The COVERX Service Module of the FORSS System

J. D. Drischler
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The COVERX Service Module of the FORSS System

J. D. Drischler

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The COVERX Service Module includes seven execution paths to aid in understanding and using multigroup cross-section covariance matrices contained in the standard interface file COVERX. The execution paths provide the following operations on COVERX file(s):

1. List the contents of a COVERX file.

2. Allow adding new multigroup cross-section covariance matrices to an existing COVERX file.

3. Allow deletion of multigroup covariance matrices from an existing COVERX file.


5. Change the mode of a file from unformatted to formatted and conversely.

6. Allow modification of the records contained in a COVERX file.

7. Selectively edits or copies a file.
I. INTRODUCTION

Multigroup cross-section covariance matrices are created using the PUFF covariance file processing code\(^1\) and placed on a proposed CCCC\(^2\) file, COVERX.\(^3\) Each covariance matrix is identified by the matrix control record of the COVERX file. The material and reaction type identification numbers are the MAT and MT numbers used in the ENDF/B\(^4\) files. Libraries\(^5\) of multigroup matrices in COVERX format are currently available through the Engineering Physics Information Center (EPIC) at Oak Ridge National Laboratory and the National Nuclear Data Center (NNDC) at Brookhaven National Laboratory. The COVERX format is described in Appendix A. A sample problem utilizing the seven execution paths of the COVERX Service Module is described in Appendix B.

When the generation of a COVERX file(s) is complete for a study, a careful review is recommended before it is used. The COVERX service module is available to aid in this review. If identification problems or errors are detected, they can often be quickly corrected by the COVERX service module. At present, the module has seven execution paths which perform the following tasks:

1. Lists the contents of a COVERX file.
2. Allows additional multigroup cross-section covariance matrices to be added to an existing COVERX file.
3. Allows deletions of multigroup cross-section covariance matrices from an existing COVERX file.
5. Changes the mode of a file from unformatted to formatted and conversely.
6. Allows modification of the records contained in the COVERX file.

7. Selectively edits or copies a file.

The user selects the desired execution path by entering one of the following words on a card beginning in column 1: LIST, ADD, DELETE, MERGE, CONVERT, FIX, EDIT. Additional FIDO input requirements are described for each execution path.

II. COVERX FILE EXECUTION PATHS

A. List

Input Data

LIST

I$$ Integer Parameter [1]

NBIN - Unit number of the COVERX file, if NBIN < 0, only the matrix control records will be listed.

B. Add

This execution path allows multigroup cross-section covariance matrices to be added by creating a new file from the card input. The existing and newly created files are then merged producing a new COVERX file.

Input Data

ADD

I$$ Integer Parameters [4]
NOLD - Unit number of existing COVERX file
NADD - The number of covariances to be added
NEW - Unit number of new COVERX file
NSSS - Unit number of a scratch device (default = 31)

Integer Parameters [4]. The MATRIX CONTROL record of the COVERX file.

MAT1 - Material 1 ID
MT1 - Reaction type 1 ID
MAT2 - Material 2 ID
MT2 - Reaction type 2 ID

Floating Point Parameters [NG]. The MATERIAL REACTION TYPE CROSS SECTION AND STANDARD DEVIATIONS record of the COVERX file. NG is the number of groups of the existing COVERX file. The standard deviations are automatically calculated by the code.

(CRS(J), J=1,NG)

CRS - Cross sections (from $E_{\text{max}}$ - $E_{\text{min}}$)

Integer Parameters [NG*2+1]. The BLOCK CONTROL record of the COVERX file.

Block control = (JBand(J),IJJ(J),J=1,NG),(LGRP(N),N=1,NBLOK)

For simplicity in creating the block control record of a covariance matrix, let NG equal the number of groups of the existing COVERX file and let NBLOK=1. The current version of FORSS requires that NBLOK=1.
Then: the 4$$ card for a three-group problem with NBLOK=1 would be:

4$$ 3 1 3 2 3 3 3

OR: using the improved FIDO

4$$ 0 1 [NG-1]Q2 A1 [NG] 1 1@ [NG-1]Q2 0@ [NG]

This is especially useful if matrices are large.

5** Floating Point Parameters [NG*NG]. The MATRIX DATA record of the COVERX FILE. If the preceding scheme for blocking is exercised, then the entire matrix can be input in one block.

COV - Matrix data (input by col.)

T

The 2$$, 3**, 4$$, and 5** sequence is repeated until NADD entries are complete.

C. Delete

This execution path allows multigroup cross-section covariance matrices to be deleted from a COVERX file.

Input Data

DELETE

1$$ Integer Parameters [3]

NBIN - Unit number of existing COVERX file
NEW - Unit number of new COVERX file
NDEL - The number of covariances to be deleted
Integer Parameters [4*NDEL]. The MATRIX CONTROL record of the COVERX FILE.

MAT1 - Material 1 ID
MT1 - Reaction type 1 ID
MAT2 - Material 2 ID
MT2 - Reaction type 2 ID

Sequence is repeated for each covariance to be deleted

T

D. Merge

This execution path merges two existing COVERX files and creates a third file.

Input Data

MERGE

1$ Integer Parameters [3]

N1 - Unit number of original COVERX file

If identical matrix control records are encountered on both the original files (N1) and the file to be merged (N2), the matrix found on unit (N2) is written on unit (N3), and the matrix found on unit (N1) is skipped.
E. Format Conversion

This execution path implements features of the COVERT code which converts the COVERX file from unformatted (binary) to formatted card images and conversely, and also lists a COVERX file.

CONVERT

1$$ Integer Parameters [4]

NBE - Select conversion mode
  = 0, unformatted to formatted
  ≠ 0, formatted to unformatted

NIN - Unit number of existing COVERX file (DEFAULT = 23)

NOUT - Unit number of COVERX file to be prepared by COVERT
  (DEFAULT = 24)

NO6 - Print option
  > 0, file is printed on unit NO6
  ≤ 0, reduced file edit on unit |NO6|

F. Record Modification

This execution path allows modification to the records contained in a COVERX file. FIX modifies only those covariances which have been selected by previously using EDIT and updates the existing COVERX file by using MERGE.

Input Data

FIX

1$$ Integer Parameter [5]
NOLD - Unit number of existing COVERX file
   > 0, complete listing
   < 0, reduced listing
NEW - Unit number of new COVERX file
NFIX - Number of covariance matrices to be repaired
NHOL - Modify file description record
   = 0, file description record not modified
   ≠ 0, prepare 2## card
NSSS - Unit number of a scratch device (default = 31)

Doubled Precision Parameters [200(A6) words max.]. The FILE
DESCRIPTION record of the COVERX file (omit if NHOL = 0).
NUNIT - Unit number where Hollerith description of file is input
NH - Number of (A6) words in Hollerith description
Then: using the improved FIDO
   [NUNIT]6G[NH] 6H(12A6) 6Hbbbbbb E T (b = blank)
would allow NH (A6) words to be input from unit NUNIT.

Integer Parameters [8]
NMAT1 - Material 1 ID
NMT1 - Reaction type 1 ID
NMAT2 - Material 2 ID
NMT2 - Reaction type 2 ID
NCRS - Modify cross sections
   = 0, do not modify cross sections
   ≠ 0, prepare 4** card
NMT - Modify matrix control record
  = 0, no modification
  ≠ 0, prepare 5$$ card

NBLK - Modify block control record
  = 0, no modification
  ≠ 0, prepare 6$$ card

NCOV - Modify matrix data record
  < 0, switch rows and columns
  = 0, no modification
  > 0, prepare 7$$ card

4** Floating Point Parameters [NG]. The MATERIAL-REACTION TYPE CROSS
SECTIONS record of the COVERX file (omit if NCRS = 0). NG is the
number of groups of the existing COVERX file. The standard
deviations are automatically calculated by the code.
(CRS(J), J=1,NG)

CRS - Cross sections (from $E_{\text{max}} - E_{\text{min}}$)

5$$ Integer Parameters [4]. The MATRIX CONTROL record of the COVERX
file (omit if NMT = 0).
MAT1 - Material 1 ID
MT1 - Reaction type 1 ID
MAT2 - Material 2 ID
MT2 - Reaction type 2 ID

6$$ Integer Parameters [NG*2+1]. The BLOCK CONTROL record of the
COVERX file (omit if NBLK = 0).
Block control = (JBAND(J), IJJ(J), J=1,NG), (LGRP(N), N=1,NBLOK)

JBAND(J) - Band for group (J)
IJJ(J) - Position of diagonal element for group (J)
LGRP(N) - Number of groups in block (N)

For simplicity in creating the block control record of a covariance matrix, let NG equal the number of groups of the existing COVERX file and let NBLOK = 1. The current version of FORSS requires that NBLOK = 1.

Then: the 6$$ card for a three-group problem with NBLOK = 1 would be:
6$$ 3 1 3 2 3 3 3

OR: using the improved FIDO
6$$ 0 1 [NG-1]Q2 A[NG] 1 1@ [NG-1]Q2 0@ [NG]

This is especially useful if matrices are large.

Floating Point Parameters [NG*NG]. The MATRIX DATA record of the COVERX file (omit if NCOV = 0). If the preceding scheme for blocking is exercised, then the entire matrix can be input in one block.

COV - Matrix data (input by col.)

The 3$$ through 7** sequence if repeated until NFIX entries are complete.

G. File Edit/Copy

This execution path permits selective listing and copying of a COVERX file. Each multigroup cross-section covariance matrix in a COVERX file is identified by the COVERX matrix control record. This record contains five
numbers: Material 1 (MAT1), reaction type 1 (MT1), Material 2 (MAT2), reaction type 2 (MT2), and the number of blocks into which matrix is subdivided (not used as input). Correlations between material-reaction types are extracted from the COVERX file using MAT1, MT1 as the first material-reaction type (column designation), and MAT2, MT2 the second material-reaction type (row designation).

As each covariance matrix is read from the COVERX file, its first four identifiers are compared with the corresponding identifiers in each edit command. If equality is found between all of the identifiers in an edit command and the corresponding identifiers from the matrix control record of the COVERX file, the multigroup cross-section covariance matrix qualifies for the edit/copy operation.

Input Data

EDIT

1$$ Integer Parameters [4]

NBIN - Unit number of existing COVERX file
> 0, complete listing
< 0, file identification

NC - Number of edit commands

NEW - Copy option
> 0, the unit number of a COVERX file to be written containing only those matrices edited
< 0, file not written

NSS - Unit number of a scratch device (default = 31)
$2\$$  Integer Parameters \([4^{\ast}\text{NC}]\)

MAT1 - Material 1 ID

MT1 - Reaction type 1 ID

MAT2 - Material 2 ID

MT2 - Reaction type 2 ID

Complete NC edit commands
ACKNOWLEDGEMENTS

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REFERENCES


3. J. L. Lucius and C. R. Weisbin, "Interface Specifications for Sensitivity Profiles (SENPRO) and Covariance Files (COVERX)," Presentation to the Committee on Computer Code Coordination, Los Alamos Scientific Laboratory (May 1976).


APPENDIX A

The Format for Standard Interface File COVERX for Multigroup Cross-Section Covariance Matrices
C***********************************************************************
C REVISED 11/01/77
C
C COVERX
C THIS FILE CONTAINS CROSS SECTIONS, STANDARD DEVIATIONS, AND
C BY DESIGNATION EITHER COVARIANCE, RELATIVE COVARIANCE,
C OR CORRELATION MATRICES.
C
C A FILE SUCH AS THIS IS NEEDED BY ORNL - FOBSS
C
C J. L. LUCIUS
C***********************************************************************

FILE STRUCTURE

RECORD TYPE

FILE IDENTIFICATION
FILE CONTROL
FILE DESCRIPTION
NEUTRON GROUP BOUNDARIES
GAMMA GROUP BOUNDARIES
MAT - MT CONTROL

(REPEAT FOR ALL MATERIAL- REACTION TYPE PAIRS)
MAT-MT CROSS SECTION AND
STANDARD DEVIATIONS

(REPEAT FOR ALL MATERIALS)
MAT MATRIX CONTROL
BLOCK CONTROL

(REPEAT FOR ALL BLOCKS)
MATRIX DATA

FILE IDENTIFICATION

HNAME, (HUSE(I), I=1,2), IVERS

HNAME, (HUSE(I), I=1,2), IVERS

FORMAT(11H OVF COVERX, A6, 1H*, 2A6, 1H*, I6)
HNAME ROLLERITH FILE NAME-COVERX (A6)
HUSE ROLLERITH USER IDENTIFICATION (A6)
IVER VERSION NUMBER
MULT 1 - A6 IS SINGLE PRECISION WORD
2 - A6 IS DOUBLE PRECISION WORD
FILE CONTROL

NGROUP, NNGRUP, NNGRP, NTYPE, NMMP, NMTRIX, NHOLL

7

FORMAT(4H1D,7I6)

NGROUP NUMBER OF ENERGY GROUPS
NNGRUP NUMBER OF NEUTRON GROUPS
NNGRP NUMBER OF GAMMA GROUPS
NTYPE TYPE OF DATA

1 - COVARIANCE MATRIX, STANDARD DEVIATION
2 - RELATIVE COVARIANCE MATRIX, RELATIVE STANDARD DEVIATION
3 - CORRELATION MATRIX, STANDARD DEVIATION

NMMP NUMBER OF MAT-MAT PAIRS
NMTRIX NUMBER OF MATRICES
NHOLL NUMBER OF HOLLERITH WORDS IN DESCRIPTION

FILE DESCRIPTION

(WORDS(J), J=1, NHOLL)
MULT*NHOLL

FORMAT(4H2D,1H*,11A6/(11A6))

WORDS(J) HOLLERITH DESCRIPTION OF FILE

NEUTRON GROUP BOUNDARIES

(GPBN(J), J=1, NNGRUP), ENMIN

PRESENT IF NNGRUP.GT.0

FORMAT(4H3D,5E12.4/(6E12.4))

GPBN(J) MAXIMUM ENERGY BOUND OF NEUTRON GROUP(J) (EV)
ENMIN MINIMUM ENERGY OF NEUTRON ENERGY RANGE

GAMMA GROUP BOUNDARIES

(GPBG(J), J=1, NNGRUP), EGMIN

PRESENT IF NNGRUP.GT.0

FORMAT(4H4D,5E12.4/(6E12.4))

GPBG(J) MAXIMUM ENERGY BOUND OF GAMMA GROUP(J) (EV)
EGMIN MINIMUM ENERGY OF GAMMA ENERGY RANGE
**MAT - MT CONTROL**

MATID(I) - MATERIAL IDENTIFICATION NUMBER
MTID(I) - REACTION TYPE IDENTIFICATION NUMBER
MWGT(I) - CROSS SECTION WEIGHTING OPTION
1 - CONSTANT
2 - 1/E
3 - THERMAL + 1/E + FISSION
4 - ARBITRARY
5 - COMBINED CTR CRBR

**MATERIAL - REACTION TYPE CROSS SECTIONS AND ERROR FILES**

CRS(J), J=1, NGROUP - CROSS SECTIONS
ERROR(J), J=1, NGROUP - ERROR FILES
2*NGROUP

**MATRIX CONTROL**

MAT1, MT1, MAT2, MT2, NBLOK
5

**BLOCK CONTROL**

(JBAND(J), IJJ(J), J=1, NGROUP), (LGRP(N), N=1, NBLOK)

JBAND(J) - BANDWIDTH FOR GROUP J
IJJ(J) - POSITION OF DIAGONAL ELEMENT FOR GROUP J
LGRP(N) - NUMBER OF GROUPS IN BLOCK(N)
**CR MATRIX DATA**

**CL** (COV(K), K=1, KMAX)

**CC** KMAX=SUM OVER JBAND(J) FOR ALL J IN BLOCK N

**CW** KMAX

**CB** FORMAT (4H9D, 5E12.4/(6E12.4))

**CD** COV NTYPE MATRIX DATA

**COEP**
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APPENDIX B.

Sample Problem

The following sample input and output problem utilizes the seven execution paths available in the COVERX Service Module. The user should be aware that although all the execution paths are utilized in the sample problem, the input parameters may vary depending on the user's requirements.

A description of the input to the sample problem follows:

1. CONVERT - The formatted card image COVERX file residing on unit 24 is converted to a binary file on unit 32, and the resulting file is listed using the reduced file edit option.

2. EDIT - The $^{235}\text{U}(n,f)$ covariance matrix is extracted from the binary COVERX file and copied to unit 33 creating a new COVERX file containing one covariance matrix. The output for EDIT gives a complete listing of the COVERX file.

3. FIX - The $^{235}\text{U}(n,f)$ covariance data residing on unit 33 is changed as follows:
   
   The Hollerith description of the file is modified (2##),
   The cross sections were modified (4**),
   The matrix control record was modified renaming the $^{235}\text{U}(n,f)$ covariance data (5$$),
   The block control record was modified (6$$), and
   The covariance data was modified (7**).
The output of FIX resides on unit 34, and a complete listing of the input plus all modifications is given.

4. EDIT - Three additional covariance matrices were extracted from unit 32 and copied to unit 35.

5. MERGE - The COVERX file residing on unit 35 and the one residing on unit 34 are merged to produce a single COVERX file on unit 33 containing four covariance matrices.

6. DELETE - The covariance matrix indicated in the 2$$ array is deleted from unit 33, and the remaining covariances are placed on unit 34.

7. ADD - A new covariance indicated in the 2$$ array was added to the COVERX file residing on unit 34 with inclusion of the Block control record (4$$) and covariance data (5**). This produced a new COVERX file on unit 33.

8. LIST - The entire COVERX file residing on unit 33 was listed.
APPENDIX B.1. Job Control Cards for Local Use and Sample Input for the COVERX Service Module

"// JD000002 JCE (1807E), J DRISCHLER, 6025"
"// CLASS CPU1=10S, IC=02, R=270K"
"// STEP EXEC FORMLC,FARM, LKD=E'NCMAF,NOLIST', REGION,GO=270K"
"// LKD=COVERX CC UNIT=3330, VCL=SER=ZX0000, DISP=SHR"
"// DSN=JDD-5AN2180, COVERX, SERVICE"
"// LKED, SYSIN CC *
INCLUDE COVERX"

"// GO FT24F001 CC UNI1T=SPA, DISP=(SHR,CATLG), VCL=*
// SPACE=(TRK,(010,010), PLSE),
// DSN=ST-JOC IE075, TEF=1, JAN1780"
"// GO FT31F001 DD UNIT=SYSDA, SPACE=(TRK,(010,010)),
// DCA=(RECFM=VAST, LRECL=BLKSIZE=3120),
// DCR=(RECFC=VST, LFECL=X, ESLIZE=3120)
// GO FT32F001 DD UNIT=SYSDA, SPACE=(TRK,(010,010)),
// DCA=(RECFM=VST, LRECL=X, BLKSIZE=3120),
// DCR=(RECFC=VST, LFECL=X, ESIZE=3120)
// GO FT33F001 DD UNIT=SYSDA, SPACE=(TRK,(010,010)),
// DCA=(RECFM=VST, LRECL=X, BLKSIZE=3120),
// DCR=(RECFC=VST, LFECL=X, ESIZE=3120)
// GO FT34F001 DD UNIT=SYSDA, SPACE=(TRK,(010,010)),
// DCA=(RECFM=VST, LRECL=X, BLKSIZE=3120),
// DCR=(RECFC=VST, LFECL=X, ESIZE=3120)
// GO FT35F001 DD UNIT=SYSDA, SPACE=(TRK,(010,010)),
// DCA=(RECFM=VST, LRECL=X, BLKSIZE=3120),
// DCR=(RECFC=VST, LFECL=X, ESIZE=3120)
// GO FT36F001 DD UNIT=SYSDA, SPACE=(TRK,(010,010)),
// DCA=(RECFM=VST, LRECL=X, BLKSIZE=3120),
// DCR=(RECFC=VST, LFECL=X, ESIZE=3120)
// GO FT37F001 DD UNIT=SYSDA, SPACE=(TRK,(010,010)),
// DCA=(RECFM=VST, LRECL=X, BLKSIZE=3120),
// DCR=(RECFC=VST, LFECL=X, ESIZE=3120)
// GO FT38F001 DD UNIT=SYSDA, SPACE=(TRK,(010,010)),
// DCA=(RECFM=VST, LRECL=X, BLKSIZE=3120),
// DCR=(RECFC=VST, LFECL=X, ESIZE=3120)
// GO FT39F001 DD UNIT=SYSDA, SPACE=(TRK,(010,010)),
// DCA=(RECFM=VST, LRECL=X, BLKSIZE=3120),
// DCR=(RECFC=VST, LFECL=X, ESIZE=3120)
// GO FT40F001 DD UNIT=SYSDA, SPACE=(TRK,(010,010)),
// DCA=(RECFM=VST, LRECL=X, BLKSIZE=3120),
// DCR=(RECFC=VST, LFECL=X, ESIZE=3120)
// GO FT41F001 DD UNIT=SYSDA, SPACE=(TRK,(010,010)),
// DCA=(RECFC=VST, LRECL=X, BLKSIZE=3120),
// DCR=(RECFC=VST, LFECL=X, ESIZE=3120)
// GO FT42F001 DD UNIT=SYSDA, SPACE=(TRK,(010,010)),
// DCA=(RECFC=VST, LRECL=X, BLKSIZE=3120),
// DCR=(RECFC=VST, LFECL=X, ESIZE=3120)
// GO FT43F001 DD UNIT=SYSDA, SPACE=(TRK,(010,010)),
// DCA=(RECFC=VST, LRECL=X, BLKSIZE=3120),
// DCR=(RECFC=VST, LFECL=X, ESIZE=3120)
// GO FT44F001 DD UNIT=SYSDA, SPACE=(TRK,(010,010)),
// DCA=(RECFC=VST, LRECL=X, BLKSIZE=3120),
// DCR=(RECFC=VST, LFECL=X, ESIZE=3120)
// GO FT45F001 DD UNIT=SYSDA, SPACE=(TRK,(010,010)),
// DCA=(RECFC=VST, LRECL=X, BLKSIZE=3120),
// DCR=(RECFC=VST, LFECL=X, ESIZE=3120)
// GO FT46F001 DD UNIT=SYSDA, SPACE=(TRK,(010,010)),
// DCA=(RECFC=VST, LRECL=X, BLKSIZE=3120),
// DCR=(RECFC=VST, LFECL=X, ESIZE=3120)
// GO FT47F001 DD UNIT=SYSDA, SPACE=(TRK,(010,010)),
// DCA=(RECFC=VST, LRECL=X, BLKSIZE=3120),
// DCR=(RECFC=VST, LFECL=X, ESIZE=3120)
// GO FT48F001 DD UNIT=SYSDA, SPACE=(TRK,(010,010)),
// DCA=(RECFC=VST, LRECL=X, BLKSIZE=3120),
// DCR=(RECFC=VST, LFECL=X, ESIZE=3120)
// GO FT49F001 DD UNIT=SYSDA, SPACE=(TRK,(010,010)),
// DCA=(RECFC=VST, LRECL=X, BLKSIZE=3120),
// DCR=(RECFC=VST, LFECL=X, ESIZE=3120)
// GO FT50F001 DD *
CONVERT"
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APPENDIX B.2. Sample Output for the COVERX Service Module
I. CONVERT OUTPUT

COVERX EXECUTION PATH SELECTED... CONV

I.S ADAY 4 ENTRIES READ

FILE CONTROL RECORD... 10 6 6 6 9 3 2 13 82 11 FILE DESCRIPTION... 20 EISSION SPECTRUM COVARIANCE MATRIX LIBRARY (GCDV & WEIGHTING).

NEUTRON GROUP FUNDAMENTALS.................. 30 2.0000E 07 3.6770E 06 1.3300E 06 1.6790E 05 1.3970E 04 1.70000E 03

MATRIX CENTREL RECORD .............. NO. 1. 70 1261 18 1261 18 1
MATRIX CENTREL RECORD .............. NO. 2. 70 1262 18 1262 18 1
MATRIX CENTREL RECORD .............. NO. 3. 70 1263 18 1263 18 1
MATRIX CENTREL RECORD .............. NO. 4. 70 1264 18 1264 18 1
MATRIX CENTREL RECORD .............. NO. 5. 70 1265 18 1265 18 1
MATRIX CENTREL RECORD .............. NO. 6. 70 1266 18 1266 18 1
MATRIX CENTREL RECORD .............. NO. 7. 70 1267 18 1267 18 1
MATRIX CENTREL RECORD .............. NO. 8. 70 1268 18 1268 18 1
MATRIX CENTREL RECORD .............. NO. 9. 70 1269 18 1269 18 1
MATRIX CENTREL RECORD .............. NO. 10. 70 1270 18 1270 18 1
MATRIX CENTREL RECORD .............. NO. 11. 70 1271 18 1271 18 1
MATRIX CENTREL RECORD .............. NO. 12. 70 1272 18 1272 18 1
MATRIX CENTREL RECORD .............. NO. 13. 70 1273 18 1273 18 1
MATRIX CENTREL RECORD .............. NO. 14. 70 1274 18 1274 18 1
MATRIX CENTREL RECORD .............. NO. 15. 70 1275 18 1275 18 1
MATRIX CENTREL RECORD .............. NO. 16. 70 1276 18 1276 18 1
MATRIX CENTREL RECORD .............. NO. 17. 70 1277 18 1277 18 1
MATRIX CENTREL RECORD .............. NO. 18. 70 1278 18 1278 18 1
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MATRIX CENTREL RECORD .............. NO. 20. 70 1280 18 1280 18 1
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MATRIX CENTREL RECORD .............. NO. 25. 70 1285 18 1285 18 1
MATRIX CENTREL RECORD .............. NO. 26. 70 1286 18 1286 18 1
MATRIX CENTREL RECORD .............. NO. 27. 70 1287 18 1287 18 1
MATRIX CENTREL RECORD .............. NO. 28. 70 1288 18 1288 18 1
MATRIX CENTREL RECORD .............. NO. 29. 70 1289 18 1289 18 1
MATRIX CENTREL RECORD .............. NO. 30. 70 1290 18 1290 18 1
MATRIX CENTREL RECORD .............. NO. 31. 70 1291 18 1291 18 1
MATRIX CENTREL RECORD .............. NO. 32. 70 1292 18 1292 18 1

THE FILE HAS BEEN SUCCESSFULLY COPIED.
II. EDIT OUTPUT

COVARFX EXECUTION PATH SELECTED... EDIT

19 ARRAY 4 ENTRIES READ

21

IN EDIT, CORE AVAILABLE: 25000 CORE NEEDED 145

21 ARRAY 4 ENTRIES READ

MAT - W1 TYPE CROSS SECTIONS AND STANDARD DEVIATIONS
1.22100E 07 1.25400E 05 1.25530E 05 1.56000E 00 1.08300E-02 2.45200E-02 2.61000E-02 2.40300E-02

MAT - W1 CENTER
1261 10

BLOCK CENTER
1 6 2 6 3 6 5

RELATIVE COVARIANCE MATRIX
9.52400E-04 1.24600E-04 1.51600E-04 4.25900E-05 8.14900E-06 3.0
3.74100E-04 5.94600E-04 4.31600E-05 1.59900E-05 4.25900E-06 5.0
1.51600E-04 1.24600E-04 7.17100E-05 9.89900E-06 2.84700E-06 0.0
0.0 0.0 0.0 0.0 5.40300E-04 1.09200E-03

27.
III. FIX OUTPUT

COVERX EXECUTION PATH SELECTED... FIX
1# ARRAY 6 ENTRIES READ

OT

2# ARRAY 200 ENTRIES READ

OT

IN FIX, CCPE AVAILABLE 25000 CCPE NEEDED 122
NMPHA 1 AMTRIX 1 MCE 1
FILT 10, COVERXERAL - FCCPE 2
3# ARRAY 8 ENTRIES READ

OT

4# ARRAY 6 ENTRIES READ

OT

5# ARRAY 4 ENTRIES READ

6# ARRAY 13 ENTRIES READ

7# ARRAY 36 ENTRIES READ
III. FIX OUTPUT (cont'd.)

FILE CONTROL: e  e  e  2  1  1  4

FILE DESCRIPTION:
THIS IS A SAMPLE FILE...

GROUP BOUNDARIES:

2.0000E+02  2.0000E+02  1.8293E+06  1.0000E+00

MAT-NT CONTROL: 1266  1  4

MAT-MT CONTROL:

1.0000E+00  1.0000E+00  1.0000E+00  1.0000E+00  2.197E-03  2.197E-03  2.197E-03

MAT-RX CONTROL:

19  129A  1  1  1

BLOCK CONTROL:

1  4  6  6  3  3  3  4  6  5

RELATIVE COVARIANCE MATRIX:

0.0  0.0  0.0  0.0  0.0  0.0  0.0
0.0  0.0  0.0  0.0  0.0  0.0  0.0
0.0  0.0  0.0  0.0  0.0  0.0  0.0
0.0  0.0  0.0  0.0  0.0  0.0  0.0
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0.0  0.0  0.0  0.0  0.0  0.0  0.0
0.0  0.0  0.0  0.0  0.0  0.0  0.0
0.0  0.0  0.0  0.0  0.0  0.0  0.0
### IV. EDIT OUTPUT

**COVEREX EXECUTION DATE SELECTED**

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<td>14 APR 87</td>
<td>4</td>
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**EDIT**

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<th>CMAC AVAILABLE</th>
<th>CMAC NEEDED</th>
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</thead>
<tbody>
<tr>
<td>1971</td>
<td>2500</td>
<td>1262 16 1264 18</td>
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<th>DATE</th>
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<td>1262 16 1264 18</td>
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**FILE CONTROL**

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<tbody>
<tr>
<td>FILE CONTROL</td>
<td>12</td>
<td>4</td>
</tr>
</tbody>
</table>

**FILE DESCRIPTION**

Fission Spectrum Cleariance Matrix Library (GODIVA Weighting).

**GROUP DEVIATIONS**

- 1.35E00 00 4.97E00 05 1.9320E 05 4.0870E 04 1.0000E-05

**MAT - MT CONTROL**

| 1262 | 18 | 16 | 1264 | 18 | 4 |

**MAT - MT TYPE CROSS SECTIONS AND STANDARD DEVIATIONS**

- 6.4300E-01 4.7800E-01 1.5300E-02 1.0400E-04 4.0350E-05 7.0190E-05 3.1200E-02 2.4310E-02 2.5900E-02 3.1460E-02 2.7800E-02 2.7300E-02 2.2400E-02 2.4000E-02 2.0000E-02

**MATRIX CONTROL**

| 1262 | 19 | 1262 | 18 | 1 |

**BLOCK CONTROL**

| 1 | 6 | 3 | 6 | 3 | 6 | 4 | 6 | 5 |
IV. EDIT OUTPUT (cont'd.)

|---------------------------|-----------------------------------------------------------------------------|-----------------------------------------------------------------------------|-----------------------------------------------------------------------------|-----------------------------------------------------------------------------|-----------------------------------------------------------------------------|

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<td>2</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>6</td>
<td>3</td>
</tr>
</tbody>
</table>

| RELATIVE COVARIANCE MATRIX | 3.50400E-04 2.54000E-04 1.85000E-05 1.84000E-06 8.01400E-07 3.0 |
|-----------------------------|-----------------------------------------------------------------------------|-----------------------------------------------------------------------------|-----------------------------------------------------------------------------|-----------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| 3.95100E-04 4.34000E-04 1.84000E-05 1.59000E-06 4.36600E-07 0.0 |
| 1.81900E-04 3.24000E-04 7.17400E-05 5.61300E-06 2.37000E-07 0.0 |
| 4.12500E-05 1.58000E-05 5.2150E-06 7.60100E-07 3.58000E-08 3.0 |
| 8.14900E-06 4.56900E-06 2.34300E-06 3.56000E-07 7.26300E-08 3.0 |
| 0.0 | 9.3 | 0.0 |

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<th>19</th>
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<td>5</td>
</tr>
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<td></td>
<td>6</td>
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</table>

| RELATIVE COVARIANCE MATRIX | 7.59100E-04 4.00000E-04 1.55000E-05 1.84000E-06 7.99400E-07 2.28500E-07 |
|-----------------------------|-----------------------------------------------------------------------------|-----------------------------------------------------------------------------|-----------------------------------------------------------------------------|-----------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| 4.90500E-04 5.45700E-04 3.1700E-05 1.82000E-06 4.69800E-07 7.93800E-08 |
| 1.85500E-04 3.31700E-04 7.45700E-05 5.49000E-06 2.34800E-07 9.83200E-08 |
| 4.46000E-05 1.63000E-05 5.80400E-06 8.67400E-07 4.00900E-07 2.62300E-08 |
| 7.29400E-06 4.00900E-05 7.60700E-07 4.89000E-08 7.37200E-09 3.0 |
| 2.28500E-07 7.88800E-07 8.09200E-07 2.62200E-07 5.37200E-08 1.15000E-09 |
V. MERGE OUTPUT

COVERX EXECUTION PATH SELECTED... MERG

I X ARRAY 3 ENTRIES READ

DT

IN EMERG, CORE AVAILABLE 25000 CORE NEEDED 150

MERGE 25 24 33
IFC 6 6 0 2 2 3 11
JFC 6 6 0 2 1 1 4
1262 16 4 1264 18 4 1266 19 4
VI. DELETE OUTPUT

COVERX EXECUTION PATH SELECTED... DELE

128 33 34 1 T

1st ARRAY 3 ENTRIES READ

UT
IN FDBL, CODE AVAILABLE 25000 CODE NEEDED 114

2nd ARRAY 4 ENTRIES READ

UT

NAME= 33 NEW= 34 N= 1

1262 18 1264 18

***** DELETEC ***** MATRIX CONTROL RECORD... NO. 2 1262 18 1264 18
VII. ADD OUTPUT

COVERX EXECUTION PATH SELECTED... ADD

13 ARRAY 4 ENTRIES READ

0T

IN ADD, CCFE AVAILABLE 25000 CORE NEEDED

21 ARRAY 4 ENTRIES READ

0T

43 ARRAY 13 ENTRIES READ

52 ARRAY 36 ENTRIES READ

0T

IN FMERG, CCFE AVAILABLE 25000 CORE NEEDED 190

MERGE 34 31 33

IFC 6 6 0 2 3 3 4

JFC 6 6 0 2 0 1 4

1262 18 4 1264 18 4 1266 19 4
THE FILE HAS BEEN SUCCESSFULLY LISTED.
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WAS INTENTIONALLY
LEFT BLANK
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