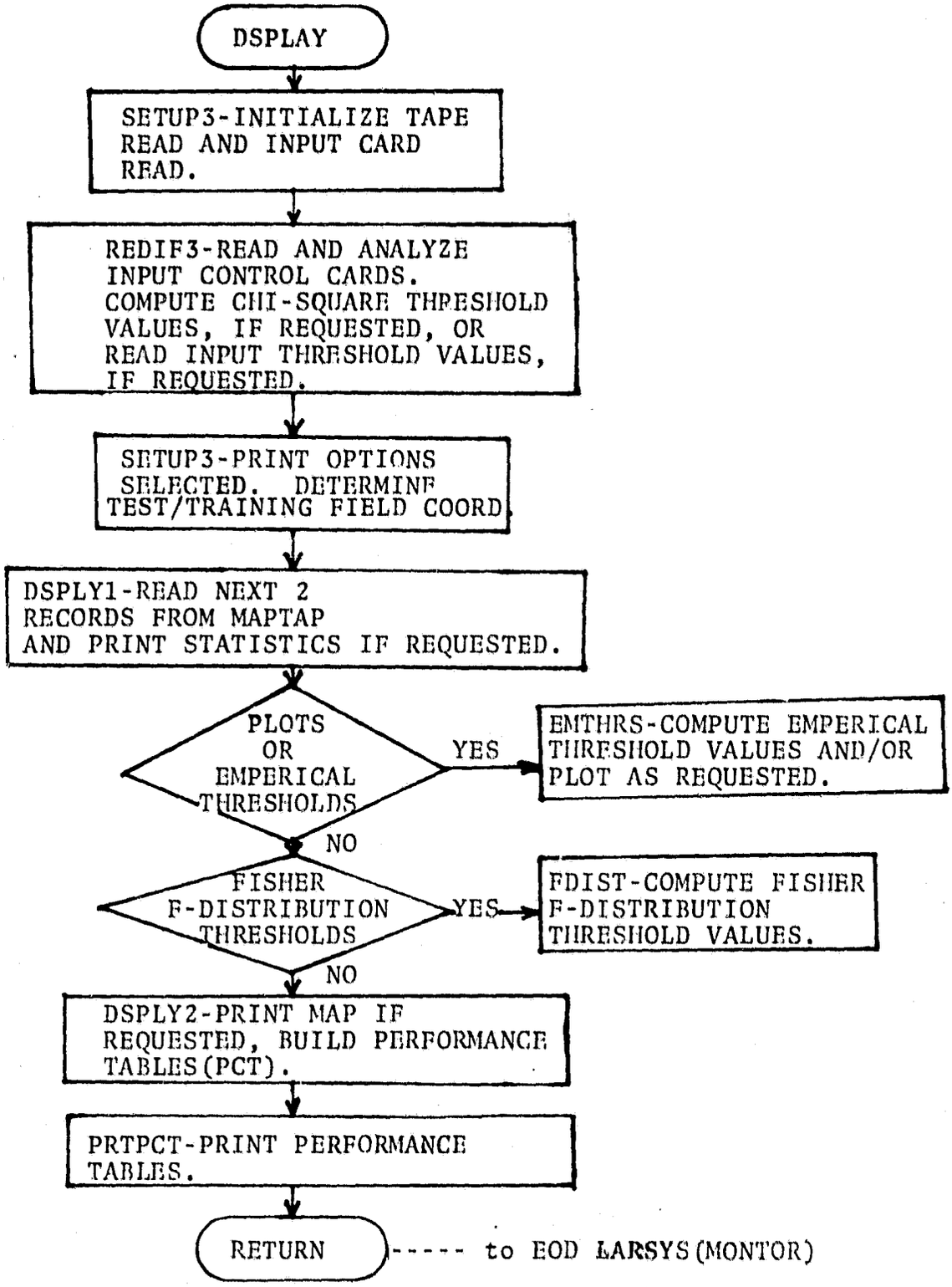
Rodolfo Rodriguez
Developer

Cognizant System Manager

Quality Assurance

Verification Date: 11/2/76

APPENDIX A
FLOWCHART


DSPLAY
SETUP3-INITIALIZE TAPE READ AND INPUT CARD READ.
REDIF3-READ AND ANALYZE INPUT CONTROL CARDS. COMPUTE CHI-SQUARE THRESHOLD VALUES, IF REQUESTED, OR READ INPUT THRESHOLD VALUES, IF REQUESTED.
SETUP3-PRINT OPTIONS SELECTED. DETERMINE TEST/TRAINING FIELD COORD
DSPLY1-READ NEXT 2 RECORDS FROM MAPTAP AND PRINT STATISTICS IF REQUESTED.
PLOTS OR EMPERICAL THRESHOLDS
YES
EMTHRS-COMPUTE EMPERICAL THRESHOLD VALUES AND/OR PLOT AS REQUESTED.
NO
FISHER F-DISTRIBUTION THRESHOLDS
YES
FDIST-COMPUTE FISHER F-DISTRIBUTION THRESHOLD VALUES.
NO
DSPLY2-PRINT MAP IF REQUESTED, BUILD PERFORMANCE TABLES(PCT).
PRTPCT-PRINT PERFORMANCE TABLES.
RETURN
----- to EOD LARSYS(MONTOR)

APPENDIX B
LISTINGS

```
GL    PDP,*    CMBK10,CMBK10                                          03 NOV 76          16:
PDP  BLI  2403 0010
THIS PROC ELEMENT PROCESSED ON 03 NOV 76 AT 16:35:17

000001       PROC ORIGIN 1     ENTRY POINT 1     CMBK10*    FCOPY
000002                                            COMMON/DISPL/CATFLG,CATNAM(61),CLSNAM(61),SUBNAM(61),SUBNO(60),
000003                                           *            SUBCAT(60),CLSSUB(60),NOMAP,TOTVT3,NOSUB3,
000004                                           *            PCFOKY,TSTKEY,TRNKEY,THRSKY,STATKY,EMPTRS,THRSVA,
000005                                           *            PLTKEY,BMFLG,BMCOMB,BMFEAT,CDATE(2),
000006                                           *            FLDSV2,FIELD2,VERTX2,FLDSV3,FIELD3,VERTX3,PCTID3,
000007                                           *            THRES(60),SYMMTX(66),HIGH(60),CON(60)
000008                                           *            ,FLDKEY,NOFLD2,NOFLD3,NOFET2,FETVC2(30)
000009                                           *            ,NOSUB2,NOTRFD,TOTVT2,NOCLS2
000010                                           *            ,CATNO(60),NOCAT,FILTER,MAPFMT
000011                                           *            ,DESKEY,DESUNI,DESOTH,CROP ,ACROP,AOTHER,ATOTAL
000012                                           *            ,SITE(4),ANALYS(3),CAM(10),CRPKEY,KEPPTS(60)
000013                                            END
000014       PROC ORIGIN 2     ENTRY POINT 2     CONT10*  FCOPY
000015                                          C*
000016                                          C*    COMMON BLOCK DISPL IS USED ONLY IN THE DISPLAY PROCESSOR
000017                                          C*
000018                                          C*
000019                                          C*    DEFINITIONS
000020                                          C*
000021                                          C*      CATFLG - FLAG INDICATING WHETHER OR NOT CATEGORY PERFORMANCE
000022                                          C*               REPORTS MUST BE GENERATED.
000023                                          C*      CATNAM - NAMES OF CATEGORIES. READ FROM MAPTAP.
000024                                          C*      CLSNAM - NAMES OF CLASSES. READ FROM MAPTAP.
000025                                          C*      SUBNAM - NAMES OF SUBCLASSES. READ FROM MAPTAP.
000026                                          C*      SUBCAT - SUBCLASS-CATEGORY CORRESPONDENCE VECTOR
000027                                          C*               (SUBCAT(I)=M  MEANS SUBCLASS I BELONGS TO CATEGORY M)
000028                                          C*      CLSSUB - SUBCLASS-CLASS CORRESPONDENCE VECTOR.
000029                                          C*               (CLSSUB(I)=M  MEANS SUBCLASS I BELONGS TO CLASS M)
```

```
000030      C*      NOMAP  - TRIGGER INDICATING WHETHER OR NOT A MAP IS TO BE PRINTED
000031      C*      TOTVTS - TOTAL NO. OF VERTICES IN INPUT TEST FIELDS.
000032      C*      NOSUBS - NO. OF SUBCLASSES USED IN CLASSIFY PLUS ONE,FOR THE
000033      C*               THRESHOLD CLASS.
000034      C*      PCFOKY - KEY INDICATING WHETHER OR NOT GROUND TRUTH PERFORMANCE
000035      C*               REPORTS ARE TO BE PRINTED ON A PER FIELD BASIS.
000036      C*      TSTKEY - KEY INDICATING WHETHER OR NOT TEST FIELDS WERE INPUT.
000037      C*      TRNKEY - KEY INDICATING WHETHER OR NOT TRAINING FIELDS ARE TO
000038      C*               BE OUTLINED.
000039      C*      THRSKY - THRESHOLD KEY
000040      C*               =1 APPLY CHI-SQUARE THRESHOLDS
000041      C*               =2 APPLY EMPIRICAL  THRESHOLDS
000042      C*               =3 APPLY USER-INPUT THRESHOLDS
000043      C*-                      =4 APPLY FISHER DISTRIBUTION THRESHOLD
000044      C*               =0 NO THRESHOLDING
000045      C*      STATKY - KEY FOR PRINTING STATS FROM MAPTAP
000046      C*      EMPTRS - EMPIRICAL THRESHOLDING FLAG
000047      C*      THRSVA - USER-INPUT THRESHOLD VALUE FLAG
000048      C*      PLTKEY - FLAG FOR PRINTING CUMMULATIVE HISTOGRAMS OF QUADRATIC
000049      C*               FORM.
000050      C*      BMFLG  - FLAG INDICATING WHETHER OR NOT A B-MATRIX WAS
000051      C*               APPLIED IN CLASSIFY.
000052      C*      BMCOMB - NO. OF LINEAR COMBINATIONS IN B-MATRIX
000053      C*      BMFEAT - NO. OF CHANNELS USED IN COMPUTING B-MATRIX
000054      C*      CDATE  - DATE OF CLASSIFICATION
000055      C*      FLDSV2 - ADDRESS IN 'ARRAY' FOR TRAINING FIELD INFORMATION,
000056      C*               FOR EACH TRAINING FIED 4 PIECES OF INFORMATION ARE
000057      C*               STORED - 1=FIELD NAME
000058      C*                        2=CLASS NO.
000059      C*                        3=SUBCLASS NO.
000060      C*                        4=NO. OF VERTICES
000061      C*      FIELD2 - ADDRESS IN 'ARRAY' FOR RECTANGULAR AREA SURROUNDING
```

```
000062                C.          EACH TRAINING FIELD. FOR EA.. TRAINING FIELD 5 PIECES
000063                C.          OF INFORMATION ARE STORED.
000064                C.                  1=LINE START
000065                C.                  2=LINE END
000066                C.                  3=SAMPLE START
000067                C.                  4=SAMPLE END
000068                C.                  5=POINTER INTO VERTEX ARRAY FOR VERTICES
000069                C.                    OF THIS FIELD.
000070                C.    VERTX2 - ADRESS IN 'ARRAY' FOR TRAINING FIELD VERTICES.
000071                C.    FLDSV3 - SAME AS FLDSV2 FOR TEST FIELDS
000072                C.    FIELD3 - SAME AS FIELD2 FOR TEST FIELDS
000073                C.    VERTX3 - SAME AS VERTX2 FOR TEST FIELDS
000074                C.    PCTID3 - ADDRESS IN'ARRAY' FOR PERFORMANCE TABLE.
000075                C.    THRES  - THRESHOLD VALUES
000076                C.    SYMBTX - SYMBOLS FOR EACH SUBCLASS, PLUS THRESHOLD SYMBOL
000077                C.             AND OUTLINE SYMBOLS.
000078                C.    HIGH   - THRESHOLD REJECTION PERCENTAGE - EMPIRICAL OPTION
000079                C.    CON    - CONSTANT FACTOR FROM PROBABILITY DENSITY FUNCTION
000080                C.             FROM CLASSIFY, ONE FOR EACH SUBCLASS.
000081                C.    FLDKEY - KEY INDICATING WHETHER GROUND TRUTH FIELDS ARE
000082                C.             ASSOCIATED WITH CLASSES OR SUBCLASSES.
000083                C.    NOFLD2 - NO. OF TRAINING FIELDS
000084                C.    NOFLD3 - NO. OF TEST FIELDS
000085                C.    NOFET2 - NO. OF CHANNELS USED IN CLASSIFICATION.
000086                C.    FETVC2 - CHANNELS USED IN CLASSIFICATION.
000087                C.    NOSUB2 - NO. OF SUBCLASSES USED IN CLASSIFICATION.
000088                C.    NOTAFD - NO. OF GROUND TRUTH FIELDS FOR WHICH PERFORMANCE
000089                C.             TABLES WILL BE MADE. EQUALS NOFLD3 OR NOFLD2.
000090                C.    TOTVT2 - TOTAL NO. OF VERTICES FOR TRAINING FIELDS.
000091                C.    NOCLS2 - NO. OF CLASSES USED IN CLASSIFICATION.
000092                C.    KATNO  - CLASS - CATEGORY CORRESPONDENCE VECTOR
000093                C.             (KATNO(I)=M  MEANS CLASS I IS IN CATEGORY M)
```

```
000094                                  C*      NOCAT  - NO. OF CATEGORIES.
000095                                  C*      FILTER - FLAG FOR SPATIAL FILTERING OPTION.
000096                                  C*    MAPFMT - FORMAT FOR OUTPUT MAP TAPE
000097                                  C*      DESKEY - KEY INDICATING WHETHER OR NOT DESIGNATED FIELDS WERE INPUT
000098                                  C*      DESUNI - NO. FOR DESIGNATED UNIDENTIABLE  (NOSUB2+5)
000099                                  C*      DESOTH - NO. FOR DESIGNATED OTHER  (NOSUB2+6)
000100                                  C*      CROP   - NAME OF CROP FOR WHICH INTENSIVE TEST SITE SUMMARY
000101                                  C*               REPORT IS TO BE PRINTED, CROP IS TO BE COMPARED WITH OTHER
000102                                  C*      ACROP  - ACRES OF 'CROP'  - USER INPUT
000103                                  C*      AOTHER - ACRES OF 'OTHER' - USER INPUT
000104                                  C*      ATOTAL - TOTAL ACRES IN CLASSIFIED SEGMENT
000105                                  C*      SITE   - NAME OF SITE (CLASSIFIED SEGMENT)
000106                                  C*      ANALYS - NAME OF ANALYST PERFORMING STUDY
000107                                  C*      CAMS   - NAME OF PROCEDURE CONFIGURATION USED IN STUDY
000108                                  C*      CRPKEY - KEY FOR GENERATING INTENSIVE TEST SITE SUMMARY REPORT
000109                                  C*-     KEPPTS - TOTAL NUMBER PIXELS IN EACH SUBCLASS
000110                                  C*
000111                                  C*
000112                                        END
    CMBK10          PROCEDURE                    12 NOV 75  17:48:49   0  01446502    14   110  (DELETE
                                                                       1  01451506    12     1
```

UNIVAC 1108 FORTRAN V EXEC 1, LEVEL 25A -(EXEC8 LEVEL E120100108)
THIS COMPILATION WAS DONE ON 03 NOV 76 AT 16:35:46

```
-136,136
      $                    I=1,NOSUB2),(KATNO(I),I=1,NOCLS2),(KEPPTS(I),
      $                    I=1,NOSUB2)

   SUBROUTINE CLSFV1    ENTRY POINT 000627

   STORAGE USED: CODE(1) 001611; DATA(8) 000437; BLANK COMMON(2) 000000

    COMMON BLOCKS:

    0003   INFORM 001159
    0004   CLASS  000723
    0005   SCRACH 030329
    0006   GLOBAL 000076

   EXTERNAL REFERENCES (BLOCK, NAME)

    0007   RELEAR
    0010   WRTFLG
    0011   THRESH
    0012   WRTMTE
    0013   MCHLSK
    0014   EXIT
    0015   NWBUS
    0016   NIO1S
    0017   NIO2S
    0020   NWDUS
    0021   NERR3S
    0022   ALOG

   STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0001   001013 1004L      0000   000122 110F      0001   000102 1042G      0001   000110 1046G      0000   000131 150F
    0001   000116 1526       0001   000124 1566       0000   000135 160F       0001   001104 1611F      0000   000142 1611F
    0001   000132 1626       0001   001111 1621       0001   000132 1646       0001   000140 1716       0001   000140 1736
    0001   001133 1031L      0000   000152 1600F      0001   001213 1031L      0001   001237 1951L      0000   000044 20F
    0001   000145 2056       0001   001375 2001L      0001   000152 2046       0000   000217 205F       0001   000160 2106
    0001   000165 2146       0000   003235 220F       0001   001446 2301L      0001   000240 2366       0001   000315 2666
    0001   000323 2716       0001   000336 2756       0001   000347 3026       0001   000362 3066       0001   000447 3236
    0001   000517 3336       0001   000526 3406       0001   000724 3716       0001   000724 3736       0000   000074 40F
    0001   000732 4006       0001   000732 4026       0001   000763 4166       0001   000767 4226       0001   001033 4456
    0001   001064 4546       0000   000076 50F        0001   001142 5026       0001   001160 5056       0001   001264 5346
    0001   001276 5366       0001   001305 5436       0001   001312 5476       0001   001344 5626       0001   001351 5666
    0000   000103 60F        0001   000537 6111L      0001   000601 6121L      0000   000107 65F        0000   000031 65F
    0005 R 000326 APR        0004 I 000000 APRFLG     0006 I 000073 ASAV       0006 I 000074 ASAVFL     0003 I 000006 AVAR2
    0000 I 000020 BADFLG     0000 I 000001 BCDFOR     0000 I 000000 BCDTWO     0004 I 000001 BMCOMB     0004 I 000002 BMFEAT
    0006 I 000055 BMFILE     0004 I 000003 BMFLG      0006 I 000056 BMKEY      0005 R 000036 BXKXBT     0005 I 000014 C
    0004 I 000011 CATMAP     0004 I 000665 CHNVEC     0003 I 000010 CLSID2     0004 I 000105 CLSSYM     0003 I 000301 CLSVC2
    0000 I 000021 CNT        0004 R 000201 CON        0005 R 000427 COV        0003 I 000007 COVAR2     0000 I 000002 DASH
    0006 I 000053 DATAPE     0006 I 000071 DATFIL     0004 R 000275 DET        0006 I 000067 DRMWDS     0006 I 000066 DRUMAD
    0005 R 000230 DUM        0006 I 000062 ERIPTP     0006 I 000063 ERPKEY     0003 I 000015 FETVC2     0004 I 000311 FLDESC
    0004 I 000372 FLDINF     0003 I 000013 FLDSV2     0003 I 000760 GROUPS     0003 I 000663 GRPCHK     0003 I 000566 GRPDEX
```

```
0003 I 000472 GRPNAM    0006 I 000200 HEAD      0006 I 000057 HISFIL    0006 I 000060 HISKEV    0000 I 000005 I
0000 I 000023 ICLAS     0004 I 003006 IDATAI    0000 I 000007 II        0000 I 000017 III       0000 I 000022 INC
0000   000320 INJP6     0000   000313 INJP6     0000 I 000006 J         0000 I 000015 K         0004 I 000400 KCLSNA
0003 I 000375 KEPPTS    0000 I 000027 L         0000 I 000025 LOC       0000 I 000003 LPRN      0006 I 000052 MAPTAP
0006 I 000064 MAPUNT    0003 I 000011 NCLS      0004 I 000007 NFILE     0004 I 000004 NOCAT     0000 I 000304 NOCATI
0004 I 000664 NOCHAN    0003 I 000000 NOCLS2    0004 I 000474 NOCTCL    0003 I 000002 NOFET2    0006 I 000065 NOFILE
0003 I 000005 NOFLO2    0003 I 000471 NOGAP     0003 I 000001 NOSUB2    0006 I 000016 NPLI      0000 I 000030 NSUBCL
0000 I 000024 NUMSUB    0006 I 000070 PAGSIZ    0000 I 000012 R         0007 R 000000 RELERR    0005 R 000327 RERROR
0000 I 000013 RRMLO2    0006 I 000054 SAVTAP    0005 I 000000 SCR1      0005 I 003720 SCR2      0006 I 000072 STAFIL
0004 I 000010 STATKY    0000 I 000026 STOP      0004 I 000570 SUBCAT    0003 I 000012 SUBUS2    0003 I 000011 SUBNO2
0003 I 000166 SUBPTH    0003 I 000053 SUBVC2    0005 R 000226 SUM       0005 R 000227 SUMTR     0000 I 000010 TEMPF2
0004 I 000005 THIJI     0003 I 000004 TOTVT2    0006 I 000061 TRFORM    0003 I 000003 VARSZ2    0005 R 000000 VEC
0003 I 000014 VERTX2


00100    C     //CLSFYI                                                            CLSF0000
00101          SUBROUTINE CLSFYI(COVMTX,AVEMTX,FLDMTX,CLSMTX,APRIOR,
00101         *  BMATR,VERTEX,SUBDES,SUBNO,COVNEW,AVENEW,KATNO)
00101          C
00101          C
00103          IMPLICIT INTEGER (A-H,O-Z)                                          CLSF0020
00103    C                                                                         CLSF0030
00103    CI--------------------------------------------------------------------ICLSF0040
00103    CI--------------------------------------------------------------------ICLSF0050
00103    CI                                                                    ICLSF0060
00103    CI    CALL...   CALL CLSFYI(COVMTX,AVEMTX,FLDMTX,RUNMTX,CLSMTX,APRIOR,
00103    CI                          BMATR,COVNEW,AVENEW )
00103    CI                                                                    ICLSF0080
00103    CI    ARGS...   COVMTX : LOCATION OF COVARIANCE MATRICES ( SYMETTRIC
00103    CI                       STORAGE ) FOR NOCLS2 TRAINING CLASSES.
00103    CI
00103    CI              AVEMTX : LOCATION OF NOCLS2 TRAINING CLASS MEAN VECTORS
00103    CI                       ( NOFET2 MEANS PER CLASS )
00103    CI
00103    CI              FLDMTX : LOCATION OF TRAINING FIELD(S) INFORMATION
00103    CI
00103    CI              CLSMTX : LOCATION OF NAME FOR EACH CLASS
00103    CI
00103    CI              APRIOR : LOCATION OF APRIORI PROBABILITY VALUES FOR
00103    CI                       EACH CLASS
00103    CI
00103    CI     VERTEX : LOCATION OF VERTICES OF SAVED TRAINING FIELDS
00103    CI
00103    CI     SUBDES : LOCATION OF SUBCLASS NAMES
00103    CI
00103    CI     SUBNO  : LOCATION OF ARRAY CONTAINING NO. OF SUBCLASSES IN
00103    CI              EACH CLASS
00103    CI               COVNEW : LOCATION USED TO STORE ''B''-TRANSFORMED
00103    CI                        COVARIANCE MATRICES.
00103    CI
00103    CI               AVENEW : LOCATION USED TO STORE THE ''B''-TRANSFORMED
00103    CI                        MEAN VECTORS.
00103    CI
00103    CI               BMATR  : LOCATION OF THE ''B''-TRANSFORMATION MATRIX,
00103    CI                        IF AVAILABLE, FOR APPLICATION TO THE CLASS
00103    CI                        MEANS AND COVARIANCE MATRICES.
00103    CI                                                                    ICLSF0100
00103    CI     KATNO  : CATEGORY - CLASS CORRESPONDENCE
00103    CI                                                                    ICLSF0130
00103    CI
00103    CI
```

```
00103     47.     C|    PURPOSE...
00103     48.     C|
00103     49.     C|              IF AVAILABLE, THE 'B'-TRANSFORMATION MATRIX IS APPLIED
00103     50.     C|
00103     51.     C|    TO THE SUBCLASS MEAN VECTORS AND COVARIANCE MATRICES,
00103     52.     C|              OBTAINS THE (MODIFIED) CHOLESKY FACTORIZATION OF THE
00103     53.     C|    SUBCLASS COVARIANCE MATRICES, PROVIDES THE 'CONSTANT' OF
00103     54.     C|              THE PROBABILITY DENSITY FUNCTION AND DETERMINANT FOR
00103     55.     C|    EACH SUBCLASS, AND OBTAINS THE SUBCLASS-PAIR THRESHOLDS FOR
00103     56.     C|              USE BY SUBR. CONTEX IN CLASSIFICATION OF INPUT SCAN
00103     57.     C|              LINES. PUBLISHES AND OUTPUTS ON MAPTAP THE TRAINING
00103     58.     C|              FIELD(S) INFORMATION AND THE STATISTICS FOR EACH OF THE
00103     59.     C|              TRAINING CLASSES.
00103     60.     C|                                                                  !CLSF0160
00103     61.     C|    RETURNS...CHOLESKY FACTORIZATION OF THE INPUT COVARIANCE MATRICES
00103     62.     C|    (AFTER 'B'-TRANSFORMATION', IF APPLICABLE), SUBCLASSPAIR
00103     63.     C|    THRESHOLDS, AND SUBCLASS STATISTICS OUTPUT ON MAPTAP.
00103     64.     C|                                                                  !CLSF0180
00103     65.     C!-------------------------------------------------------------------!CLSF0190
00103     66.     C!-------------------------------------------------------------------!CLSF0200
00103     67.     C                                                                    CLSF0210
00103     68.     C                                                                    CLSF0220
00103     69.     C                                                                    CLSF0230
00104     70.           INCLUDE COMBK1,LIST
00104     71.     C                                                                    CLSF0350
00104     72.     C                                                                    CLSF0450
00104     73.     C     ---------------------------------------------------------------CLSF0460
00104     74.     C                                                                    CLSF0470
00105     74.           COMMON/INFORM/NOCLS2,NOSUB2,NOFET2,VARSZ2,TOTVT2,NOFLD2,
00105     74.          .              AVAR2,COVAR2,CLSID2,SUBND2,SUBDS2,FLDSV2,VERTX2,
00105     74.          .              FETVC2(30),SUBVC2(75),SUBPTR(75),CLSVC2(60),
00105     74.          .              KEPPTS(60),NOGRP,GRPNAM(60),GRPDES(61),
00105     74.          .              GRPCHK(61),GROUPS(124)
00106     74.           END
00107     75.           INCLUDE COMBK2,LIST
00107     76.     C                                                                    CLSF0510
00107     77.     C                                                                    CLSF0530
00107     78.     C     ---------------------------------------------------------------CLSF0540
00107     79.     C                                                                    CLSF0550
00110     79.           COMMON /CLASS/ APRFLG,BMCONB,BMFEAT,BMFLG,NOCAT,THIJ(),IDATA(),
00110     79.          .               NFILE,STATKY,CATNAM(60),
00110     79.          3               CLSSYM(60),CON(60),DET(60),FLDESC,FLDINF(6),
00110     79.          4               KCLSNA(60),NOCTCL(60),SUBCAT(60)
00110     79.          .    ,NOCHAN,CHNVEC(30)                                        *NOW
00110     79.     C*
00111     79.           END
00112     80.           REAL CON,DET,COVMTX(VARSZ2,NOSUB2)
00113     81.           REAL AVEMTX(NOFET2,NOSUB2),APR(OR(1),VEC(30),BXXXBT(120)
00113     82.     C
00114     83.           REAL SUM,SUMTR,DUM(60),REARR(60),APR,COV(465)
00114     84.     C
00115     85.           REAL  RELERR
00115     86.     C
00115     87.     C     ---------------------------------------------------------------
00115     88.     C
00116     89.           COMMON /SCRACH/SCR1(2000),SCR2(10500)
00116     90.     C
00116     91.     C     ---------------------------------------------------------------
00116     92.     C
00116     93.     C
00117     94.           EQUIVALENCE  ( VEC(1),  SCR1(1)) , ( BXXXBT(1),  SCR1(31) ) ,
00117     95.     C
00117     96.          1             ( SUM,  SCR1(151) ) , ( SUMTR,  SCR1(152) )
```

```
00117       C
00117             2          , ( BUM(1),  SCR1(153)), ( APR,  SCR1(215) )
00117       C
00117             3 ,(RERROR(1),SCR1(216)),(COV(1),SCR1(280))
00117       C     ---------------------------------------------------------------
00117       C
00120              DIMENSION CLSMTX(1),FLDMTX(4,NOFLD2),SUBNO(1),SUBDES(1),
00120             *  VERTEX(2,TOTVT2),KATNO(1)
00120       C                                                                  CLSF0640
00121              DATA  BCDTWO/ '2' / , BCDFOR/ '4' /, DASH/ '------' /
00125              DATA  LPRN/'(      '/
00125       C                                                                  CLSF0660
00125       C     ---------------------------------------------------------------CLSF0670
00125       C
00125       C
00125       C
00125       C
00127              REAL  BMATA(BMCOMB,BMFEAT)
00127       C
00130            . REAL AVENEW(BMCOMB,BMFEAT),COVNEW(BMFLG,NOSUB2)
00130       C
00130       C
00130       C     ---------------------------------------------------------------
00130       C
00130       C
00131              INCLUDE  COMBK6,LIST
00131       C
00131       C
00132              COMMON/GLOBAL/HEAD(42),MAPTAP,DATAPE,SAVTAP,BMFILE,BMKEY,
00132             *              MISFIL,MISKEY,TRFORM,ERIPTP,ERPKEY,MAPUNT,NOFILE,
00132             *    DRUMAD,DRMWDS,PAGSIZ,DATFIL,STAFIL,ASAV,ASAVFL
00133              END
00134              ----------------------------------------------------------------
00134       C
00134       C                                                                  CLSF0730
00134       C      HEADER RECORD  NO. 2 FOR MAPTAP
00134       C
00134 .            IF (NOCAT .GT. 0)  NOCAT1 = NOCAT
00136              IF ( NOCAT .LE. 0   ) NOCAT1 = NOCLS2
00140              WRITE(MAPTAP)(CATNAM(I),I=1,NOCAT1),(CLSMTX(I),I=1,NOCLS2),
00140          . 1             (SUBNO(I),I=1,NOCLS2),(SUBDES(I),I=1,NOSUB2),
00140            2            ((FLDMTX(I,J),I=1,4),J=1,NOFLD2),((VERTEX(I,J),I=1,2),
00140            3             J=1,TOTVT2),(SUBCAT(I),I=1,NOSUB2),(CLSVC2(I),
00140            4                     I=1,NOSUB2),(KATNO(I),I=1,NOCLS2),(KEPPTS(I),       *NEW
00140            5                     I=1,NOSUB2)                                         *NEW
00140       C                                                                  CLSF0770**-1
00140       C       WRITE OUT TRAINING FIELD INFORMATION
00140       C     ---------------------------------------------------------------CLSF0790
00140       C                                                                  CLSF0800
00220         65   FORMAT(3X,'***  CLASSIFICATION STUDY  ***    MAPTAP FILE ',5X,I2//)
00221         10   CALL WRTFLD(FLDMTX,VERTEX,NOFLD2,1,CLSMTX,SUBDES)
00221       C
00221       C
00221       C       PUBLISH THE CLASSES AND CHANNELS (WITH SPECTRAL BAND) TO BE
00221       C       CONSIDERED IN CLASSIFICATION.
00221       C
00222              WRITE(6,HEAD)
00224              WRITE(6,65) NFILE
00227              WRITE(6,20)
00231          20 FORMAT( ////T27,'SUBCLASSES CONSIDERED',T90,'CHANNELS CONSIDERED'
00231             *//T21,'SYMBOL',T32,'SUBCLASS',T45,'A PRIOR',T88,'TRAINING   RECOGN
00231             *ITION')
00232              II = NOSUB2
```

```
00233    156*          IF ( II .LT. NOFET2 ) II = NOFET2
00235    157*          DO 30 I=1,II                                                CLSF0880
00240    158*          WRITE (6,40)                                                CLSF0890
00242    159*          IF (I .LE. NOSUB2) WRITE(6,50)CLSSYM(I),SUBDES(I),APRIOR(I)
00250    160*          IF (I .LE. NOFET2) WRITE(6,60)FETVC2(I),CHNVEC(I)
00255    161*       30 CONTINUE                                                    CLSF0920
00257    162*       40 FORMAT(' ')                                                 CLSF0930
00260    163*       50 FORMAT('0',T23,A1,T33,A6,T45,F7.4)
00261    164*       60 FORMAT('0',T91,I2,T103,I2)
00261    165*     C                                                               CLSF1120
00261    166*     C     SAVE AND PUBLISH THE MEAN AND COVARIANCE                  CLSF1130
00261    167*     C     ---- --- ------- --- ---- ----------                      CLSF1140
00261    168*     C                                                               CLSF1150
00261    169*     C
00261    170*     C      IF B-MATRIX IS AVAILABLE, TRANSFORM THE COVARIANCE MATRIX AND
00261    171*     C      MEAN VECTOR
00261    172*     C
00261    173*     C
00262    174*          TEMPF2 = NOFET2
00263    175*          IF( BMFLG .LE. 0)  GO TO 611
00265    176*          DO 610 NCLS=1,NOSUB2
00270    177*          DO  605  R=1,BMCOMB
00273    178*          RRR102 = ( R * (R-1) )/2
00274    179*          DO  603  C=1,R
00277    180*          I = RRR102 + C
00300    181*          SUMTR = 0.0
00301    182*          DO  602  J=1,NOFET2
00304    183*          SUM = 0.0
00305    184*          DO  601  K=1,NOFET2
00310    185*          II = ( K * (K-1) )/2 + J
00311    186*          IF( J .GT. K)  II= ( J * (J-1) )/2 + K
00313    187*      601 SUM = SUM + BMATR(R,K) * COVMTX(II,NCLS)
00315    188*      602 SUMTR = SUMTR + BMATR(C,J) * SUM
00317    189*      603 BXXXBT(I) = SUMTR
00321    190*          SUM = 0.0
00322    191*          DO  604  J=1,NOFET2
00325    192*      604 SUM = SUM + BMATR(R,J) * AVEMTX(J,NCLS)
00327    193*          VEC(R) = SUM
00330    194*      605 CONTINUE
00332    195*          DO  606  J=1,I
00335    196*      606 COVNEW(J,NCLS) = BXXXBT(J)
00337    197*          DO  607  J=1,BMCOMB
00342    198*      607 AVENEW(J,NCLS) = VEC(J)
00344    199*      610 CONTINUE
00346    200*          VARSZ2 = BMFLG
00347    201*          NOFET2 = BMCOMB
00350    202*      611 CALL CLSFIA(COVMTX,AVEMTX,VARSZ2,NOFET2,NOSUB2)
00351    203*          CONTINUE
00351    204*     C
00351    205*     C .    OBTAIN THE SUBCLASS-PAIR THRESHOLDS, FOR USE BY CLSFV2/CONTEX
00351    206*     C
00351    207*     C
00352    208*          IF (NOCAT .GT. 0)  GO TO 612
00354    209*          NPL1 = NOFET2 + 1
00355    210*          CALL THRESH(NOSUB2,NOFET2,NPL1,APRIOR,AVEMTX,COVMTX,DET,VARSZ2,
00355    211*         1            SCR2(1),SCR2(901),SCR2(1801),SCR2(1831),SCR2(1861),
00355    212*         2     SCR2(2791),SCR1(THIJ1))
00356    213*      612 CONTINUE
00356    214*     C
00356    215*     C
00357    216*          NOFET2 = TEMPF2
00360    217*          RETURN
00360    218*     C
```

```
00360      C   ***  END - CLSFY1  ***
00360      C
00360      C       -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-
00360      C
00360      C
00360      C         INTERNAL SUBROUTINE CLSF1A
00360      C
00360      C
00360      C
00360      C
00361            SUBROUTINE CLSF1A(COVMTX,AVEMTX,VARSZ2,NOFET2,NOSUB2)
00361      C
00364            INTEGER  VARSZ2
00364      C
00365          . REAL COVMTX(VARSZ2,NOSUB2),AVEMTX(NOFET2,NOSUB2)
00366            III = 0
00366      C
00366      C
00366      C
00366      C     ---------------------------------------------------------------
00366      C
00366      C     OUTPUT THE ORIGINAL COVARIANCE AND MEAN MATRIX( AFTER B-TRANSFORM
00366      C     IF  B-MATRIX AVAILABLE) FOR ALL SUBCLASSES, ON THE CLASSIFICATION
00366      C     RESULTS OUTPUT FILE,  MAPTAP
00366      C
00366      C     ---------------------------------------------------------------
00366      C
00366      C     HEADER RECORD  NO. 3 FOR MAPTAP
00366      C
00367            WRITE(MAPTAP) ((COVMTX(I,J),I=1,VARSZ2),J=1,NOSUB2),
00367          *          ((AVEMTX(I,J),I=1,NOFET2),J=1,NOSUB2)
00367      C
00407            BADFLG = 0
00407      C
00410            IF (STATKY.EQ.0) GO TO 180                                  CLSF1180
00412            CNT = 7+(5+3+2*NOFET2)*((NOFET2+11)/12)                     CLSF1190
00413            CNT = PAGSIZ/CNT                                            CLSF1200
00414            INC = CNT                                                   CLSF1210
00415            DO 170 ICLAS=1,NOCLS2                                       CLSF1220
00420            NUMSUB = SUBNO(ICLAS)
00421            DO 120  II=1,NUMSUB
00424            III = III + 1
00425            IF (INC.LT.CNT) GO TO 100                                   CLSF1230
00427            WRITE (6,HEAD)                                              CLSF1240
00431            WRITE(6,65)INFILE
00434         65 FORMAT(3X,'***  CLASSIFICATION STUDY  ***   MAPTAP FILE ',5X,12//)
00435            INC = 0                                                     CLSF1260
00436        100 CONTINUE
00437            WRITE(6,110) CLSMTX(ICLAS),SUBDES(III)
00443        110 FORMAT(//'  CLASS    : 'A6/'  SUBCLASS: ',A6 )
00444            DO 140 LOC=1,NOFET2,12                                      CLSF1290
00447            STOP = LOC+11                                               CLSF1300
00450            IF( STOP .GT. NOFET2 ) STOP = NOFET2                        CLSF1310
00452        130 WRITE(6,150)( AVEMTX(I,III),I=LOC,STOP)
00461        150 FORMAT('0 MEAN:',3X,12F9.2)
00461      C
00462            IF( BMFLG .GT. 0)  GO TO 161
00464            WRITE(6,160)
00466        160 FORMAT(//'  COVARIANCE MATRIX:')
00467            GO TO 162
00470        161 WRITE(6,1611)
00472       1611 FORMAT(//'  COVARIANCE MATRIX (B-TRANSFORMED) :')
00473        162 CALL WRTMTX(COVMTX(1,III),NOFET2,      BCDTWO)
```

```
00474          INC = INC+1                                                  CLSF1420
00475      120   CONTINUE
00477      170 CONTINUE                                                     CLSF1430
00477    C                                                                  CLSF1440
00477    C
00477    C  OBTAIN THE ''MODIFIED'' CHOLESKY DECOMPOSITION OF THE COVARIANCE
00477    C    MATRIX FOR EACH SUBCLASS, THE DETERMINANT, AND COMPUTE THE
00477    C  '' CONSTANT ''  TERM OF THE PROBABILITY DENSITY FUNCTION
00477    C  =  -2 * LOG Q(I) + LOG DETERMINANT(I) , WHERE Q(I) IS THE
00477    C    APRIORI PROBABILITY VALUE FOR SUBCLASS I
00477    C
00477    C    PDF = Q(I) * ( DET(I)**-1/2 * E**-1/2 * (X-M)*  * K**-1 * (X-M) )
00477    C
00477    C    LOG PDF = -1/2 * ( CON + (X-M)*  * K**-1  * (X-M) )
00477    C
00477    C
00477    C
00501     180  DO 195  NCLS=1,NOSUB2
00501    C
00501    C     TRANSFER ORIGINAL COVARIANCE MATRIX TO TEMPORARY STORAGE ( COV )
00501    C
00504          DO  181  I=1,VARSZ2
00507     181  COV(I) = COVMTX(I,NCLS)
00507    C
00507    C     OBTAIN THE ''MODIFIED'' CHOLESKY FACTORIZATION OF THE
00507    C     COVARIANCE MATRIX
00507    C
00511          CALL MCHLSK( COVMTX(1,NCLS), NOFET2, DUM, DET(NCLS) )
00511    C
00512          IF( DET(NCLS) .GT. 0.0)  GO TO 183
00514          WRITE(6,1800)  NCLS, DET(NCLS)
00520    1800 FORMAT(//// 5X,'*****  CLSFY/CLSFY1/CLSF1A ---  THE COVARIANCE MAT
00520        1RIX,FOR SUBCLASS NO',I4,' IS EITHER SINGULAR OR NOT POSITIVE DEFIN
00520        2ITE'// 35X,'DETERMINANT =',F20.4///5X,'*****  TERMINATING PROGRAM
00520        3 EXECUTION  *****' )
00520    C
00521          BADFLG = 99
00522          GO TO 195
00523     183  APR = APRIOR(NCLS)**-2
00524          CON(NCLS) = ALOG( APR * DET(NCLS) )
00524    C
00524    C
00524    C      OBTAIN THE RELATIVE ERROR OF FACTORED MATRIX ( RATIO OF
00524    C      EUCLIDEAN NORM OF DIFFERENCE,  K-LDL*  , TO EUCLIDEAN NORM OF  K)
00524    C
00525          RERROR(NCLS) = RELERR( COVMTX(1,NCLS),COV,NOFET2,VARSZ2)
00525    C
00525    C
00526     195  CONTINUE
00526    C
00526    C     ERROR TERMINATION, IF ONE OR MORE SUBCLASSES HAVE AN INVALID
00526    C     (SINGULAR, OR NON-POSITIVE DEFINITE) COVARIANCE MATRIX
00526    C
00530          IF( BADFLG .GT. 0)  CALL EXIT
00530    C
00530    C
00530    C
00530    C     ----------------------------------------------------------------
00530    C     OUTPUT THE ( MODIFIED ) CHOLESKY FACTORIZATION OF THE
00530    C     COVARIANCE MATRIX, ON THE CLASSIFICATION OUTPUT FILE, MAPTAP
00530    C     ----------------------------------------------------------------
00530    C
00530    C
```

```
00530    345.      C     HEADER RECORD  NO. 4 FOR MAPTAP
00530    346.      C
00532    347.            WRITE(MAPTAP) ((COVMTX(I,J),I=1,VARSZ2),J=1,NOSUB2),
00532    348.           .           (CON(I),I=1,NOSUB2),(DET(I),I=1,NOSUB2)
00553    349.            IF (STATKY.EQ.0) GO TO 230                                  CLSF1520
00555    350.            CNT = 13 + (5+2*NOFET2) * ((NOFET2+1)/12)
00556    351.            CNT = PAGSIZ/CNT                                            CLSF1540
00557    352.            INC = CNT                                                   CLSF1550
00557    353.      C
00560    354.            III = 0
00561    355.            DO 210   L=1,NOCLS2
00564    356.            NSUBCL = SUBNO(L)
00565    357.            DO 210   I=1,NSUBCL
00570    358.            III = III + 1
00571    359.            IF (INC.LT.CNT) GO TO 200                                   CLSF1570
00573    360.            WRITE (6,HEAD)                                              CLSF1580
00575    361.            WRITE(6,65)INFILE
00600    362.            INC =0 '                                                    CLSF1600
00601    363.       200  WRITE(6,220)CLSMTX(L),L,SUBDES(III),III,DET(III),CON(III)
00611    364.            CALL WRTMTX(COVMTX(1,III),NOFET2,BCDFOR)
00611    365.      C
00612    366.            WRITE(6,205)RERROR(III)    '
00615    367.       205  FORMAT(1X,'** RELATIVE ERROR  ( EUCLIDEAN NORM (K-LDL*)/EUCLIDEAN
00615    368.           1NORM  K )  =' , F15.8 // )
00615    369.      C
00616    370.            INC = INC+1                                                 CLSF1630
00617    371.       210  CONTINUE                                                    CLSF1640
00622    372.       220  FORMAT(1H0//  T50,'MULTISPECTRAL CHARACTERISTICS FOR',/ T57,A6,
00622    373.           1' ( CLASS',I3,' )',/T56,A6,' ( SUBCLASS',I3,' )'//
00622    374.           2 1H0,'DETERMINANT =',F25.4 / 1H0,                'PROB. DENSITY FU
00622    375.           2NCTION - CONSTANT TERM=',F10.4// 1H0,'COVARIANCE MATRIX  (CHOLESKY
00622    376.           3 FACTORIZATION) :' / )
00622    377.      C
00622    378.      C
00623    379.       230  CONTINUE
00623    380.      C
00624    381.            RETURN
00625    382.             END                                                        CLSF1730

   END OF COMPILATION:        NO  DIAGNOSTICS.
CLSFV1          SYMBOLIC                          16 AUG 76  14:14:24   0  01555172   14   381  (DELETE
CLSFV1  CODE    RELOCATABLE                       16 AUG 76  14:14:24   1  01567520   48     1  (DELETE
                                                                       0  01567600   14   111
```

```
@     FOR,*    DSPLAY,DSPLAY                                                    03 NOV 76            16:3
UNIVAC 1108 FORTRAN V EXEC 11 LEVEL 25A  -(EXEC8 LEVEL E12010010A)
THIS COMPILATION WAS DONE ON 03 NOV 76 AT 16:36:20

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C-

C-    TEST THRSKY = 4  FOR FISHER F-DISTRIBUTION THRESHOLDS

C-    CALL FDIST TO COMPUTE AND STORE THRESHOLDS

C-

      IF(THRSKY.EQ.4) CALL FDIST

C-

   SUBROUTINE DSPLAY    ENTRY POINT 000272

   STORAGE USED: CODE(1) 000307; DATA(0) 000040; BLANK COMMON(2) 000000

    COMMON BLOCKS:

    0003   DISPL  001463

   EXTERNAL REFERENCES (BLOCK, NAME)

    0004   SETUP3
    0005   DSPLY1
    0006   EMIHRS
    0007   FDIST
    0010   DSPLY2
    0011   PRTPCT
    0012   NWDUS
    0013   NIO2S
    0014   NERR3S

   STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0001   000037 10L       0000   000000 100F      0001   000127 30L       0003   001342 ACROP     0003   001351 ANALYS
    0003   001343 AOTHER    0003   001344 ATOTAL    0003   000570 BMCOMB    0003   000571 BMFEAT    0003   000567 BMFLG
    0003   001354 CAM       0003   000000 CATFLG    0003   000001 CATNAM    0003   000572 CDATE     0003   000076 CLSNAM
    0003   000460 CLSSUB    0003   001075 CON       0003   001341 CROP      0003   001366 CRPKEY    0003   001336 DESKEY
    0003   001340 DESOTH    0003   001337 DESUNI    0003 I 000564 EMPTRS    0003   001175 FETVC2    0003 I 000575 FIELD2
    0003 I 000600 FIELD3    0003   001334 FILTER    0003 I 001171 FLDKEY    0003 I 000574 FLDSV2    0003 I 000577 FLDSV3
    0003   001001 HIGH      0000   000020 INJPS     0003   001237 KATNO     0003   001367 KEPPTS    0003   001335 MAPFMT
    0003   001333 NOCAT     0003   001236 NOCLS2    0003   001174 NOFET2    0003 I 001172 NOFLD2    0003 I 001173 NOFLD3
    0003   000554 NOMAP     0003   001233 NOSUB2    0003   000556 NOSUB3    0003   001234 NOTRFD    0003   000557 PCFDKY
    0003 I 000602 PCTID3    0003 I 000566 PLTKEY    0003   001345 SITE      0003   000563 STATKY    0003   000364 SUBCAT
    0003   000173 SUBNAM    0003   000270 SUBNO     0003   000677 SYMMTX    0003   000603 THRES     0003 I 000562 THRSKY
    0003   000565 THRSVA    0003   001235 TOTVT2    0003   000555 TOTVT3    0003   000561 TRNKEY    0003 I 000560 TSTKEY
    0003 I 000576 VERTX2    0003 I 000601 VERTX3


00100      1*      C     //DSPLAY
```

```
00101     2•          SUBROUTINE DSPLAY(ARRAY,TOP)
00101     3•     C                                                              SUP30020
00103     4•          IMPLICIT INTEGER (A-H,O-Z)                                SUP30030
00103     5•     C                                                              SUP30040
00103     6•     C                                                              SUP30050
00104     7•          DIMENSION ARRAY(1)
00104     8•     C                                                              SUP30070
00104     9•     C                                                              SUP30080
00104    10•     CI-------------------------------------------------------------ISUP30090
00104    11•     CI-------------------------------------------------------------ISUP30100
00104    12•     CI                                                             ISUP30110
00104    13•     CI    CALL..    CALL DSPLAY(ARRAY,TOP)
00104    14•     CI                                                             ISUP30130
00104    15•     CI    ARGS..    ARRAY -  SFE 'MONTOR'                          ISUP30140
00104    16•     CI              TOP   -  SFE 'MONTOR'                          ISUP30150
00104    17•     CI                                                             ISUP30160
00104    18•     CI    PURPOSE..COORDINATES ROUTINES FOR DISPLAYING CLASSIFICATION
00104    19•     CI             MAP AND PERFORMANCE TABLES.
00104    20•     CI                                                             ISUP30230
00104    21•     CI-------------------------------------------------------------ISUP30240
00104    22•     CI-------------------------------------------------------------ISUP30250
00104    23•     C                                                              SUP30260
00105    24•          INCLUDE CM8410,LIST
00105    25•     C•
00105    26•     C•   SETUP3 WILL READ FIRST 2 RECORDS FROM MAPTAP, AND CALL REDIF3
00105    27•     C•   TO READ IN CONTROL CARDS.  ALL OF THE PARAMETERS IN COMMON BLOCK
00105    28•     C•   DISPL ARE INITIALIZE BEFORE RETURNING TO THIS ROUTINE IN ADDITION
00105    29•     C•   TRAINING AND/OR TEST FIELD DEFINITIONS WILL BE STORED IN 'ARRAY'
00105    30•     C•
00106    30•          COMMON/DISPL/CATFLG,CATNAM(61),CLSNAM(61),SUBNAM(61),SUBNO(60),
00106    30•         •             SUBCAT(60),CLSSUB(60),NOMAP,TOTVT3,NOSUB3,
00106    30•         •             PCFOKY,TSTKEY,TRNKEY,THRSKY,STATKY,EMPTRS,THRSVA,
00106    30•         •             PLTKEY,BMFLG,BMCOMB,BMFEAT,COATE(2),
00106    30•         •             FLDSV2,FIELD2,VERTX2,FLDSV3,FIELD3,VERTX3,PCTID3,
00106    30•         •             THRES(60),SYMMTX(66),HIGH(60),CONF(60)
00106    30•         •             ,FLDKEY,NOFLD2,NOFLD3,NOFET2,FETVC2(30)
00106    30•         •             ,NOSUB2,NOTRFD,TOTVT2,NOCLS2
00106    30•         •             ,CATNO(60),NOCAT,FILTER,MAPFMT
00106    30•         •             ,DESKEY,DESUNI,DESOTH,CROP ,ACROP,AOTHER,ATOTAL
00106    30•         •             ,SITE(4),ANALYS(3),CAM(10),CRPKEY,KEPPTS(60)      •NEW
00107    30•          END                                                           ••-1
00110    31•          CALL SETUP3(ARRAY,TOP)
00110    32•     C•
00110    33•     C•   DSPLY1 WILL READ NEXT 2 RECORDS FROM MAPTAP AND PRINT THE
00110    34•     C•   STATISTICS IF REQUESTED.
00110    35•     C•
00111    36•          CALL DSPLY1
00112    37•          IF(EMPTRS.NE.2.AND. PLTKEY.NE.1)GO TO 30
00112    38•     C•
00112    39•     C•   EMTHRS COMPUTES AND PLOTS THE HISTOGRAM OF THE QUADRATIC FORM
00112    40•     C•   FOR THE CORRECTLY CLASSIFIED PIXELS WITHIN THE TRAINING OR TEST
00112    41•     C•   FIELDS.
00112    42•     C•
00114    43•          IF(FLDKEY.EQ.1)GO TO 10
00116    44•          WRITE(6,100)
00120    45•          GO TO 30
00121    46•        10 CONTINUE
00122    47•          IF(TSTKEY.EQ.1)CALL EMTHRS(ARRAY(FLDSV3),ARRAY(FIELD3),
00122    48•         •                           ARRAY(VERTX3),NOFLD3)
00124    49•          IF(TSTKEY.NE.1)CALL EMTHRS(ARRAY(FLDSV2),ARRAY(FIELD2),
00124    50•         •                           ARRAY(VERTX2),NOFLD2)
00126    51•        30 CONTINUE
00126    52•     C-                                                             •NEW
```

```
00126      C-    TEST THRSKY = 4  FOR FISHER F-DISTRIBUTION THRESHOLDS          *NEW
00126      C-    CALL FOIST TO COMPUTE AND STORE THRESHOLDS                     *NEW
00126      C-                                                                   *NEW
00127             IF(THRSKY.EQ.4) CALL FOIST                                    *NEW
00127      C-                                                                   *NEW
00127      C*
00127      C*    DSPLY2 PAINTS THE MAP AND CALLS PCT TO BUILD PERFORMANCE TABLES.
00127      C*
00131             CALL DSPLY2(ARRAY(FLDSV2),ARRAY(FIELD2),ARRAY(VERTX2),
00131            *            ARRAY(FLDSV3),ARRAY(FIELD3),ARRAY(VERTX3),
00131            *            ARRAY(PCTID3))
00131      C*
00131      C*    PRTPCT PRINTS THE PERFORMANCE TABLES
00131      C*
00132             IF(TSTKEY.EQ.1)CALL PRTPCT(ARRAY(FLDSV3),ARRAY(PCTID3),NOFLD3)
00134             IF(TSTKEY.NE.1)CALL PRTPCT(ARRAY(FLDSV2),ARRAY(PCTID3),NOFLD2)
00136             RETURN
00137        100 FORMAT(/'  **DISPLAY** - FIELDS MUST BE DEFINED FOR SUBCLASSES FOR
00137            * EMPIRICAL THRESHOLDS'/)
00140             END                                                  SUP30740

   END OF COMPILATION:        NO  DIAGNOSTICS.
 DSPLAY         SYMBOLIC            16 AUG 76  14:15:06   0  01700162   14    66  (DELETE
 DSPLAY   CODE  RELOCATABLE         16 AUG 76  14:15:06   1  01702016   36     1  (DELETE
                                                          8  01702062   14    22
```

```
0    FOR    FDIST,FDIST                                                    03 NOV 76          16:
UNIVAC 1100 FORTRAN V EXEC II LEVEL 25A  -(EXEC8 LEVEL E12010010A)
THIS COMPILATION WAS DONE ON 03 NOV 76 AT 16:36:43

   SUBROUTINE FDIST     ENTRY POINT 000077

   STORAGE USED: CODE(1) 000103; DATA(0) 000136; BLANK COMMON(2) 000000

    COMMON BLOCKS:

    0003   DISPL  001463

   EXTERNAL REFERENCES (BLOCK, NAME)

    0004   FISHIN
    0005   NMDU8
    0006   NIO2S
    0007   NERR3S

   STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0000   000101 11F       0001   000005 11DG      0001   000013 11SG      0001   000059 1SL       0001   000064 20L
    0003   001342 ACROP     0003   001351 ANALYS    0003   001343 AOTHER    0003   001344 ATOTAL    0003   000570 BMCOMB
    0003   000571 BMFEAT    0003   000567 BMFLG     0003   001354 CAM       0003   000000 CATFLG    0003   000001 CATNAM
    0003   000572 CDATE     0003   000076 CLSNAM    0003   000460 CLSSUB    0003   001075 CON       0003   001341 CROP
    0003   001366 CRPKEY    0003   001336 DESKEY    0003   001340 DESOTH    0003   001337 DESUNI    0003   000564 EMPTRS
    0000 R 000000 F         0003   001175 FETVC2    0003   000575 FIELD2    0003   000600 FIELD3    0003   001334 FILTER
    0004 R 000000 FISHIN    0000 R 000100 FX        0003   001171 FLDKEY    0003   000574 FLDSV2    0003   000577 FLDSV3
    0000 R 000075 FX        0003   001001 HIGH      0000 I 000074 I         0000   000126 INJP2     0003   001237 KATNO
    0003 I 001367 KEPPTS    0003   001335 MAPFMT    0003   001333 NDCAT     0003   001236 NDCL52    0003 I 001174 NDFET2
    0003   001172 NDFLD2    0003   001173 NDFLD3    0003   000554 NDMAP     0003 I 001233 NDSUB2    0003   000556 NDSUB3
    0003   001234 NDTRFD    0000 I 000076 NS        0003   000557 PCFDKY    0003   000602 PCTID3    0003   000566 PLTKEY
    0003   001345 SITE      0003   000563 STATKY    0003   000364 SUBCAT    0003   000173 SUBNAM    0003   000270 SUBNO
    0003   000677 SYMMTX    0003 R 000603 THRES     0003   000562 THRSKY    0003   000565 THRSVA    0003   001235 TOTVT2
    0003   000555 TOTVT3    0003   000561 TRNKEY    0003   000560 TSTKEY    0000 R 000077 VAR       0003   000576 VERTX2
    0003   000601 VERTX3

00101      1•            SUBROUTINE FDIST
00101      2•      C-
00101      3•      C-   ROUTINE TO USE FISH TO GET THRESHOLD VALUES
00101      4•      C-
00103      5•            DIMENSION F'60)
00103      6•      C-
00104      7•            INCLUDE CMBK10,LIST
00104      8•      C-
00104      9•      C-    NOSUB2 = NUMBER OF SUBCLASSES
00104     10•      C-   THRES(I) CONTAINS INPUT CONFIDENCE LEVELS
00104     11•      C-
00104     12•      C-
00105     12•            COMMON/DISPL/CATFLG,CATNAM(61),CLSNAM(61),SUBNAM(61),SUBNO(60),
00105     12•           •             SUBCAT(60),CLSSUB(60),NDMAP,TOTVT3,NOSUB3,
00105     12•           •             PCFDKY,TSTKEY,TRNKEY,THRSKY,STATKY,EMPTRS,THRSVA,
00105     12•           •             PLTKEY,BMFLG,BMCOMB,BMFEAT,CDATE(2),
00105     12•           •             FLDSV2,FIELD2,VERTX2,FLDSV3,FIELD3,VERTX3,PCTID3,
00105     12•           •             THRES(63),SYMMTX(66),HIGH(60),CON(60)
```

```
00105     12*          *              ,FLOKEY,NOFLD2,NOFLD3,NOFET2,FETVC2(30)
00105     12*          *              ,NOSUB2,NOTAFD,TOTVT2,NOCLS2
00105     12*          *              ,KATNO(60),NOCAT,FILTER,MAPFAT
00105     12*          *              ,DESKEY,DESUN1,DESOTH,CROP  ,ACROP,AOTHER,ATOTAL
00105     12*          *              ,SITE(4),ANALYS(3),CAM(10),CAPKEY,KEPPTS(60)                    *NEW
00106     12*           END                                                                            **-1
00107     13*           DO 10 I=1,NOSUB2
00112     14*        10 F(I)=1-THRES(I)
00112     15*     C-
00112     16*     C-     NI = NUMBER OF SAMPLES
00112     17*     C- NOFET2 = NUMBER OF CHANNELS
00112     18*     C-
00112     19*     C-   COMPUTE THRESHOLD VALUES USING FISHER F-DISTRIBUTION FUNTION
00112     20*     C-
00114     21*           DO 20 I=1,NOSUB2
00117     22*           FX = KEPPTS(I)
00120     23*           NS=KEPPTS(I)-NOFET2
00120     24*     C-
00120     25*     C-
00120     26*     C-
00121     27*           VAR=FISHIN(F(I),NOFET2,NS,$15)
00121     28*     C-
00122     29*           FX =(NOFET2*(FX-1)*(FX+1))/(NS*FX)
00122     30*     C-
00123     31*           THRES(I) = FX*VAR
00123     32*     C-
00124     33*           GO TO 20
00124     34*     C-
00124     35*     C-
00124     36*     C-
00124     37*     C-   THRESHOLD WILL BE SET TO 999,999 IF OVERFLOW OCCURS IN FISHIN.
00124     38*     C-
00125     39*        15 THRES(I)=999.999
00126     40*           WRITE(6,11)I
00131     41*        11 FORMAT(6X,'FDIST- OVERFLOW CONDITION IN FISHIN ROUTINE FOR SUBCLAS
00131     42*          1S=',I4,'. THRESHOLD SET TO 999.999')
00131     43*     C-
00131     44*     C-
00132     45*        20 CONTINUE
00132     46*     C-
00134     47*           RETURN
00135     48*           END

      END OF COMPILATION:        NO  DIAGNOSTICS.
```

```
0     MAP,*  LARSAA,LARSAA                                                    03 NOV 76          16:37

-12,12

E  SEG  DSPLAY-DISPL-*(DSPLY1,DSPLY2,SETUP3),EMTHRS,PRTPCT,FDIST)

    1.         BLK  BMTRX,SCRACH
    2.          BLK  PASS,CLASS,DISPL,FSL,DVNBLK,GRCBLK,STBASE,STCBLK,TABLCK
    3.          SEG  MONTOR-A-*(B,C,D,E,F,G,H,I)
    4.       A  SEG  *(TAPERD,CROSTA,A1,GRPSCN,WRTFLD)
    5.       A1 SEG REOSAV-SAVFIL-CLSCHK-REODAT
    6.       B  SEG  HIST-GRAYMP-GRCBLK-*(SETUP5,SETUP6,HISTGR,PICT)
    7.       C  SEG  STAT-STBASE-STCBLK-*(SETUP1,C)
    8.       C1 SEG  LEARNN-*(CLSSPC,COVARR)
    9.       D  SEG  CLSFY-BMTRX-SCRACH-CLASS-*(DA,D1,SETUP2)
   10.       DA  SEG  CLSFY1-MCHLSK-THRESH-FALSY-GGG-GJR-RELERR
   11.       D1 SEG  CLSFY2-CONTEX-CATGRY
   12.       E  SEG  DSPLAY-DISPL-*(DSPLY1,DSPLY2,SETUP3,EMTHRS,PRTPCT,FDIST)                *NEW
   13.       F  SEG  SELECT-DIVERG-TRACE-COLINV-F1-FSL-DVNBLK-*(F2,PRELIM,)                  **-1
   14.              EXSRCH,WHRPLC,F4,USERIN,GENRPT,EVLFET,PLOT)
   15.       F1 SEG GTSTAT-EVALSP-*(AVEDIV,TRNDIV,BHTCHR,TRNCLS)
   16.       F2  SEG  SETUP4-*(WGTSCN,WGTCHK,PRTFLD)
   17.       I  SEG  DATATR-TRSTAT-TABLCK-TRANSF-FLOATR-*(MAKMAT,TRHIST,LNTRAN,;
   18.                 SETUP8,KBTRAN,SETUP9,TRANTX)
   19.       F4 SEG DAVION-*(DAVON1,DAVON2,DAVON3)
   20.       G  SEG  ISOCLS-PRINT-ROMEAN-PASS-*(SETUP7,ISODAT,COVAR1,;
   21.              TWRITE,PCHST1,CHAIN,RODATA,OSTAPE)
   22.       H   SEG SIGEST

MAP LCC 1104 0036
    LARSAA           SYMBOLIC                          16 AUG 76  14:13:47   0  01457666    14     22  (DELETED)
    LARSAA  CODE     PROCESSED MAP                     16 AUG 76  14:13:47   1  01460352  1896      1  (DELETED)
                                                                            62  01464122    12      1
```

```
@     FOR,* REDIF3,REDIF3                                          03 NOV 76          16:3
UNIVAC 1108 FORTRAN V EXEC II LEVEL 25A  -(EXEC8 LEVEL E120100108)
THIS COMPILATION WAS DONE ON 03 NOV 76 AT 16:36:45

-153,153

C-    -- SET THRESHOLD KEYS FOR EMPERICAL THRESHOLDING,TURN OTHERS OFF

  395 THRSVA=0

      EMPTRS=2

-159,159

C-    -- SET THRESHOLD KEYS FOR CHI SQUARE THRESHOLDING,TURN OTHERS OFF

  397 EMPTRS=0

      THRSVA=0

      THRSKV=1

-164,164

C-    -- SET THRESHOLD KEYS FOR INPUT-VALUE THRESHOLDING,TURN OTHERS OFF

  398 EMPTRS=0

      THRSVA=3

-167,167

C-    CHECK FOR FISHER OR FILTER

  399 COL=COL+1

      M=NXTCHR(CARD2,COL)

      IF(M.EQ.'L') GO TO 3990

      IF(M.EQ.'S') GO TO 3991

      GO TO 315

 3990 FILTER=1

      GO TO 390

C-

 3991 IX=0

      DO 3995 I=1,NRSUB2

      IF(KEPPTS(I).GT.NOFET2)GO TO 3995

      IF(IX.NE.0)GO TO 3993

      WRITE(6,3992)

 3992 FORMAT(1H0,////)
```

```
      I6=1
 3993 WRITE(6,3994)II,KEPPTS,NOFET2
 3994 FORMAT(' *****   FISHER THRESHOLD REQUESTED-NOT PERFORMED',/,8X,
     1'... NO. SAMPLES FOR SUBCLASS',I6,'(=',I6,') IS LESS THAN OR EQUAL
     2 TO NUMBER OF CHANNELS (=', I6,')',/)
 3995 CONTINUE
      IF(II.EQ.0)GO TO 3996
      WRITE(6,3992)
      GO TO 390
C-
C-   -- SET THRESHOLD KEYS FOR  FISHER   THRESHOLDING,TURN OTHERS OFF
 3996 EMPTRS=0
      THRSVA=0
      THRSKY=9
C-
C-
-269,269
C-
C-   BYPASS IF NOT EQUAL TO 1 OR 2.
C-
      IF(THRSKY.GT.2) GO TO 830
C-

   SUBROUTINE REDIF3    ENTRY POINT 001437

   STORAGE USED: CODE(1) 001452; DATA(0) 000545; BLANK COMMON(2) 000000

    COMMON BLOCKS:

    0003   DISPL  001463
    0004   GLOBAL 000075

   EXTERNAL REFERENCES (BLOCK, NAME)

    0005   CHIN
    0006   NXTCHR
    0007   FIND
    0010   FLTNUM
    0011   LAREAD
```

```
0012   CMERR
0013   NRQU6
0014   N1016
0015   N1026
0016   NWQU6
0017   NERR25
0020   NERR35
```

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

```
0001   000047 10L      0001   000134 100L     0000   000116 104F     0001   000166 110L     0001   001376 1400L
0000   000331 14000F   0001   001403 1500L    0000   000344 15002F   0001   000041 176G     0001   000203 200L
0000   000123 201F     0001   000056 211G     0001   000071 221G     0001   000100 230G     0001   000211 260G
0001   000225 270G     0001   000262 300G     0001   000216 300L     0000   000120 304F     0001   000253 315L
0000   000325 3152F    0001   000267 340L     0001   000403 354G     0001   000272 360L     0001   000431 371G
0001   000275 380L     0001   000317 385L     0001   000320 390L     0001   000332 395L     0001   000340 397L
0001   000345 398L     0001   000353 399L     0001   000373 3990L    0001   000376 3991L    0000   000163 3992F
0001   000422 3993L    0000   000165 3994F    0001   000437 3995L    0001   000451 3996L    0001   000456 400L
0001   000503 420G     0001   000516 430G     0001   000531 440G     0001   000544 447G     0001   000557 456G
0001   001010 554G     0001   000475 600L     0000   000222 601F     0001   001162 633G     0001   001227 657G
0001   000510 710L     0001   000523 720L     0001   000536 730L     0001   001412 734G     0001   000561 740L
0001   000564 750L     0001   000614 760L     0001   000623 770L     0000   000226 772F     0001   000656 773L
0001   000710 780L     0001   000724 781L     0001   000760 800L     0001   001036 825L     0001   001025 826L
0000   000236 827F     0001   001040 830L     0001   001045 840L     0001   001142 850L     0000   000267 851F
0000   000271 853F     0001   001201 854L     0001   001207 460L     0000   000311 862F     0001   001246 863L
0001   001252 865L     0001   001315 870L     0000   000224 9998F    0003 R 001342 ACROP    0000 * 001351 ANALYS
0003 R 001343 AOTHER    0004   000073 ASAV     0004   000374 ASAVFL   0003 R 001344 ATOTAL   0000 I 000051 BLANK
0003 I 000570 BMCOMB    0003   000571 BMFEAT   0004   000365 BMFILE   0003 I 000567 BMFLG    0004   000056 BMKEY
0000 I 000040 C         0003   001364 CAM      0000 I 000101 CAMS     0000   000360 CARD1    0000 I 000372 CARD2
0003   000006 CATFLG    0003   000001 CATNAM   0003   000572 CDATE    0005 R 000000 CHIN     0000 I 000112 CLSIND
0003 I 000076 CLSNAM    0003 I 000460 CLSSUB   0000 I 000031 CODATO   0000 I 000075 CODE     0000 I 000076 COL
0004 I 000037 COMENT    0000 I 000052 COMMA    0003 I 000020 CONVEC   0003   001075 CON      0003 I 001341 CROP
0003 I 001366 CRPKEY    0004   000053 DATAPE   0004 I 000016 DATE     0004   000071 DATFIL   0003 I 001336 DESKEY
0003   001340 DESOTH    0000 I 000057 DESSYM   0003   001337 DESUNI   0004   000067 DRMJDS   0004   000066 DRUMAD
0000 I 000055 DUPSYM    0003 I 000564 EMPTRS   0000 I 000047 ENDACO   0000 I 000043 EQUCOM   0004   000062 ERIPTP
0004   000063 ERPKEY    0003   001175 FETVC2   0003   000575 FIELD2   0003   000600 FIELD3   0003 I 001334 FILTER
0007 I 000000 FIND      0003   001171 FLDKEY   0003   000574 FLDSV2   0003   000577 FLDSV3   0010 I 000000 FLTNUM
0000 I 000064 GAPTR     0004   000000 HEAD     0004 I 000022 HED1     0004 I 000023 HED2     0003 R 001001 HIGH
0004   000057 HISFIL    0004   000060 HISKEY   0000 I 000073 I        0000 I 000103 IBIT     0000 I 000104 IC
0000 I 000110 ICK       0000 I 000022 INF      0000   000516 INJPS    0000 I 000001 INTAPE   0000 I 000107 IPT
0000 I 000100 IX        0000 I 000102 J        0003   001237 KATNO    0003 I 001367 KEPPTS   0000 I 000061 L
0011 I 000000 LAREAD    0000 I 000071 LOGSWT   0003 I 000077 M        0003 I 001335 MAPFMT   0004   000052 MAPTAP
0004   000064 MAPUNT    0000 I 000106 MZ       0000 I 000114 NAME     0000 I 000105 NDEGR    0003   001333 NOCAT
0003 I 001236 NOCLS2    0003 I 001174 NOFET2   0004   000065 NOFILE   0003   001172 NOFLO2   0003 I 001173 NOFLO3
0000 I 000045 NOSRP     0003 I 000554 NOMAP    0003 I 001233 NOSUB2   0003 I 000556 NOSUB3   0003 I 001234 NOTAFD
0000 I 000111 NV        0006 I 000000 NRTCHR   0003 I 000552 OPT      0000 I 000046 OPTNUM   0004   000070 PAGSIZ
0000 I 000072 PCCLKV    0003 I 000557 PCFDKV   0003   000542 PCTID3   0003 I 000566 PLTKEY   0004   000054 SAVTAP
0003 I 001345 SITE      0004   000072 STAFIL   0003 I 000563 STATKV   0000 I 000063 STOPFG   0003   000364 SUBCAT
0000 I 000113 SUBIND    0003 I 000173 SUBNAM   0003   000270 SUBND   0000 I 000062 SYMCNT   0000 I 000074 SYMMAX
0003 I 000677 SYMMTX    0000 I 000115 TEST     0003 R 000603 THRES    0003 I 000562 THRSKV   0003 I 000565 THRSVA
0000 I 000056 THRSYM    0000 I 000050 TKSBCD   0003 I 000567 TMSCNT   0003   001235 TOTVT2   0003 I 000555 TOTVT3
0004   000061 TRFORM    0003 I 000561 TRNKEY   0000 I 000553 TRNSYM   0000 I 000070 TSTCNT   0003 I 000560 TSTKEY
0000 I 000054 TSTSYM    0000 I 000066 TYPE     0003   000576 VERTX2   0003   000601 VERTX3   0000 R 000000 X
```

```
00100      1*      C     //REQIF3                                                    REQ30000
00101      2*            COMPILER (DATA=SHORT)                                     REQ30010
00103      3*            SUBROUTINE REQIF3(TSTSAV,TSTFLD,TSTVER,VDIM)
00105      4*            IMPLICIT INTEGER (A-H,O-Z)                                REQ30050
00105      5*      C|----------------------------------------------------------------|REQ30060
```

```
00105     6.    C*---------------------------------------------------------------------*RED30070
00105     7.    C*                                                                     *RED30240
00105     8.    C*    PURPOSE.. READS AND ANALYZES SUPERVISOR CONTROL CARDS             *RED30250
00105     9.    C*              FOR ' DISPLAY'                                          *RED30260
00105    10.    C*                                                                     *RED30270
00105    11.    C*                                                                     *RED30290
00105    12.    C*---------------------------------------------------------------------*RED30300
00105    13.    C*---------------------------------------------------------------------*RED30310
00105    14.    C                                                                       RED30320
00105    15.    C                                                                       RED30330
00105    16.    C                                                                       RED30340
00105    17.    C                                                                       RED30350
00106    18.          EQUIVALENCE     (HED1(1),HEAD(3)), (DATE(1),HEAD(15)),            RED30580
00106    19.         1                (HED2(1),HEAD(20)),(COMENT(1),HEAD(32))           RED30590
00106    20.    C                                                                       RED30600
00106    21.    C     ----------------------------------------------------------------RED30610
00107    22.          INCLUDE CMBK10,LIST
00110    22.          COMMON/DISPL/CATFLG,CATNAM(61),CLSNAM(61),SUBNAM(61),SUBNO(60),
00110    22.         *             SUBCAT(60),CLSSUB(60),NOMAP,TOTVT3,NOSUB3,
00110    22.         *             PCFOKY,TSTKEY,TANKEY,THRSKY,STATKY,EMPTRS,THRSVA,
00110    22.         *             PLTKEY,BMFLG,BMCOMB,BMFEAT,CDATE(2),
00110    22.         *             FLDSV2,FIELD2,VERTX2,FLDSV3,FIELD3,VERTX3,PCTID3,
00110    22.         *             THRES(60),SYMMTX(66),HIGH(60),CON(60)
00110    22.         *             ,FLDKEY,NOFLD2,NOFLD3,NOFET2,FETVC2(30)
00110    22.         *             ,NOSUB2,NOTAFD,TOTVT2,NOCLS2
00110    22.         *             ,KATNO(60),NOCAT,FILTER,MAPFMT
00110    22.         *             ,DESKEY,DESUNI,DESOTH,CROP ,ACROP,AOTHER,ATOTAL
00110    22.         *             ,SITE(4),ANALYS(3),CAM(10),CRPKEY,KEPPTS(60)              *NEW
00111    22.          END                                                                   ***1
00112    23.          REAL HIGH,CMIN
00113    24.          REAL ACROP,AOTHER,ATOTAL,X
00113    25.    C                                                                       RED30720
00114    25.          REAL THRES
00115    27.          DATA INTAPE/5/
00117    28.          DIMENSION TSTSAV(4,200),TSTFLD(5,200),TSTVFR(VDIM),
00117    29.         *          OPT(14),COMVEC(2),INF(7)
00117    30.         3,CODBCO(10),EQUCOM(3),CARD2(62),CARD1(80)
00117    31.         4 ,          COMENT(10), DATE(2), HED1(10), HED2(10)           RED30770
00117    32.    C                                                                       RED30780
00120    33.          DATA OPT/'SYMBOL','SITE','OPTION','THRESH','ANALYS','COMMEN',
00120    34.         *          'HED1  ','HED2','DATE  ','PROCED','ACREAG','*END* ',
00120    35.         *          'FORMAT','CROP'/
00122    36.          DATA OPTNUM/12/,ENDBCO/'$END*'/,THSBCO/'THRS'/,BLANK/' '/,
00122    37.         1  COMMA/','/,CODBCO/' ','S','O','P','N','E','C','T','F'/
00122    38.         2 ,     EQUCOM/2,'=',','/, COMVEC/1,','/                    RED30830
00122    39.    C                                                                       RED30840
00133    40.          DATA SYMMTX/'1','2','3','4','5','6','7','8','9','A','B','C','D',
00133    41.         1             'E','F','G','H','I','J','K','L','M','N','O','P','Q',
00133    42.         2             'R','S','T','U','V','W','X','Y','Z','*','#','Δ','/',
00133    43.         3             '-','+','*','$','@','=','0','?','>','<',')','(',';',
00133    44.         4             '!',' ','!',' ',1H','.','.','.',' ' /
00135    45.          DATA TRNSYM,TSTSYM,DUPSYM,THRSYM/'*','*','$',' '/
00142    46.          DATA DESSYM/'#'/
00144    47.          DATA C,L/'C','L'/
00147    48.          INCLUDE  COMBK6,LIST
00150    48.          COMMON/GLOBAL/HEAD(42),MAPTAP,DATAPE,SAVTAP,BMFILE,BMKEY,
00150    48.         *             HISFIL,HISKEY,TRFORM,ERIPTP,FRPKEY,MAPUNT,NOFILE,
00150    48.         *    DRUMAD,DRMWDS,PAGSIZ,DATFIL,STAFIL,ASAV,ASAVEL
00151    48.          END
00152    49.          EQUIVALENCE  (CARD2(1),CARD1(11))                                RED30860
00152    50.    C                                                                       RED30870
00152    51.    C     ----------------------------------------------------------------RED30880
00152    52.    C     ----------------------------------------------------------------RED30890
```

```
00152     C                                                                      RED30900
00152     C       INIZ                                                          'RED30910
00152     C       -------------------------------------------------------------RED30920
00152     C                                                                      RED30930
00153              MAPFMT = 0
00154              NOMAP=1
00155              FILTER=0
00156              THRSVA = 0
00157              EMPTRS = 0
00160              SYMCNT = 0                                                    RED30940
00161              THRSKY=0
00162              STOPFG = 0                                                    RED30950
00163              GRPTR = 0                                                     RED30960
00164              NOSHP = 0                                                     RED30970
00165              NOTRED = 0                                                    RED30980
00166              TYPE=0
00167              CAPKEV=0
00170              THSCNT=0                                                      RED30990
00171              DESKEY=0
00172              TSTCNT = 0                                                    RED31000
00173              LOGSWT = 0                                                    RED31010
00174              PCCLKY = 1                                                    RED31050
00175              DO 6 I=1,SYMMAX                                               RED31060
00200              THRES(I) = 0                                                  RED31080
00201            6 CONTINUE
00203              NOFLD3=200
00204              SYMMAX=60
00205           10 CONTINUE
00205     C                                                                      RED31190
00205     C                                                                      RED31200
00205     C       READ IN SUPERVISON CARDS                                       RED31210
00205     C       -------------------------------------------------------------RED31220
00205     C                                                                      RED31230
00206           15 READ(INTAPE,104)  CODE.CARD2                                  RED31260
00215          104 FORMAT (A6,4X,62A1)                                           RED31270
00216           17 WRITE(6,304)      CODE,CARD2                                  RED31280
00225          304 FORMAT (T7,A6,4X,62A1)                                        RED31290
00226           19 COL = 0                                                       RED31300
00227              DO 20 I=1,14
00232           20 IF(OPT(I) .EQ. CODE)GO TO(100,200,300,400,600,710,720,730,
00232            *     740,760,770,800,750,780),I
00235              GOTO 1500                                                     RED31340
00235     C                                                                      RED31350
00235     C       GET SYMBOLS                                                    RED31360
00235     C       -------------------------------------------------------------RED31370
00235     C                                                                      RED31380
00236          100 IF ( SYMCNT .GE. SYMMAK ) GOTO 10                             RED31390
00240              SYMCNT = SYMCNT+1                                             RED31400
00241              SYMMTX(SYMCNT) = BLANK                                        RED31410
00242              M = NXTCHR(CARD2,COL)                                         RED31420
00243              IF ( M .EQ. BLANK ) GO TO 10                                  RED31430
00245              IF ( M .EQ. COMMA) GO TO 100                                  RED31440
00247              SYMMTX(SYMCNT) = CARD2(COL)                                   RED31450
00250          110 M = NXTCHR(CARD2,COL)                                         RED31460
00251              IF ( M .EQ. BLANK ) GO TO 10                                  RED31470
00253              IF ( M .NE. COMMA ) GO TO 110                                 RED31480
00255              GO TO 100                                                     RED31490
00255     C*
00255     C*      SITE NAME
00255     C*
00256          200 READ(30,201)SITE
00264          201 FORMAT(6X,4A4)
00265              GO TO 10
```

```
00265   C                                                            RED31890
00265   C      SCAN  OPTION CARD                                     RED31900
00265   C      ----------------------                                RED31910
00265   C                                                            RED31920
00266     300 M = NXTCHR(CARD2,COL)                                  RED31930
00267         DO 310   I=1,9
00272     310 IF (M .EQ. CODBCD(I)) GO TO (10,340,360,380,385,395,
00272        *   397,398,399),I
00275    315  WRITE(6,3152)  CODE, CARD2
00304    3152 FORMAT(//// 5X,'****  DSPLAY/REDIF3  ---  ERROR IN  ''OPTION''  CA
00304        1RD  ...'//5X,2H'',A6,4X,62A1,2H''//5X,'****  SCAN OF THIS CARD DIS
00304        2CONTINUED  ---  PROCEEDING TO NEXT CARD  ****' ///)
00305         GO TO 10                                               RED31980
00305   C     ---------                                              RED32050
00305   C                                                            RED32060
00306     340 STATKY = 1                                             RED32070
00307         GO TO 390                                              RED32080
00307   C     ---------                                              RED32090
00307   C                                                            RED32100
00310     360 TRNKEY = 1                                             RED32110
00311         GO TO 390                                              RED32120
00311   C     ---------                                              RED32130
00311   C                                                            RED32140
00311   C                                                            RED32150
00312     380 M=NXTCHR(CARD2,COL)
00313         IF(M.EQ.C)PCFDKY=1
00315         IF(M.EQ.L)PLTKEY=1
00317         GO TO 390
00317   C     -----
00317   C
00320     385 NOMAP=0
00320   C     ---------                                              RED32170
00320   C                                                            RED32180
00321     390 M = FIND(CARD2,COL,EQUCOM)                             RED32190
00322         IF ( M .LE. 0 ) GO TO 10                               RED32200
00324         GO TO 300                                              RED32210
00324   C
00324   C-   -- SET THRESHOLD KEYS FOR EMPERICAL THRESHOLDING,TURN OTHERS OFF     *NEW
00325     395 THRSVA=0                                                            *NEW
00326         EMPTRS=2                                                            *NEW
00327         THRSKY=2                                                            **-1
00330         GO TO 390
00330   C
00330   C     ---------------
00330   C
00330   C-   -- SET THRESHOLD KEYS FOR CHI SQUARE THRESHOLDING,TURN OTHERS OFF    *NEW
00331     397 EMPTRS=0                                                            *NEW
00332         THRSVA=0                                                            *NEW
00333         THRSKY=1                                                            *NEW
00334         GO TO 390                                                           **-1
00334   C
00334   C     --------------
00334   C
00334   C-   -- SET THRESHOLD KEYS FOR INPUT-VALUE THRESHOLDING,TURN OTHERS OFF   *NEW
00335     398 EMPTRS=0                                                            *NEW
00336         THRSVA=3                                                            *NEW
00337         THRSKY=3                                                            **-1
00340         GO TO 390
00340   C-    CHECK FOR FISHER OR FILTER                                          *NEW
00341     399 COL=COL+1                                                           *NEW
00342         M=NXTCHR(CARD2,COL)                                                 *NEW
00343         IF(M.EQ.'L') GO TO 3990                                             *NEW
00345         IF(M.EQ.'S') GO TO 3991                                             *NEW
```

```
00347         GO TO 315                                                    *NEW
00350    3990 FILTER=1                                                     *NEW
00351         GO TO 390                                                    *NEW
00351   C-                                                                 *NEW
00352    3991 IX=0                                                         *NEW
00353         DO 3995 I=1,NOSUB2                                           *NEW
00356         IF(KEPPTS(I).GT.NOFET2)GO TO 3995                            *NEW
00360         IF(IX.NE.0)GO TO 3993                                        *NEW
00362         WRITE(6,3992)                                                *NEW
00364    3992 FORMAT(1H0,////)                                             *NEW
00365         IX=1                                                         *NEW
00366    3993 WRITE(6,3994)I,KEPPTS,NOFET2                                 *NEW
00376    3994 FORMAT(' *****   FISHER THRESHOLD REQUESTED-NOT PERFORMED',/,8X,   *NEW
00376        1'... NO. SAMPLES FOR SUBCLASS',I6,'(=',I6,') IS LESS THAN OR EQUAL *NEW
00376        2 TO NUMBER OF CHANNELS (=', I6,')',/)                        *NEW
00377    3995 CONTINUE                                                     *NEW
00401         IF(IX.EQ.0)GO TO 3996                                        *NEW
00403         WRITE(6,3992)                                                *NEW
00405         GO TO 390                                                    *NEW
00405   C-                                                                 *NEW
00405   C-   -- SET THRESHOLD KEYS FOR  FISHER   THRESHOLDING,TURN OTHERS OFF  *NEW
00406    3996 EMPTRS=0                                                     *NEW
00407         THRSVA=0                                                     *NEW
00410         THRSKY=4                                                     *NEW
00410   C-          -                                                      *NEW
00410   C-                                                                 *NEW
00411         GO TO 390                                                    **-1
00411   C                                                          RED32220
00411   C     READ IN THRESHOLDS                                   RED32230
00411   C     -----------------------                              RED32240
00411   C                                                          RED32250
00412     400 CONTINUE                                             RED32260
00413         I = SYMMAX-THSCNT                                    RED32270
00414         THSCNT = THSCNT+FLTNUM(CARD2,COL,THRES(THSCNT+1),I)  RED32280
00415         GO TO 10                                             RED32300
00415   C                                                          RED32310
00415   C*
00415   C*    ANALYST NAME
00415   C*
00416     600 READ(30,601)ANALYS
00424     601 FORMAT(10X,3A6)
00425         GO TO 10
00425   C                                                          RED32430
00425   C     COMMENT                                              RED32440
00425   C     -----------------------                              RED32450
00425   C                                                          RED32460
00426     710 READ (30,9998) COMENT                                RED32470
00434    9998 FORMAT (10X,10A6)                                    RED32480
00435         GOTO 10                                              RED32490
00435   C                                                          RED32500
00435   C     HED1                                                 RED32510
00435   C     -----------------------                              RED32520
00435   C                                                          RED32530
00436     720 READ (30,9998) HED1                                  RED32540
00444         GOTO 10                                              RED32550
00444   C                                                          RED32560
00444   C     HED2                                                 RED32570
00444   C     -----------------------                              RED32580
00444   C                                                          RED32590
00445     730 READ (30,9998) HED2                                  RED32600
00453         GOTO 10                                              RED32610
00453   C                                                          RED32620
00453   C     DATE                                                 RED32630
```

```
00453   C       ----------------------                          RED32640
00453   C                                                       RED32650
00454     740 READ (30,9998) DATE                               RED32660
00462         GO TO 10                                          RED32670
00462   C
00462   C     MAP TAPE FORMAT
00462   C     --------------------
00463    750  M = NXTCHR(CARD2,COL)
00464         IF ( M .EQ. 1HU )  MAPFMT = 1
00466         IF ( M .EQ. 1HL )  MAPFMT = 2
00470         IF ( M .EQ. 1H  )  MAPFMT = 1
00472         GO TO 10
00472   C
00472   C
00472   C*
00472   C*    PROCEDURE CONFIGURATION TITLE
00472   C*
00473     760 READ(30,9998)CAMS
00476         GO TO 10
00476   C*
00476   C*    ACREAGE
00476   C*
00477     770 M=NXTCHR(CARD2,COL)
00500         IF(M.EQ.BLANK)GO TO 10
00502         IF(M.EQ.COMMA)GO TO 770
00504         J=FIND(CARD2,COL,EQUCOM)
00505         IF(J.EQ.2)GO TO 773
00507         WRITE(6,772)
00511     772 FORMAT(' *ERROR IN ACREAGE CARD - CARD IGNORED')
00512         GO TO 10
00513     773 J = FLTNUM(CARD2,COL,X,1)
00514         IF(M.EQ.'T')ATOTAL=X
00516         IF(M.EQ.'C')ACROP =X
00520         IF(M.EQ.'O')AOTHER=X
00522         GO TO 770
00522   C*
00522   C*    INTENSIVE STUDY CROP NAME
00522   C*
00523     780 M=NXTCHR(CARD2,COL)
00524         IBIT=0
00525         IC=1
00526         CROP=BLANK
00527         CAPK Y=1
00530     781 FLD(IBIT,6,CROP )=FLD(0,6,M)
00531         IBIT=IBIT+6
00532         IC=IC+1
00533         IF(IC.GT.6)GO TO 10
00535         M=NXTCHR(CARD2,COL)
00536         IF(M.EQ.BLANK)GO TO 10
00540         GO TO 781
00541     800 CONTINUE
00541   C*
00541   C*    *END*   END OF CONTROL CARDS.- NOW FIND CHI-SQUARE THRESHOLDS,
00541   C*              THEN READ IN TEST FIELDS
00542         IF (THSCNT .EQ. 0)  GO TO 830
00542   C*    IF THRESHOLDS WERE INPUT WITHOUT OPTION - ASSUME CHI-SQUARE
00544         IF(THRSKY.EQ.0)THRSKY=1
00546         NDEGR = NOFFT2
00547         IF (BMFLG .GT. 0) NDEGR = BMCOMB
00547   C-                                                          *NEW
00547   C-    BYPASS IF NOT EQUAL TO 1 OR 2.                        *NEW
00547   C-                                                          *NEW
00551         IF(THRSKY.GT.2) GO TO 830                             *NEW
```

```
00551        C-                                                                                    *NEW
00553              DO 825 MZ=1,NOSUB2                                                              **-1
00556              HIGH(MZ) = 1. - THRES(MZ)
00557              THRES(MZ) = CHIN(HIGH(MZ),NDEGR,&826)
00560              GO TO 825
00561          826 WRITE(6,827) MZ,THRES(MZ)
00565          827 FORMAT(// ' *** A THRESHOLD VALUE IS OUTSIDE THE ALLOWABLE RANGE 0
00565            * - 1, THEREFORE'/'       NO THRESHOLDING HAS BEEN DONE IN THIS RUN
00565            3***' ,I5,F15.5//)
00566              THRSKY = 0
00567              GO TO 830
00570          825 CONTINUE
00572          830 CONTINUE
00572        C*
00572        C*    NOW READ TEST OR DESIGNATED FIELDS
00572        C*
00573              TOTVT3=0
00574              NOFLD3=1
00575              IPT=1
00576          840 ICK=LAREAD(TSTSAV(1,NOFLD3),TSTVER(IPT),INF,NV)
00577              IF(ICK.EQ.-3)GO TO 865
00601              IF(ICK.EQ.-2)GO TO 850
00603              IF(ICK.EQ.-1)GO TO 860
00605              IF(ICK.EQ. 0)GO TO 870
00607              TSTSAV(2,NOFLD3)=CLSIND
00610              TSTSAV(3,NOFLD3)=SUBIND
00611              TSTSAV(4,NOFLD3)=NV
00612              TSTFLD(1,NOFLD3)=INF(1)
00613              TSTFLD(2,NOFLD3)=INF(2)
00614              TSTFLD(3,NOFLD3)=INF(4)
00615              TSTFLD(4,NOFLD3)=INF(5)
00616              TSTFLD(5,NOFLD3)=IPT
00617              IPT=IPT + 2*NV
00620              NOFLD3 = NOFLD3 + 1
00621              TOTVT3=TOTVT3+NV
00622              GO TO 840
00622        C*
00622        C*    SUBCLASS NAME
00622        C*
00623          850 READ(30,851)NAME
00626              IF(TYPE.EQ.2)GO TO 1400
00630              TYPE=1
00631          851 FORMAT(10X,A6)
00632              DO 852 I=1,NOSUB2
00635          852 IF(NAME.EQ.SUBNAM(I))GO TO 854
00640              WRITE(6,853)NAME
00643          853 FORMAT(' *ERROR ON SUBCLASS NAME CARD -',A6,' DOES NOT MATCH A SUB
00643             *CLASS FROM THE MAPTAP FILE *')
00644              CALL CMERR
00645          854 SUBIND=I
00646              CLSIND=CLSSUB(I)
00647              GO TO 840
00647        C*
00647        C*    CLASSNAME CARD
00647        C*
00650          860 READ(30,851)NAME
00653              IF(TYPE.EQ.2)GO TO 1400
00655              TYPE=1
00656              DO 861 I=1,NOCLS2
00661          861 IF(NAME.EQ.CLSNAM(I))GO TO 863
00664              WRITE(6,862)NAME
00667          862 FORMAT(' *ERROR ON CLASSNAME CARD -',A6,' DOES NOT MATCH A CLASS N
00667             *AME FROM THE MAPTAP FILE *')
```

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HOUSTON, TEXAS

03 NOV 76

SIMULATED DATA - SS4052

$EXIT

```
00670    368*            CALL CMERR
00671    369*          863 CLSIND=1
00672    370*              SUBIND=0
00673    371*              GO TO 840
00673    372*       C*
00673    373*       C*     DESIGNATED FIELDS
00673    374*       C*
00674    375*          865 READ(30,851)TEST
00677    376*              IF(TYPE.EQ.1)GO TO 1400
00701    377*              TYPE=2
00702    378*              SUBIND=1
00703    379*              IF(TEST.EQ.'OTHER')SUBIND=2
00705    380*              IF(TEST.EQ.'UNIDEN')CLSIND=NOSUB3+4
00707    381*              IF(TEST.EQ.'OTHER')CLSIND=NOSUB3+5
00711    382*              GO TO 840
00711    383*       C*
00711    384*       C*     $END*  - END OF TEST OR DESIGNATED FIELDS
00711    385*       C*
00712    386*          870 NOFLD3 = NOFLD3-1
00713    387*              IF(TYPE.EQ.1 .AND. NOFLD3.GT.0)TSTKEY=1
00715    388*              IF(TYPE.EQ.2 .AND. NOFLD3.GT.0)DESKEY=1
00715    389*       C*
00715    390*       C*     SET THRESHOLD AND OUTLINE SYMBOLS
00715    391*       C*
00717    392*              SYMBTX(NOSUB3)=THRSYM
00720    393*              SYMBTX(NOSUB3+1)=TRNSYM
00721    394*              SYMBTX(NOSUB3+2)=TSTSYM
00722    395*              SYMBTX(NOSUB3+3)=DUPSYM
00723    396*              SYMBTX(NOSUB3+4)=DESSYM
00724    397*              SYMBTX(NOSUB3+5)=DESSYM
00724    398*       C                                                          REQ33210
00724    399*       C      GO HOME                                             REQ33220
00724    400*       C      ------------------------------------------------------REQ33230
00724    401*       C                                                          REQ33240
00725    402*              RETURN                                              REQ33250
00725    403*       C                                                          REQ33260
00725    404*       C      ERROR ROUTINES                                      REQ33270
00725    405*       C      ------------------------------------------------------REQ33280
00725    406*       C                                                          REQ33290
00726    407*         1400 WRITE(6,14000)
00730    408*        14000 FORMAT(' TEST FIELDS AND DESIGNATED FIELDS CANNOT BE INPUT TOGETHE
00730    409*             *R'/)
00731    410*         1500 WRITE (6,15002) CODE, CARD2                         REQ33300
00740    411*        15002 FORMAT(/1X,A6,4X,62A1/' INVALID CONTROL CARD-CHECK SPELLING OF KEY
00740    412*             * WORD' )
00741    413*              GO TO 10
00742    414*               END                                                REQ33330

      END OF COMPILATION:        NO  DIAGNOSTICS.
   REDIF3          SYMBOLIC                          16 AUG 76  14:18:05   0  02323656   14   373  (DELET
   REDIF3  CODE    RELOCATABLE                       16 AUG 76  14:18:05   1  02336024   36     1  (DELET
                                                                           0  02336070   14   102
```

```
@     FOR,* SETUP3,SETUP3                                                    03 NOV 76            16:
UNIVAC 1108 FORTRAN V EXEC II LEVEL 25A  -(EXEC8 LEVEL E12010010A)
THIS COMPILATION WAS DONE ON 03 NOV 76 AT 16:37:00

-80,80

      *           ,(KATNO(I),I=1,NOCLS2),(KEPPTS(I),I=1,NOSUB2)

-100

C-

C-    TEST FOR FISHER

      IF(THRSKV.EQ.4) GO TO 80

C-

-109

C-

C-    TEST FOR FISHER

      IF(THRSKV.EQ.4) WRITE(6,817)

C-

-126

C-

  817 FORMAT(T10,'APPLY FISHER F-DISTRIBUTION THRESHOLDS')

C-

   SUBROUTINE SETUP3    ENTRY POINT 001227

   STORAGE USED: CODE(1) 001464; DATA(0) 000553; BLANK COMMON(2) 000000

    COMMON BLOCKS:

    0003   GLOBAL 000075
    0004   DISPL  001463

   EXTERNAL REFERENCES (BLOCK, NAME)

    0005   FIND
    0006   NUMBER
    0007   FSASFL
    0010   EXIT
    0011   REDIF3
    0012   WRTFLD
    0013   NRDUS
    0014   NIO1S
    0015   NIO2S
    0016   NREWS
    0017   NWDUS
    0020   NRBUS
```

0021 MERA34

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0000		000174	1F	0001		000041	10L	0001		001025	102L	0001	001046	103L	0001	001070	105L
0001		001076	106L	0001		000011	122G	0001		000065	15L	0001	001433	20L	0001	001175	200L
0001		000157	202G	0001		000250	225G	0001		000255	231G	0001	000262	235G	0001	000267	241G
0001		000275	245G	0001		000303	251G	0001		000310	255G	0001	000315	261G	0001	000322	265G
0001		000327	271G	0000		000175	45F	0001		001001	450G	0001	000132	50L	0000	000431	5044F
0001		001200	508L	0001		001260	526G	0001		001310	541G	0001	000173	55L	0001	001422	566G
0001		000423	80L	0000		000233	802F	0000		000244	803F	0000	000252	804F	0000	000261	805F
0000		000267	806F	0000		000276	808F	0000		000304	810F	0000	000312	812F	0000	000225	817F
0000		000335	818F	0000		000345	819F	0000		000346	820F	0000	000356	821F	0000	000373	822F
0000		000401	823F	0000		000416	824F	0001		000720	85L	0001	000764	99L	0004	I 001342	ACROP
0004	I	001351	ANALYS	0004	I	001343	AOTHER	0003	I	000073	ASAV	0003	I 000074	ASAVFL	0004	I 001344	ATOTAL
0004	I	000570	BMCOMB	0004	I	000571	BMFEAT	0003	I	000055	BMFILE	0004	I 000567	BMFLG	0003	I 000056	BMKEY
0004	I	001354	CAM	0000	I	000040	CARD	0004	I	000000	CATFLG	0004	I 000001	CATNAM	0004	I 000572	CDATE
0004	I	000076	CLSNAM	0004	I	000460	CLSSUB	0000	I	000140	COL	0004	I 001075	CON	0004	I 001341	CROP
0004	I	001366	CRPKEY	0003	I	000053	DATAPE	0003	I	000071	DATFIL	0004	I 001336	DESKEY	0004	I 001340	DESOTH
0004	I	001337	DESUNI	0003	I	000067	DRMDOS	0003	I	000066	DRUMAD	0004	I 000564	EMPTRS	0003	I 000062	ERIPTP
0003	I	000063	ERPKEY	0004	I	001175	FETVC2	0004	I	000575	FIELD2	0004	I 000600	FIELD3	0004	I 001334	FILTER
0000	I	000036	FILVEC	0005	I	000000	FIND	0004	I	001171	FLOKEY	0004	I 000574	FLOSV2	0004	I 000577	FLOSV3
0003	I	000000	HEAD	0004	I	001001	HIGH	0003	I	000057	HISFIL	0003	I 000060	HISKEY	0000	I 000147	I
0000	I	000161	IAD	0000	I	000164	IB	0000	I	000162	IBD	0000	I 000172	IE	0000	I 000157	IK
0000		000472	INJPS	0000		000457	INJPS	0000		000466	INJPS	0000	I 000165	IPT	0000	I 000145	ISTAT
0000	I	000173	J	0004	I	001237	KATNO	0004	I	001367	KEPPTS	0000	I 000171	LINEND	0000	I 000170	LINSTR
0000	I	000142	M	0004	I	001335	MAPFMT	0003	I	000052	MAPTAP	0003	I 000064	MAPUNT	0000	I 000137	NBCD
0000	I	000150	NCAT	0000	I	000144	NF	0000	I	000141	NFILE	0004	I 001333	NOCAT	0004	I 001236	NOCLS2
0004	I	001174	NOFET2	0003	I	000065	NOFILE	0004	I	001172	NOFLD2	0004	I 001173	NOFLD3	0004	I 000554	NOMAP
0004	I	001233	NOSUB2	0004	I	000556	NOSUB3	0000	I	000156	NOTHRS	0004	I 001234	NOTAFD	0006	I 000000	NUMBER
0000	I	000000	NUMVEC	0000	I	000152	NV	0003	I	000070	PAGSIZ	0004	I 000557	PCFDKY	0004	I 000602	PCTID3
0000	I	000160	PCTSZ	0004	I	000566	PLTKEY	0000	I	000167	SAMEND	0000	I 000166	SAMSTR	0003	I 000054	SAVTAP
0000	I	000143	SERIAL	0004	I	001345	SITE	0003	I	000072	STAFIL	0004	I 000563	STATKY	0000	I 000155	STOPFG
0004	I	000364	SUBCAT	0004	I	000173	SUBNAM	0004	I	000270	SUBNO	0004	I 000677	SYMMTX	0004	I 000603	THRES
0004	I	000562	THRSKY	0004	I	000565	THRSVA	0000	I	000163	TIME	0000	I 000151	TOP1	0000	I 000154	TOP2
0004	I	001235	TOTVT2	0004	I	000555	TOTVT3	0003	I	000061	TRFORM	0004	I 000561	TRNKEY	0004	I 000560	TSTKEY
0000	I	000146	VARSZ2	0000	I	000153	VDIM	0004	I	000576	VERTX2	0004	I 000601	VERTX3	0000	I 000136	VBCD

```
00101    1•          SUBROUTINE SETUP3(ARRAY,TOP)
00103    2•          INCLUDE COMBK6,LIST
00104    2•          COMMON/GLOBAL/HEAD(42),MAPTAP,DATAPE,SAVTAP,BMFILE,BMKEY,
00104    2•         •            HISFIL,HISKEY,TRFORM,ERIPTP,ERPKEY,MAPUNT,NOFILE,
00104    2•         •    DRUMAD,DRMDOS,PAGSIZ,DATFIL,STAFIL,ASAV,ASAVFL
00105    2•          END
00106    3•          INCLUDE CMBK10,LIST
00106    4•     C                                                                SET30030
00107    4•          COMMON/DISPL/CATFLG,CATNAM(61),CLSNAM(61),SUBNAM(61),SUBNO(60),
00107    4•         •            SUBCAT(60),CLSSUB(60),NOMAP,TOTVT3,NOSUB3,
00107    4•         •            PCFDKY,TSTKEY,TRNKEY,THRSKY,STATKY,EMPTRS,THRSVA,
00107    4•         •            PLTKEY,BMFLG,BMCOMB,BMFEAT,CDATE(2),
00107    4•         •            FLOSV2,FIELD2,VERTX2,FLOSV3,FIELD3,VERTX3,PCTID3,
00107    4•         •            THRES(60),SYMMTX(66),HIGH(60),CON(60)
00107    4•         •            ,FLOKEY,NOFLD2,NOFLD3,NOFET2,FETVC2(30)
00107    4•         •            ,NOSUB2,NOTAFD,TOTVT2,NOCLS2
00107    4•         •            ,KATNO(60),NOCAT,FILTER,MAPFMT
00107    4•         •            ,DFSKEY,DESUNI,DESOTH,CROP ,ACROP,AOTHER,ATOTAL
00107    4•         •            ,SITE(4),ANALYS(3),CAM(10),CRPKEY,KEPPTS(60)          •NEW
00110    4•          END                                                              ••-1
00111    5•          IMPLICIT INTEGER (A-H,O-Z)                                   SET30040
```

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ORIGINAL PAGE IS
OF POOR QUALITY

```
00111      C|-------------------------------------------------------------------|SET30050
00111      C|-------------------------------------------------------------------|SET30060
00111      C|                                                                   |SET30220
00111      C|    PURPOSE,, LOCATES FILE ON 'MAPTAP' AND COORDINATES             |SET30230
00111      C|              ROUTINES TO ANALYSIZE 'DISPLAY' CONTROL CARDS        |SET30240
00111      C|                                                                   |SET30250
00111      C|                                                                   |SET30300
00111      C|-------------------------------------------------------------------|SET30310
00111      C                                                                     SET30320
00111      C                                                                     SET30330
00112            DIMENSION NUMVEC(30),FILVEC(2)
00113            DIMENSION CARD(62),ARRAY(1)
00114            DATA  VBCD/ 'V' /, NBCD/ 'N' /, FILVEC/ 1 , 'F' /
00114      C     INIZ                                                            SET31000
00114      C     ----------------------------------------------------------------SET31010
00114      C                                                                     SET31020
00114      C                                                                     SET31070
00114      C*    REREAD AND SCAN 'DISPLAY' CONTROL CARD FOR FILE NUMBER
00114      C     ----------------------------------------------------------------SET31090
00114      C                                                                     SET31100
00120            READ(30,1)CARD
00126          1 FORMAT(62A1)
00127            COL = 0                                                         SET31110
00130            NFILE = 0
00131        5   M = FIND(CARD,COL,FILVEC)
00132            IF ( M .LE. 0 .OR. COL .EQ. 62) GO TO 15
00134            M = 0
00135       10   M = NUMBER( CARD, COL, NUMVEC, M)
00136            IF( M .EQ. 0 .AND. COL .LT. 62)  GO TO 10
00140            NFILE = NUMVEC(1)
00141       15   IF (NFILE .LE. 0) NFILE = 1
00142            SERIAL = NFILE
00143      C                                                                     SET31280
00143      C     GET TAPE READY                                                  SET31290
00143      C                                                                     SET31300
00144         40 REWIND MAPTAP                                                   SET31310
00145            IF ( NFILE .EQ. 1 ) GO TO 50                                    SET31320
00147            NF = NFILE - 1                                                  SET31330
00150            CALL FSBSFL(MAPTAP,NF,ISTAT)
00151            IF (ISTAT .EQ. 0) GO TO 50
00153            WRITE(6, 45)  NF, ISTAT
00157       45   FORMAT(//// 5X,'***** DSPLAY/SETUP3  ...  ERROR CONDITION ON ATTEM
00157           1PT TO POSITION MAPTAP OVER',I8,3X,'FILES'// 5X,
00157           2 '***** FSBSFL STATUS CODE =',I4,3X,'...  ABORTING RUN *****'/1H1)
00160            REWIND MAPTAP
00161            CALL EXIT
00161      C                                                                     SET31350
00161      C      READ  MAPTAP
00161      C     ----------------------------------------------------------------SET31370
00161      C                                                                     SET31380
00161      C                                                                     SET31390
00162         50 CONTINUE                                                        SET31400
00163            CATFLG=1
00164            READ(MAPTAP) CDATE(1),CDATE(2),BMFLG,BMCOMB,BMFEAT,NOCLS2,
00164           *              NOFLO2,NOSUB2,NOFET2,TOTVT2,NOCAT,VARSZ2,
00164           *             (FETVC2(I),I=1,NOFET2)
00206            NCAT=NOCAT
00207            IF(NOCAT.GT.0)GO TO 55
00211            CATFLG=0
00212            NCAT=NOCLS2
00212      C*    SET BASE ADDRESSES FOR TRAINING FIELD INFORMATION
00213         55 CONTINUE
00214            NOSUB3=NOSUB2+1
```

```
00215     69.           FLDSV2=1
00216     70.           VERTX2=FLDSV2 + NOFLD2*4
00217     71.           FIELD2=VERTX2 + TOTVT2*2
00220     72.           TOP1= FIELD2 + NOFLD2*5
00221     73.           NV=TOTVT2*2
00222     74.           NF=NOFLD2*4
00223     75.           READ(MAPTAP)(CATNAM(I),I=1,NCAT),(CLSNAM(I),I=1,NOCLS2),
00223     76.          .            (SUBNO(I),I=1,NOCLS2),(SUBNAM(I),I=1,NOSUB2),
00223     77.          .            (ARRAY(FLDSV2-1+I),I=1,NF),
00223     78.          .            (ARRAY(VERTX2-1+I),I=1,NV) ,
00223     79.          .            (SUBCAT(I),I=1,NOSUB2),(CLSSUB(I),I=1,NOSUB2)
00223     80.          .           ,(CATNO(I),I=1,NOCLS2),(KEPPTS(I),I=1,NOSUB2)                    *NEW
00223     81.     C.                                                                                **-1
00223     82.     C.    GO READ CONTROL CARDS AND TEST FIELDS
00223     83.     C.
00275     84.           FLDSV3=TOP1
0027A     85.           FIELD3= FLDSV3 + 800
00276     86.     C.    RESERVE ROOM FOR 200 TEST FIELDS
00277     87.           VERTX3=FIELD3 + 1000
00300     88.           VDIM = TOP - VERTX3
00301     89.           CALL REDIF3(ARRAY(FLDSV3),ARRAY(FIELD3),ARRAY(VERTX3),VDIM)
00302     90.           TOP2=VERTX3+TOTVT3*2
00303     91.           IF(NOFLD3.LE.0)TOP2=TOP1
00303     92.     C.    WRITE OUT SAVED TRAINING FIELDS AND TEST FIELDS
00305     93.           IF ( STOPFG .NE. 0 ) GOTO 200                                    SET31970
00305     94.     C                                                                      SET31980
00305     95.     C     PRINT OUT SUPERVISOR INFORMATION                                 SET31990
00305     96.     C     ---------------------------------------------------------------- SET32000
00305     97.     C                                                                      SET32010
00307     98.           IF(THRSKY ,EQ. 1)  GO TO 80
00311     99.           IF(EMPTRS ,EQ. 2)  GO TO 80
00313    100.           IF(THRSVA ,EQ. 3)  GO TO 80
00313    101.     C-                                                                        *NEW
00313    102.     C-   TEST FOR FISHER                                                      *NEW
00315    103.           IF(THRSKY.EQ.4) GO TO 80                                          *NEW
00315    104.     C-                                                                        *NEW
00317    105.           NOTHRS = 4
00320    106.        80 CONTINUE
00321    107.           WRITE(6,819)
00323    108.           WRITE(6,802)                                                     SET32050
00325    109.       802 FORMAT(15,' YOU HAVE SELECTED THE FOLLOWING OPTIONS'/)           SET32060
00326    110.           IF (NOTHRS .EQ. 4) WRITE(6,803)
00331    111.           IF (THRSKY .EQ. 1) WRITE(6,804)
00334    112.           IF(EMPTRS .EQ. 2) WRITE(6,805)
00337    113.           IF (THRSVA .EQ. 3) WRITE(6,818)
00337    114.     C-                                                                        *NEW
00337    115.     C-    TEST FOR FISHER                                                     *NEW
00342    116.           IF(THRSKY.EQ.4) WRITE(6,817)                                      *NEW
00342    117.     C-                                                                        *NEW
00345    118.           IF ( TRNKEY  .EQ. 1 )  WRITE(6,806)                              SET32080
00350    119.           IF ( TSTKEY  .EQ. 1 )  WRITE(6,808)                              SET32090
00353    120.           IF ( STATKY  .EQ. 1 )  WRITE(6,810)                              SET32100
00356    121.           IF ( PCFDKY  .EQ. 1 )  WRITE(6,812)                              SET32110
00361    122.           IF(NOMAP.EQ.0)WRITE(6,820)
00364    123.           IF(PLTKEY.NE.0)WRITE(6,821)
00367    124.           IF(FILTER.EQ.1)WRITE(6,822)
00372    125.           IF(DESKEY.EQ.1)WRITE(6,823)
00375    126.           IF(CRPKEY.EQ.1)WRITE(6,824)CROP
00401    127.       803 FORMAT(T10,'APPLY NO THRESHOLDING')
00402    128.       804 FORMAT(T10,'APPLY CHI SQUARE THRESHOLDS')
00403    129.       805 FORMAT(T10,'APPLY EMPIRICAL THRESHOLDS')
00404    130.       806 FORMAT(T10,'OUTLINE THE TRAINING FIELDS')                        SET32140
00405    131.       808 FORMAT(T10,'OUTLINE THE TEST FIELDS')                            SET32150
```

```
00496    132*       810 FORMAT(T10,'PRINT OUT THE STATISTICS')                          SET32160
00497    133*       812 FORMAT(T10,'PRINT THE GROUND TRUTH PERFORMANCE SUMMARIES BY FIELD'
00498    134*          * )
00499    135*      C-                                                                    *NEW
00500    136*        817 FORMAT(T10,'APPLY FISHER F-DISTRIBUTION THRESHOLDS')            *NEW
00510    137*      C-                                                                    *NEW
00511    138*        818 FORMAT(T10, 'APPLY USER INPUT THRESHOLD VALUES')
00512    139*        819 FORMAT(////)
00513    140*        820 FORMAT(T10,'DO NOT DISPLAY A CLASSIFICATION MAP')
00514    141*        821 FORMAT(T10,'DISPLAY THE HISTOGRAMS OF THE QUADRATIC FORM FOR ALL S
00514    142*           *UBCLASSES')
00515    143*        822 FORMAT(T10,'PERFORM SPATIAL FILTERING')
00516    144*        823 FORMAT(T10,'EXCLUDE PIXELS IN THE DESIGNATED AREAS FROM CLASSIFICATION
00516    145*           *TION SUMMARIES')
00517    146*        824 FORMAT(T10,'PRINT THE INTENSIVE TEST SITE SUMMARY REPORT FOR ',A6)
00517    147*      C                                                                     SET32190
00517    148*      C                                                                     SET32200
00517    149*      C                                                                     SET32250
00520    150*            CALL WRTFLD(ARRAY(FLDSV2),ARRAY(VERTX2),NOFLD2,1,CLSNAM,SUBNAM)
00521    151*            IF(NOFLD3.LE.0)GO TO 85
00523    152*            IF(TSTKEY.EQ.1)IK=2
00525    153*            IF(DESKEY.EQ.1)IK=3
00527    154*            CALL WRTFLD(ARRAY(FLDSV3),ARRAY(VERTX3),NOFLD3,IK,CLSNAM,SUBNAM)
00530    155*         85 CONTINUE
00530    156*      C*    WILL PCTAB FIT IN ARRAY?
00531    157*            NOTAFD=NOFLD2
00532    158*            IF(TSTKEY.EQ.1)NOTAFD=NOFLD3
00534    159*            PCTSZ=NOTAFD*NOSUB2
00535    160*            IF(PCTSZ.LE.TOP-TOP2)   TO 106
00535    161*      C*    MOVE TEST FIELD INFO .   TO GAPS ARE IN ARRAY (IF STORAGE IS NEEDED)
00537    162*            IF(TSTKEY.EQ.0) GO TO   /
00537    163*      C*    MUST TRAINING FIELD INFO BE KEPT IN CORE?
00541    164*            IAD=FLDSV2-1
00542    165*            IF(TRNKEY.EQ.1)IAD=TOP1-1
00544    166*            IBO=FLDSV3-1
00545    167*            NF=4*NOFLD3
00546    168*            TIME=0
00547    169*         99 DO 101 I=1,NF
00552    170*        101 ARRAY(IAD+I)=ARRAY(IBO+I)
00554    171*            IF(TIME.GT.0)GO TO 102
00556    172*            IAD=IAD+NF
00557    173*            IBO=FIELD3-1
00560    174*            NF=5*NOFLD3
00561    175*            TIME=TIME+1
00562    176*            GO TO 99
00563    177*        102 IF(TIME.EQ.2)GO TO 103
00565    178*            IAD=IAD+NF
00566    179*            IBO=VERTX3-1
00567    180*            NF=TOTVT3*2
00570    181*            TIME=TIME+1
00571    182*            GO TO 99
00572    183*        103 CONTINUE
00573    184*            FLDSV3=TOP1
00574    185*            IF(TRNKEY.EQ.0)FLDSV3=1
00576    186*            FIELD3=FLDSV3 + 4*NOFLD3
00577    187*            VERTX3=FIELD3 + 5*NOFLD3
00500    188*            TOP2 = VERTX3 + 2*TOTVT3
00501    189*         105 IF(PCTSZ.GT.TOP-TOP2)GO TO 500
00503    190*         106 PCTID3=TOP2
00503    191*      C*    SET UP FIELD ARRAY FOR TRAINING FIELDS
00504    192*            IF(TSTKEY.EQ.0.OR. TRNKEY.EQ.1)CALL FIXFLD(ARRAY(FLDSV2),
00504    193*           *                                ARRAY(FIELD2),ARRAY(VERTX2))
00504    194*      C*
```

```
00504     195•      C•    SET FLOKEY
00504     196•      C•
00506     197•            IF(TSTKEY.EQ.1)CALL SETKEY(ARRAY(FLDSV3),NOFLD3)
00510     198•            IF(TSTKEY.NE.1)CALL SETKEY(ARRAY(FLDSV2),NOFLD2)
00512     199•          200 RETURN                                                    SET32260
00512     200•      C                                                               SET32270
00512     201•      C     ERROR ROUTINES                                            SET32280
00512     202•      C     ------------------------------------------------------------SET32290
00512     203•      C                                                               SET32300
00512     204•      C                                                               SET32340
00513     205•          900 WRITE (6,5044)                                          SET32350
00515     206•           5044 FORMAT(///// 5X,'******  DSPLAY/SETUP3  ---   CORE OVERFLOW  -----
00515     207•              1-   EXECUTION TERMINATED  ******' / 1H1)
00516     208•            CALL EXIT                                                 SET32370
00516     209•      C
00516     210•      C•    INTERNAL ROUTINE TO FIND RECTANGULAR COORDINTES FOR TRAINING FIELDS
00516     211•      C•
00522     212•            SUBROUTINE FIXFLD(FLDSAV,FIELDS,VERTEX)
00522     213•            DIMENSION FLDSAV(4,NOFLD2),FIELDS(5,NOFLD2),VERTEX(2,TOTVT2)
00523     214•            IB=1
00524     215•            IPT=1
00525     216•            DO 20 I=1,NOFLD2
00530     217•            SAMSTR = 100000
00531     218•            SAMEND = 0
00532     219•            LINSTR = 100000
00533     220•            LINEND = 0
00534     221•            NV = FLDSAV(4,I)
00535     222•            FIELDS(5,I)=IPT
00536     223•            IPT=IPT+NV+2
00537     224•            IE=IB+NV-1
00540     225•            DO 10 J=IB,IE
00543     226•            SAMSTR =  MIN(SAMSTR,VERTEX(1,J))
00544     227•            SAMEND =  MAX(SAMEND,VERTEX(1,J))
00545     228•            LINSTR =  MIN(LINSTR,VERTEX(2,J))
00546     229•           10 LINEND =  MAX(LINEND,VERTEX(2,J))
00550     230•            FIELDS(1,I)=LINSTR
00551     231•            FIELDS(2,I)=LINEND
00552     232•            FIELDS(3,I)=SAMSTR
00553     233•            FIELDS(4,I)=SAMEND
00554     234•            IB=IE+1
00555     235•           20 CONTINUE
00557     236•            RETURN
00557     237•      C
00557     238•      C•    INTERNAL ROUTINE TO SET FLOKEY=1 IF FIELDS ARE ASSOCIATED
00557     239•      C•    WITH SUBCLASSES,OTHERWISE = 0
00557     240•      C•
00560     241•            SUBROUTINE SETKEY(FLDSAV,NOFLD)
00563     242•            DIMENSION FLDSAV(4,NOFLD)
00564     243•            FLOKEY=1
00565     244•            DO 10 I=1,NOFLD
00570     245•            IF(FLDSAV(3,I).EQ.0)GO TO 20
00572     246•           10 CONTINUE
00574     247•            RETURN
00575     248•           20 FLOKEY=0
00576     249•            RETURN
00577     250•             END                                                      SET32380

     END OF COMPILATION:        NO  DIAGNOSTICS.
SETUP3          SYMBOLIC                          16 AUG 76  14:18:29   0  02405116   14   239  (DELETED
SETUP3  CODE    RELOCATABLE                       16 AUG 76  14:18:29   1  02413540   36     1  (DELETED
                                                                        0  02413604   14   102
```

APPENDIX C
MAPTAP FORMAT

MAPTAP FORMAT

The tape, MAPTAP, is output by the processor CLASSIFY. It contains the statistics actually used in classification, the training field, category, class, and subclass information, and the classified data.

Each file consisting of the following types or records:

4 - run header records
Repeated for each classified field {
1 - field header record
N - data records
1 - end-of-field record
}
1 - end-of-run record
end-of-file mark

All records are written with a nonformatted FORTRAN write statement.

RUN Header Record 1

```
WRITE(MAPTAP)(DATE(I),I=1,2),BMFLG,BMCOMB,BMFEAT,NOCLS2,
              NOFLD2,NOSUB2,NOFET2,TOTVT2,NOCAT,VARSZ2,
              (FETVC2(I),I=1,NOFET2)
```

FORTRAN NAME AND DIMENSION	DESCRIPTION
DATE(2)	Date classification was performed
BMFLG	Flag indicating B-MATRIX was used in classification
BMCOMB	No. of linear combinations in B-MATRIX

FORTRAN NAME AND DIMENSION	DESCRIPTION
BMFEAT	No. of channels used in computing the B-MATRIX
NOCLS2	No. of classes
NOFLD2	No. of training fields
NOSUB2	No. of subclasses
NOFET2	No. of channels used in classificatio
TOTVT2	No. of vertices in training fields
NOCAT	No. of categories
VARSZ2	Size of covariance for each subclass
FETVC2(NOFET2)	Actual channels used in classificatio

RUN Header Record 2

```
WRITE(MAPTAP)(CATNAM(I),I=1,NOCAT1),(CLSMTX(I),I=1,NOCLS2),
             (SUBNO(I),I=1,NOCLS2),(SUBDES(I),I=1,NOSUB2),
             ((FLDMTX(I,J)I=1,4),J=1,NOFLD2),((VERTEX(I,J),
             I=1,2),J=1,TOTVT2),(SUBCAT(I),I=1,NOSUB2),
             (CLSVC2(I),I=1,NOSUB2),(KATNO(I),I=1,NOCLS2),
             (KEPPTS(I),I=1,NOSUB2)
```

FORTRAN NAME AND DIMENSION	DESCRIPTION
CATNAM(NOCAT1)	Category names (if available) NOCAT1 = no. of categories if CATEGORY classifier was applied NOCAT1 = no. of classes if STANDARD classifier was applied.
CLSMTX(NOCLS2)	Class names

FORTRAN NAME AND DIMENSION	DESCRIPTION
SUBNO(NOCLS2)	No. of subclasses in each class
SUBDES(NOSUB2)	Subclass names
FLDMTX(4,NOFLD2)	Training field information 1 - field name 2 - Class number field belongs to 3 - Subclass number field belongs to 4 - No. of vertices in this field
VERTEX(2,TOTVT2)	Vertices for all the fields Vertices are ordered $(sample,line)_1$, $(sample,line)_2$,...$(sample,line)_{TOTVT2}$
SUBCAT(NOSUB2)	Contains the category number to which each corresponding subclass belongs
CLSVC2(NOSUB2)	Contains the class number to which each corresponding subclass belongs
KATNO(NOCLS2)	Contains the category number to which each class belongs
KEPPTS(NOSUB2)	Contains the total number of training field pixels in each subclass

RUN Header Record 3

```
WRITE(MAPTAP((COVMTX(I,J),I=1,VARSZ2)J=1,NOSUB2)
             ((AVEMTX(I,J),I=1,NOFET2),J=1,NOSUB2)
```

FORTRAN NAME AND DIMENSION	DESCRIPTION
COVMTX(VARSZ2,NOSUB2)	Original or B-tranformed covariance matrix for each subclass
AVEMTX(NOFET2,NOSUB2)	Mean vector for each subclass

APPENDIX D
ERROR MESSAGES

DIAGNOSTICS(Display Processor)

1. *****DSPLAY/SETUP3 ... ERROR CONDITION ON ATTEMP TO POSITION MAPTAP OVER _____ FILES.
   *****FSBSFL STATUS CODE = ____... ABORTING RUN ***

   The system routine FSBSFL for positioning files has encountered difficulties in positioning the MAPTAP to correct file. Error occured in SETUP3 routine for DISPLAY.

   User should make sure he has indicated the correct file number for the MAPTAP, and that the MAPTAP does in fact have the correct number of files.

2. ***DSPLAY/SETUP3 --- CORE OVERFLOW --- EXECUTION TERMINATED***

   Subroutine SETUP3 computes the storage needed for the specific problem, if more is needed than available this diagnostic is printed.

3. AA0650 INVALID SUPERVISOR CONTROL CARD.

   The invalid card is printed along with this message. Check the spelling of the KEYWORD.

4. WRITE ON UNIT N TERMINATED ABNORMALLY DAS TAPE NOT CREATED. ISTAT = _____.

   Attempt to write on DAS output tape failed. This usually indicates a bad tape. ISTAT is the status code returned from the system binary I/O routine NTRAN. Execution continues.

5. END OF TAPE ENCOUNTERED ON DAS UNIT LAST LINE = N.

The end-of-tape marker was encountered on the DAS output tape. The last line written was N. Execution of DISPLAY continues without further attempts to write on DAS tape.

6. *****FISHER THRESHOLD REQUESTED-NOT PERFORMED
...NO. SAMPLES FOR SUBCLASS "NAME" (=N) IS LESS THAN OR EQUAL TO NUMBER OF CHANNELS (=M)

The program compares the number of samples (pixels) for each training subclass to the number of channels. If the number of samples is less than or equal the number of channels, the threshold request is bypassed for the subclass.

7. FDIST-OVERFLOW CONDITION IN FISHIN ROUTINE FOR SUBCLASS=XXXX. THRESHOLD SET TO 999.999

The FISHIN routine has returned an overflow condition. The threshold value is set to 999.999 by the program, for the subclass.