```
====================================================================== Fixup
                                                                       Fixup
     PROGRAM FIXUP                                                     Fixup
     VERSION 84-1 (NOVEMBER 1984)                                      Fixup
     VERSION 86-1 (JANUARY 1986) *IMPROVED BASED ON USER COMMENTS       Fixup
                                 *FORTRAN-77/H VERSION                 Fixup
     VERSION 86-2 (JUNE 1986)    *ALLOW CREATION OF SECTIONS OF CROSS   Fixup
                                  SECTIONS WHICH ARE NOT PRESENT IN    Fixup
                                  THE ORIGINAL EVALUATION              Fixup
     VERSION 88-1 (JULY 1988)    *OPTION...INTERNALLY DEFINE ALL I/O    Fixup
                                  FILE NAMES (SEE, SUBROUTINE FILEIO   Fixup
                                  FOR DETAILS).                        Fixup
                                 *IMPROVED BASED ON USER COMMENTS.      Fixup
     VERSION 89-1 (JANUARY 1989) *PSYCHOANALYZED BY PROGRAM FREUD TO    Fixup
                                  INSURE PROGRAM WILL NOT DO ANYTHING  Fixup
                                  CRAZY.                               Fixup
                                 *UPDATED TO USE NEW PROGRAM CONVERT    Fixup
                                  KEYWORDS.                            Fixup
                                 *ADDED LIVERMORE CIVIC COMPILER        Fixup
                                  CONVENTIONS.                         Fixup
     VERSION 89-2 (MARCH 1989)   *ADDED ENDF/B-VI SUMMATION RULES AND   Fixup
                                  DEFINED MF AND MT NUMBERS. PROGRAM   Fixup
                                  WILL NOW USE MF=1, MT=451 TO DEFINE  Fixup
                                  THE ENDF/B FORMAT OF THE DATA (E.G.,  Fixup
                                  ENDF/B-VI OR EARLIER) AND USE THE    Fixup
                                  CORRECT SUMMATION RULES FOR EACH     Fixup
                                  VERSION OF THE ENDF/B FORMAT. IF     Fixup
                                  MF=1, MT=451 IS NOT PRESENT PROGRAM  Fixup
                                  WILL USE ENDF/B-VI SUMMATION         Fixup
                                  CONVENTIONS AS A DEFAULT.            Fixup
     VERSION 90-1 (JUNE 1990)    *UPDATED BASED ON USER COMMENTS        Fixup
                                 *ADDED PHOTON INTERACTION, MF=23       Fixup
     VERSION 91-1 (JUNE 1991)    *ADDED FORTRAN SAVE OPTION             Fixup
                                 *NEW MORE CONSISTENT ENERGY OUTPUT     Fixup
                                  ROUTINE                              Fixup
     VERSION 92-1 (JANUARY 1992) *ADDED OPTION TO CALCULATE RATIOS,     Fixup
                                  E.G., CAPTURE/FISSION AND PRODUCTS,  Fixup
                                  NU-BAR*FISSION - AND OUTPUT THE      Fixup
                                  RESULTS IN THE ENDF/B FORMAT (SEE,   Fixup
                                  BELOW - CREATING RATIOS AND PRODUCTS) Fixup
                                 *ALLOW TOTAL NU-BAR (MF=1, MT=452) TO  Fixup
                                  BE USED IN DEFINING RATIOS OR        Fixup
                                  PRODUCTS.                            Fixup
                                 *ALLOW ALL CROSS SECTIONS TO BE PUT    Fixup
                                  ON A UNIFORM ENERGY GRID.            Fixup
                                 *NOTE, CHANGE IN INPUT FORMAT FOR      Fixup
                                  RANGES OF MT NUMBERS                 Fixup
                                 *COMPLETELY CONSISTENT I/O ROUTINES -  Fixup
                                  TO MINIMIZE COMPUTER DEPENDENCE.     Fixup
     VERSION 93-1 (JULY 1993)    *CORRECTED ALGORITHM TO CREATE UNIFORM Fixup
                                  ENERGY GRID.                         Fixup
     VERSION 94-1 (JANUARY 1993) *VARIABLE ENDF/B DATA FILENAMES        Fixup
                                  TO ALLOW ACCESS TO FILE STRUCTURES    Fixup
                                  (WARNING - INPUT PARAMETER FORMAT     Fixup
                                  HAS BEEN CHANGED)                    Fixup
                                 *INCREASED PAGE SIZE FROM 1002 TO      Fixup
                                  12000 DATA POINTS.                   Fixup
                                 *CLOSE ALL FILES BEFORE TERMINATING    Fixup
                                  (SEE, SUBROUTINE ENDIT)              Fixup
     VERSION 96-1 (JANUARY 1996) *COMPLETE RE-WRITE                     Fixup
                                 *IMPROVED COMPUTER INDEPENDENCE        Fixup
                                 *ALL DOUBLE PRECISION                  Fixup
                                 *ON SCREEN OUTPUT                      Fixup
```

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                           *UNIFORM TREATMENT OF ENDF/B I/O       Fixup
                           *IMPROVED OUTPUT PRECISION             Fixup
                           *DEFINED SCRATCH FILE NAMES            Fixup
                           *INCREASED PAGE SIZE FROM 12000 TO     Fixup
                            36000 DATA POINTS.                    Fixup
VERSION 99-1 (MARCH 1999)  *CORRECTED CHARACTER TO FLOATING       Fixup
                            POINT READ FOR MORE DIGITS            Fixup
                           *UPDATED TEST FOR ENDF/B FORMAT        Fixup
                            VERSION BASED ON RECENT FORMAT CHANGE Fixup
                           *GENERAL IMPROVEMENTS BASED ON         Fixup
                            USER FEEDBACK                         Fixup
VERSION 99-2 (JUNE 1999)   *ASSUME ENDF/B-VI, NOT V, IF MISSING   Fixup
                            MF=1, MT-451.                         Fixup
                           *FIXED CREATION OF SECTIONS            Fixup
VERS. 2000-1 (FEBRUARY 2000)*GENERAL IMPROVEMENTS BASED ON        Fixup
                            USER FEEDBACK                         Fixup
VERS. 2002-1 (MAY 2002)    *OPTIONAL INPUT PARAMETERS             Fixup
                           *SUMMATION RULES ARE DEFINED BASED     Fixup
                            ON CONTENTS OF TABLES.                Fixup
VERS. 2004-1 (JAN. 2004)   *GENERAL UPDATE BASED ON USER FEEDBACK Fixup
                           *INCREASED PAGE SIZE FROM 36000 TO     Fixup
                            60000 DATA POINTS.                    Fixup
VERS. 2005-1 (JAN. 2005)   *UPDATED MT CREATION TO ALLOW MAT =0   Fixup
                            INDICATING CREATE FOR ALL MATS.       Fixup
VERS. 2007-1 (JAN. 2007)   *CHECKED AGAINST ALL ENDF/B-VII        Fixup
                           *INCREASED PAGE SIZE FROM 60,000 TO    Fixup
                            600,000 DATA POINTS.                  Fixup
                                                                  Fixup
OWNED, MAINTAINED AND DISTRIBUTED BY                              Fixup
-----------------------------------                               Fixup
THE NUCLEAR DATA SECTION                                          Fixup
INTERNATIONAL ATOMIC ENERGY AGENCY                                Fixup
P.O. BOX 100                                                      Fixup
A-1400, VIENNA, AUSTRIA                                           Fixup
EUROPE                                                            Fixup
                                                                  Fixup
ORIGINALLY WRITTEN BY                                             Fixup
-------------------------------------                             Fixup
DERMOTT E. CULLEN                                                 Fixup
UNIVERSITY OF CALIFORNIA                                          Fixup
LAWRENCE LIVERMORE NATIONAL LABORATORY                            Fixup
L-159                                                             Fixup
P.O. BOX 808                                                      Fixup
LIVERMORE, CA 94550                                               Fixup
U.S.A.                                                            Fixup
TELEPHONE  925-423-7359                                           Fixup
E. MAIL    CULLEN1@LLNL.GOV                                       Fixup
WEBSITE    HTTP://WWW.LLNL.GOV/CULLEN1                            Fixup
                                                                  Fixup
PURPOSE                                                           Fixup
=======                                                           Fixup
THIS PROGRAM IS DESIGNED TO READ EVALUATED DATA IN THE ENDF/B     Fixup
FORMAT, PERFORM CORRECTIONS AND OUTPUT THE RESULT IN THE ENDF/B    Fixup
FORMAT. TWO TYPES OF CORRECTIONS ARE POSSIBLE (1) AUTOMATIC AND   Fixup
(2) OPTIONAL (BASED ON USER INPUT) CORRECTIONS.                    Fixup
                                                                  Fixup
ONE OF THE MOST IMPORTANT FUNCTIONS OF THIS PROGRAM IS TO         Fixup
RE-DEFINE ALL REDUNDANT CROSS SECTIONS (E.G. TOTAL) TO BE EXACTLY Fixup
EQUAL TO THE SUM OF ITS PARTS. THIS PROCEDURE ELIMINATES THE      Fixup
PROBLEM WITH MANY ENDF/B EVALUATIONS, WHERE DUE TO THE USE OF     Fixup
NON-LINEAR INTERPOLATION LAWS THE TOTAL MAY BE EQUAL TO THE SUM   Fixup
OF ITS PARTS AT ALL TABULATED ENERGIES, BUT BASED ON THE          Fixup
INTERPOLATION LAWS IT CAN BE QUITE DIFFERENT AT ENERGIES BETWEEN  Fixup
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```
TABULATED ENERGIES.                                                    Fixup
                                                                       Fixup
AUTOMATIC CHECKS/CORRECTIONS                                           Fixup
============================                                           Fixup
(1) CHECK THAT MAT/MF/MT DOES NOT CHANGE UNLESS A MEND/FEND/SEND       Fixup
    LINE IS READ. IF MAT/MF/MT CHANGES A WARNING MESSAGE IS            Fixup
    PRINTED BUT NO CORRECTIVE ACTION IS TAKEN.                         Fixup
(2) ALL LINES WITHIN A GIVEN MAT WILL BE SEQUENTIALLY NUMBERED         Fixup
    ON OUTPUT.                                                         Fixup
                                                                       Fixup
OPTIONAL CHECKS/CORRECTIONS                                            Fixup
===========================                                            Fixup
THE FOLLOWING NUMBERS CORRESPOND TO THE INPUT DATA OPTION COLUMNS      Fixup
(SEE THE DESCRIPTION OF THE INPUT BELOW)                               Fixup
                                                                       Fixup
(1) CORRECT ZA AND AWR IN ALL SECTIONS. CHECK TO INSURE THAT THE       Fixup
    C1 AND C2 VALUES (ZA AND AWR) ARE THE SAME IN ALL SECTIONS.        Fixup
    THE C1 AND C2 OF THE FIRST SECTION READ ARE ASSUMED TO BE          Fixup
    CORRECT AND ARE USED FOR COMPARISON. IF THE C1 AND/OR C2 OF        Fixup
    THE FIRST SECTION ARE NOT POSITIVE AN ERROR MESSAGE IS OUTPUT      Fixup
    AND THE MATERIAL IS COPIED WITHOUT CHANGE.                         Fixup
    NOTE....TO CHANGE THE ZA AND/OR AWR OF ANY MATERIAL IT IS          Fixup
    MERELY NECESSARY TO CHANGE THE ZA AND/OR AWR IN THE FIRST          Fixup
    SECTION OF THE MATERIAL AND USE THIS OPTION TO AUTOMATICALLY       Fixup
    CHANGE ALL OTHER SECTIONS.                                         Fixup
(2) CORRECT CROSS SECTION (MF=3) THRESHOLDS. THE Q-VALUE AND AWR       Fixup
    ARE USED TO DERIVE THE REACTION THRESHOLD USING THE RELATION,      Fixup
                                                                       Fixup
    E-THRESHOLD = -(Q-VALUE)*(AWRE+1.0)/AWRE                           Fixup
                                                                       Fixup
    IF THE THRESHOLD IS POSITIVE THE CROSS SECTION IS CHECKED TO       Fixup
    INSURE THAT THE FIRST TABULATED POINT IS AT THE THRESHOLD AND      Fixup
    HAS A ZERO CROSS SECTION. IF NOT, THE CROSS SECTION WILL BE        Fixup
    CHANGED.                                                           Fixup
    (A) IF THE FIRST TABULATED POINT IS ABOVE THE THRESHOLD AND        Fixup
        HAS A ZERO CROSS SECTION, THE POINT IS DELETED AND A POINT     Fixup
        IS INSERTED AT THE THRESHOLD.                                  Fixup
    (B) IF THE FIRST TABULATED POINT IS ABOVE THE THRESHOLD AND        Fixup
        HAS A NON-ZERO CROSS SECTION, A POINT WITH ZERO CROSS          Fixup
        SECTION IS INSERTED AT THE THRESHOLD.                          Fixup
    (C) IF THE FIRST TABULATED POINT IS BELOW THE THRESHOLD AND        Fixup
        HAS A NON-ZERO CROSS SECTION, ALL POINTS BELOW THE             Fixup
        THRESHOLD ARE DELETED AND A POINT WITH ZERO CROSS SECTION      Fixup
        IS INSERTED AT THE THRESHOLD.                                  Fixup
(3) EXTEND ALL CROSS SECTIONS (MF=3) TO 20 MEV. IF THE TABULATED       Fixup
    CROSS SECTION ENDS BELOW 20 MEV IT WILL BE EXTENDED TO 20 MEV      Fixup
    AS EITHER ZERO (IMOPS(3)=1) OR CONSTANT (IMOPS(3)=2) EQUAL         Fixup
    TO THE LAST TABULATED VALUE.                                       Fixup
(4) ALLOW REACTION (MF=3, ANY MT) DELETION. ALL SPECIFIED              Fixup
    REACTIONS WILL BE DELETED WHEN THE DATA IS READ FROM THE           Fixup
    INPUT ENDF/B DATA FILE AND WILL NOT BE IN THE OUTPUT ENDF/B        Fixup
    DATA FILE. WARNING DELETED REACTIONS MAY NOT BE USED TO DEFINE     Fixup
    ANY RECONSTRUCTED REACTIONS (I.E. REACTIONS DEFINED BY SUMMING     Fixup
    OTHER REACTIONS). SINCE DELETED REACTIONS ARE DELETED DURING       Fixup
    READING IT IS AS IF THEY NEVER EXISTED AND IF ANY DELETED          Fixup
    REACTION IS REQUIRED LATER TO DEFINE ANY SUM AN ERROR WILL         Fixup
    RESULT. THE USER MAY SPECIFY THAT THE DELETION RULES ARE TO BE     Fixup
    READ FROM INPUT (IMOPS(4)=1) OR THAT THE BUILT IN SUMMATION        Fixup
    RULES ARE TO BE USED (MOPS(4)=2). AT THE PRESENT TIME THE          Fixup
    BUILT-IN DELETION RULES ARE THAT NO SECTIONS SHOULD BE DELETED     Fixup
    (THE USER MAY OVERRIDE THIS CONVENTION BY INPUT).                  Fixup
(5) ALLOW REACTION (MF=3, ANY MT) RECONSTRUCTION BY SUMMING OTHER      Fixup
    REACTIONS. IN ORDER TO OPTIMIZE THE RUNNING TIME OF THIS           Fixup
```

PROGRAM CARE SHOULD BE EXERCISED TO MINIMIZE THE NUMBER OF TIMES THAT EACH CONTRIBUTING CROSS SECTION MUST BE USED. THE USED MAY SPECIFY THAT THE SUMMATION RULES ARE TO BE READ AS INPUT (IMOPS(5)=1) OR THAT THE BUILT IN SUMMATION RULES ARE TO BE USED (IMOPS(5)=2). THE BUILT IN SUMMATION RULES ARE DESIGNED TO USE ENDF/B CONVENTIONS AND TO MINIMIZE THE NUMBER OF TIMES THAT EACH CROSS SECTION IS USED.

(6) INSURE THAT ALL CROSS SECTIONS ARE NON-NEGATIVE (I.E. ARE ZERO OR POSITIVE). DURING READING ALL NEGATIVE CROSS SECTIONS WILL BE SET EQUAL TO ZERO AND TREATED AS SUCH DURING ALL SUBSEQUENT SUMMATIONS AND ENDF/B OUTPUT.
NOTE...THIS OPTION SHOULD NEVER BE USED WITH DATA CONTAINING BACKGROUND CROSS SECTIONS WHICH MAY BE NEGATIVE. ONLY AFTER THE RESONANCE CONTRIBUTION HAS BEEN ADDED TO THE BACKGROUND TO DEFINE THE ACTUAL CROSS SECTION IS IT VALID TO ELIMINATE NEGATIVE CROSS SECTIONS.
NOTE...THIS OPTION MAY BE USED TO DELETE NEGATIVE ELASTIC CROSS SECTIONS THAT MAY RESULT FROM RECONSTRUCTING CROSS SECTIONS FROM SINGLE LEVEL BREIT-WIGNER PARAMETERS. IF THE TOTAL CROSS SECTION IS THEN RECONSTRUCTED USING THE CORRECTED ELASTIC CROSS SECTION THE TOTAL WILL BE POSITIVE DUE TO THE CONTRIBUTIONS OF CAPTURE AND FISSION (THUS AVOIDING NUMERICAL INSTABILITY PROBLEMS DURING SELF-SHIELDING CALCULATIONS).

(7) WITHIN EACH SECTION OF CROSS SECTIONS DELETE ENERGIES THAT ARE NOT IN ASCENDING ENERGY ORDER (ENERGY REPETITION IS O.K.)

(8) WITHIN EACH SECTION OF CROSS SECTIONS ELIMINATE DUPLICATE POINTS (SUCCESSIVE POINTS WITH THE SAME ENERGY-CROSS SECTION).

(9) TEST THAT ALL SECTIONS ARE IN ASCENDING MAT/MF/MT ORDER. IF NOT, NO CORRECTIVE ACTION WILL BE TAKEN, ONLY AN ERROR MESSAGE WILL BE OUTPUT.

(10) CHECK MF/MT FOR EACH SECTION TO INSURE THAT THEY ARE DEFINED IN THE ENDF/B FORMAR MANUAL. IF THEY ARE NOT DEFINED AN ERROR MESSAGE IS PRINTED, BUT NO CORRECTIVE ACTION IS TAKEN.

(11) ALLOW SECTIONS WHICH ARE NOT PRESENT IN THE ORIGINAL (INPUT) EVALUATION TO BE CREATED. NORMALLY THIS PROGRAM WILL ONLY RECONSTRUCT AND OUTPUT SECTIONS IF THE SECTION IS PRESENT IN THE ORIGINAL EVALUATION. THIS PROCEDURE IS FOLLOWED BECAUSE NORMALLY THE PROGRAM DOES NOT KNOW HOW TO DEFINE THE CONTENTS OF THE FIRST TWO LINES OF THE SECTION (E.G., Q-VALUE, TEMPERATURE, INITIAL AND FINAL STATES). THIS OPTION MAY BE USED TO ALLOW THE PROGRAM TO READ AND SAVE A TABLE DEFINING THE CONTENTS OF THE FIRST TWO LINES OF EACH SECTION TO BE CREATED.
NOTE...IF A SECTION IS PRESENT ANY COMMAND TO CREATE IT WILL BE IGNORED.

(12)ALLOW ENERGY POINTS TO BE INSERTED. THE PROGRAM CAN READ UP TO 50, ENERGIES, MAT, MT AND USE LINEAR INTERPOLATION TO INSERT ENERGY POINTS INTO TABLES AS THEY ARE READ, E.G., INSERT AN ENERGY POINT AT THERMAL ENERGY (0.0253 EV). IF AN MAT AND/OR MT IS ZERO THIS IMPLIES = ALL - INSERT THE ENERGY IN ALL TABLES.

(13)PUT ALLOW CROSS SECTIONS ON A UNIFORM ENERGY GRID = EACH SECTION (MT) OF CROSS SECTIONS WILL INCLUDE ALL ENERGIES WHICH APPEAR IN AT LEAST ONE SECTION OF DATA. PARAMETERS (MT=251 THROUGH 255) ARE NOT INCLUDED IN THE UNIFORM ENERGY GRID.

(14)DELETE SECTION IF CROSS SECTION = 0 AT ALL ENERGIES. THIS SOUNDS LIKE AN ABSURD OPTION, BUT IS REQUIRED BECAUSE SUCH SECTIONS EXIST IN ENDF/B-VI.

CREATING RATIOS AND PRODUCTS

IN ORDER TO CREATE RATIOS AND PRODUCTS = NEW MT NUMBERS, YOU MUST DO TWO THINGS,

1) DEFINE EACH NEW MT NUMBER AS A RATIO OR PRODUCT OF TWO MT NUMBERS.

2) USE THE CREATE MT NUMBER OPTION AND INPUT THE FIRST TWO LINES OF THE SECTION

WARNING - UNLESS YOU DO BOTH OF THESE YOU WILL NOT OBTAIN OUTPUT IN THE ENDF/B FORMAT.

TWO SPECIAL MT NUMBERS HAVE BEEN DEFINED BY CSEWG INVOLVING RATIOS AND PRODUCTS,

ALPHA (MT=254)= CAPTURE (MT=102)/FISSION (MT=18)

ETA (MT=255) = NU-BAR (MT=452)*FISSION (MT=18)/ABSORPTION (MT=27)

ABSORPTION (MT=27) = FISSION (MT=18) + SUM (MT=102 THROUGH 116)

AS YET THERE IS NO STANDARD DEFINITION OF MT NUMBERS FOR RATIO OR PRODUCT DATA. YOU ARE FREE TO USE ANY MT NUMBERS NORMALLY NOT USED IN THE ENDF/B. HOWEVER, IT WILL THEN BE YOUR RESPONSIBILITY TO PROPERLY INTERPRET THE RESULTS, I.E., NOBODY ELSE WILL HAVE ANY IDEA HOW TO INTERPRET A TABLE OF DATA ASSOCIATED WITH THE MT NUMBERS YOU HAVE USED.

THIS PROGRAM CAN BE ONLY DIRECTLY DEFINE RATIOS AND PRODUCTS USING TWO MT NUMBERS = BINARY OPERATIONS, E.G., DEFINE THE CAPTURE TO FISSION RATIO, OR DEFINE THE PRODUCT NU-BAR*FISSION.

THIS PROGRAM CANNOT DIRECTLY DEFINE RATIO OR PRODUCT OF A SUM OF SECTIONS TO THE SUM OF ANOTHER SET OF SECTIONS. HOWEVER, THIS CAN BE DONE INDIRECTLY BY FIRST DEFINING A DUMMY MT NUMBER (ANY MT NUMBER NOT NORMALLY USED IN ENDF/B) TO BE A SUM OF SECTIONS AND A SECOND DUMMY MT NUMBER TO BE A SECOND SUM OF SECTIONS. YOU CAN THEN DEFINE RATIO OR PRODUCT YOU REQUIRE TO BE THE RATIO OF THESE TWO DUMMY MT NUMBERS.

FOR EXAMPLE, TO DEFINE ETA,
1) FIRST DEFINE (MT=27) = (MT=27) + (SUM OF MT=102 THROUGH 116)
2) NEXT DEFINE (MT=333) = (MT=452)*(MT=18)
3) LAST DEFINE (MT=255) = (MT=333)/(MT=27)
DO NOT FORGET TO TURN ON THE CREATE SECTION OPTION (ON THE FIRST INPUT LINE) AND INPUT THE FIRST TWO LINES OF SECTION MT=255 - OTHERWISE YOU WILL NOT GET ANY ENDF/B FORMATTED OUTPUT.

THE ONLY SPECIAL CONVENTIONS USED BY THIS PROGRAM IN CALCULATING RATIOS ARE WHEN THE DENOMINATOR OF THE RATIO IS ZERO. IN THIS CASE IF THE NUMERATOR IS ALSO ZERO THE RATIO IS DEFINED TO BE ONE. IN THIS CASE IF THE NUMERATOR IS NOT ZERO THE RATIO IS DEFINED TO BE ZERO.

ENDF/B FORMAT
=============
THIS PROGRAM MAY BE USED WITH DATA IN ANY VERSION OF THE ENDF/B FORMAT (I.E. ENDF/B-I, II, III, IV, V OR VI FORMAT). SINCE A PAGING SYSTEM IS USED STORE CROSS SECTION TABLES ON SCRATCH FILES THERE IS NO LIMIT TO THE SIZE OF TABLES (E.G. THE TOTAL CROSS SECTION MAY BE REPRESENTED BY 200,000 TABULATED POINTS).

WARNING

=======

(1) FOR EACH SECTION OF CROSS SECTIONS (I.E. EACH MT, MF=3) IN THE ORIGINAL EVALUATION (I.E. ENDF/B DATA READ) ONE SECTION OF DATA WILL BE OUTPUT, UNLESS THE SECTION HAS BEEN DELETED. THIS INCLUDES ANY SECTIONS WHICH ARE NOT PRESENT IN THE ORIGINAL EVALUATION, BUT THE USER INDICATES (BY INPUT) SHOULD BE CREATED.

THE PROGRAM WILL NOT OUTPUT ANY SECTION RECONSTRUCTED BY SUMMATION UNLESS THE CORRESPONDING SECTION (MT NUMBER) IS PRESENT IN THE ORIGINAL EVALUATION OR USER INPUT INDICATES SHOULD BE CREATED AND OUTPUT. THIS IS (A) BECAUSE THE PROGRAM CANNOT DEFINE THE PARAMETERS TO APPEAR ON THE FIRST TWO LINES OF THE SECTION, (B) TO AVOID OUTPUTTING TOO MUCH DATA WHICH THE USER MAY NOT BE INTERESTED IN.

(2) FOR ANY SECTIONS THAT DO NOT APPEAR IN THE ORIGINAL DATA THE USER MAY SPECIFY THAT THEY BE DEFINED BY SUMMATION. ANY SUCH SECTION MAY BE USED BE DEFINE SUBSEQUENT SUMS, BUT THE SECTION ITSELF WILL NOT BE OUTPUT (E.G. GENERALLY MT=27 AND 101 ARE NOT PRESENT IN EVALUATIONS. HOWEVER, THE BUILT-IN SUMMATION RULES OF THIS PROGRAM USES THE ENDF/B SUMMATION RULES TO DEFINE MT=27 AND 101, WHICH IN TURN ARE USED TO DEFINE THE NON-ELASTIC CROSS SECTION, MT=3. SECTIONS MT=27 AND 101 ARE NOT OUTPUT).

(3) ALL DATA IN FILE 3 AND 23 MUST BE LINEARLY INTERPOLABLE. IF THE DATA IS NOT LINEARLY INTERPOLABLE THIS PROGRAM WILL TERMINATE.

PROGRAM OPERATION
=================

ALL MAT NUMBER ON AN ENDF/B TAPE ARE PROCESSED. EACH MAT IS TREATED SEPARATELY. WITHIN EACH MAT, EACH SECTION BEFORE MF=3 IS READ, CHECKED/CORRECTED (BASED ON INPUT OPTIONS) AND OUTPUT. WHEN MF=3 IS LOCATED ALL CROSS SECTIONS ARE READ, SECTIONS TO BE DELETED ARE DELETED, SECTIONS WHICH ARE NOT PRESENTED AND USER INPUT INDICATES SHOULD BE CREATED ARE CREATE, SECTIONS TO BE KEPT ARE CHECKED/CORRECTED (BASED ON INPUT OPTIONS) AND WRITTEN TO A SCRATCH FILE. NEXT, IF THE USER SPECIFIES THAT THEY SHOULD, SECTIONS ARE RECONSTRUCTED. FINALLY ALL CROSS SECTIONS (OLD AND NEW) ARE OUTPUT. WITHIN THE SAME MAT, EACH SECTION AFTER MF=3 IS READ, CHECKED/CORRECTED (BASED ON INPUT OPTIONS) AND OUTPUT.

MF=3
====

THE TREATMENT OF THE CROSS SECTIONS REQUIRES UP TO 4 PASSES FOR CROSS SECTIONS. IN THE PROGRAM THEY CORRESPOND TO SUBROUTINES PASS1, PASS2, PASS3 AND PASS4. THE ORIGINAL AND FINAL ENDF/B DATA FILES, 5 SCRATCH FILES AND 3 IN CORE ARRAYS ARE USED. OPERATIONS PERFORMED DURING EACH PASS ARE,

PASS1
=====

READ ALL CROSS SECTIONS FROM ITAPE. DELETED ANY SECTIONS. CREATE ANY SECTIONS. CHECK/CORRECT THEM AND WRITE THEM TO SCRATCH FILE. DATA IS READ INTO ARRAY A, TRANSFERRED TO ARRAY C (AFTER EDITING) AND OUTPUT TO ISCRC FROM ARRAY C.

ITAPE - UNIT ORIGINAL ENDF/B DATA IS READ FROM.
ISCRC - SCRATCH UNIT THAT EDITED DATA IS WRITTEN ON.
TABA - ARRAY INTO WHICH ORIGINAL DATA IS READ.
TABC - ARRAY INTO WHICH EDITED DATA IS TRANSFERRED TO AND FROM WHICH IT IS WRITTEN TO ISCRC.

```
                                                                      Fixup
PASS2                                                                 Fixup
=====                                                                 Fixup
IF A UNIFORM ENERGY GRID IS REQUESTED IT IS CREATED DURING THIS       Fixup
PASS. FIRST ALL OF THE CROSS SECTIONS FROM PASS1 ARE READ AND A       Fixup
UNIFORM ENERGY GRID IS CREATED = ALL ENERGIES THAT ARE INCLUDED       Fixup
IN AT LEAST ONE SECTION (MT) OF CROSS SECTIONS.                       Fixup
ISCRA  - SCRATCH UNIT CONTAINING UNIFORM ENERGY GRID.                 Fixup
ISCRB  - SCRATCH UNIT CONTAINING UNIFORM ENERGY GRID.                 Fixup
ISCRC  - SCRATCH UNIT THAT EDITED DATA IS READ FROM.                  Fixup
TABA   - ARRAY CONTAINING UNIFORM ENERGY GRID.                        Fixup
TABB   - ARRAY CONTAINING UNIFORM ENERGY GRID.                        Fixup
TABC   - ARRAY CONTAINING EDITED DATA.                                Fixup
                                                                      Fixup
THE UNIFORM ENERGY GRID ENDS UP ON ISCRB. NEXT EACH SECTION OF        Fixup
CROSS SECTIONS FROM PASS1 IS READ FROM ISCRC, INTERPOLATED TO         Fixup
THE UNIFORM ENERGY GRID AND OUTPUT TO ISCRA. FINALLY ISCRA AND        Fixup
ISCRC ARE SWITCH, SO THAT AT THE END OF THIS PASS THE DATA WILL       Fixup
AGAIN BE ON ISCRC (EXACTLY AS AT THE END OF PASS1), WITH UPDATED      Fixup
POINT COUNTS.                                                         Fixup
ISCRA  - SCRATCH UNIT THAT UNIFORM ENERGY GRID DATA IS WRITTEN ON.    Fixup
ISCRB  - SCRATCH UNIT CONTAINING UNIFORM ENERGY GRID.                 Fixup
ISCRC  - SCRATCH UNIT THAT EDITED DATA IS READ FROM.                  Fixup
TABA   - ARRAY CONTAINING UNIFORM ENERGY GRID DATA.                   Fixup
TABB   - ARRAY CONTAINING UNIFORM ENERGY GRID.                        Fixup
TABC   - ARRAY CONTAINING EDITED DATA.                                Fixup
                                                                      Fixup
PASS3                                                                 Fixup
=====                                                                 Fixup
SUMMATION CROSS SECTIONS ARE DEFINED BY READING DATA FROM ISCRC       Fixup
AND MERGING THEM ONTO ISCRA. THE FIRST SECTION THAT CONTRIBUTES       Fixup
TO A SUM IS MERELY COPIED FROM C TO A. IF MORE SECTIONS WILL          Fixup
CONTRIBUTE TO THE SUM THE DATA IN A IS TRANSFERRED TO B, A            Fixup
SECTION OF DATA FROM C IS ADDED TO THE DATA IN B AND STORED IN        Fixup
A. THE CYLE OF ADDED C AND B TO A, FOLLOWED BY MOVING A TO B          Fixup
IS CONTINUED UNTIL ALL CONTRIBUTING SECTIONS HAVE BEEN ADDED.         Fixup
THE SUM IS THEN COPIED FROM A TO D. IF NEWLY CONSTRUCTED SECTION      Fixup
IS REQUIRED FOR ANY LATER SUMMUATIONS IT IS ALSO COPIED TO E.         Fixup
THE CYCLE OF ADDED SECTIONS FROM C AND B TO A IS REPEATED FOR         Fixup
EACH REQUIRED SUMMATION REACTION. IN ADDITION TO SECTIONS FROM        Fixup
C, AFTER THE FIRST SUMMATION SECTIONS MAY ALSO BE ADDED TO A          Fixup
FROM E (THE CONTRIBUTION OF NEW RECONSTRUCTED CROSS SECTIONS).        Fixup
WHEN ALL REQUIRED SECTIONS HAVE BEEN RECONSTRUCTED THE NEW            Fixup
SECTIONS WILL BE ON E AND THE ORIGINAL SECTIONS ON C.                 Fixup
ISCRC  - SCRATCH FILE FROM WHICH ORIGINAL DATA IS READ.               Fixup
ISCRA  - SCRATCH FILE ONTO WHICH SUM FOR ONE SECTION IS WRITTEN.      Fixup
ISCRD  - SCRATCH FILE ONTO WHICH ALL SUM CROSS SECTIONS ARE           Fixup
         WRITTEN.                                                     Fixup
ISCRE  - SCRATCH FILE ONTO WHICH ALL SUM CROSS SECTIONS WHICH         Fixup
         ARE REQUIRED FOR LATER SUMS ARE WRITTEN.                     Fixup
ISCRB  - UTILITY SCRATCH FILE USED TO CREATE SUM CROSS SECTIONS.      Fixup
TABA   - ARRAY INTO WHICH SUMS ARE WRITTEN.                           Fixup
TABB   - ARRAY INTO WHICH PARTIAL SUMS ARE WRITTEN.                   Fixup
TABC   - ARRAY INTO WHICH ORIGINAL DATA IS READ.                      Fixup
                                                                      Fixup
PASS4                                                                 Fixup
=====                                                                 Fixup
CROSS SECTIONS ARE READ FROM ISCRC (ORIGINAL) AND ISCRD (NEW)         Fixup
AND ARE WRITTEN IN THE ENDF/B FORMAT ON OTAPE. THE BEGINNING OF       Fixup
EACH SECTION OF ORIGINAL DATA IS READ FROM ISCRC (TO DEFINE           Fixup
SECTION HEADER INFORMATION). IF THIS MT HAS NOT BEEN RECOSTRUCTED     Fixup
ON ISCRD THE ORIGINAL SECTION IS OUTPUT. IF THE SECTION HAS BEEN      Fixup
RECONSTRUCTED THE ORIGINAL SECTION IS SKIPPED AND THE NEW SECTION     Fixup
```

```
 IS OUTPUT.                                                          Fixup
 OTAPE  - OUTPUT DATA IN THE ENDF/B FORMAT.                          Fixup
 ISCRC  - SCRATCH FILE FROM WHICH ORIGINAL DATA IS READ.             Fixup
 ISCRD  - SCRATCH FILE FROM WHICH NEW DATA IS READ.                  Fixup
 TABC   - ARRAY INTO WHICH CROSS SECTIONS ARE READ FROM SCRATCH      Fixup
          AND WRITTEN TO OTAPE                                       Fixup
                                                                     Fixup
 I/O FILE DEFINITIONS                                                Fixup
 ====================                                                Fixup
 UNIT   DESCRIPTION                                                  Fixup
 ====   ===========                                                  Fixup
   2    INPUT PARAMETERS.                                           Fixup
   3    OUTPUT REPORT.                                              Fixup
  10    ORIGINAL DATA IN THE ENDF/B FORMAT.                         Fixup
  11    FINAL DATA IN THE ENDF/B FORMAT.                            Fixup
  12    SCRATCH FILE                                                Fixup
  14    SCRATCH FILE                                                Fixup
  15    SCRATCH FILE                                                Fixup
  16    SCRATCH FILE                                                Fixup
  17    SCRATCH FILE                                                Fixup
                                                                    Fixup
 OPTIONAL STANDARD FILE NAMES (SEE SUBROUTINE FILIO1 AND FILIO2)     Fixup
 ============================================================       Fixup
 UNIT  FILE NAME   FORMAT                                           Fixup
 ====  ==========  ======                                           Fixup
   2   FIXUP.INP    BCD                                           Fixup
   3   FIXUP.LST    BCD                                           Fixup
  10   ENDFB.IN     BCD                                           Fixup
  11   ENDFB.OUT    BCD                                           Fixup
12-17  (SCRATCH)   BINARY                                          Fixup
                                                                    Fixup
 INPUT LINES                                                        Fixup
 ===========                                                        Fixup
 LINE  COLUMNS  FORMAT  DESCRIPTION                                 Fixup
 ====  =======  ======  ===========                                 Fixup

   1    1-14     14I1   INPUT OPTIONS AS DESCRIBED ABOVE.           Fixup
                        EACH COLUMN OF THE INPUT LINE CONTROLS      Fixup
                        ONE OF THE TESTS/CORRECTIONS DESCRIBED      Fixup
                        ABOVE. TESTS/CORRECTION 1-14 (NOT ALL       Fixup
                        IMPLEMENTED YET) CORRESPOND TO COLUMNS      Fixup
                        1-14 OF THIS INPUT LINE AND ARE TREATED     Fixup
                        AS FOLLOWS,                                 Fixup
                        = 0 - DO NOT PERFORM TEST/CORRECTION.       Fixup
                        = 1 - PERFORM TEST/CORRECTION.              Fixup
                        FOR MT EXCLUSION FROM THRESHOLD TESTS       Fixup
                        (COLUMN 2), DELETION (COLUMN 4), OR         Fixup
                        SUMMATION (COLUMN 5) THE INPUT OPTION       Fixup
                        MAY BE,                                     Fixup
                        = 1 - READ RULES FROM INPUT                 Fixup
                        = 2 - USE BUILT-IN RULES                    Fixup
   2    1-60      A60   ENDF/B INPUT DATA FILENAME                  Fixup
                        (STANDARD OPTION = ENDFB.IN)                Fixup
   3    1-60      A60   ENDF/B OUTPUT DATA FILENAME                 Fixup
                        (STANDARD OPTION = ENDFB.OUT)               Fixup
 4-M    1-5      FREE   CHARACTER (S,D,T,R,*) FOLLOWED BY BLANK OR  Fixup
                 FORM   MT NUMBER                                   Fixup
                        - THE ALLOWED CHARACTERS ARE,               Fixup
                        - S OR BLANK = SUM (OR DIFFERENCES)         Fixup
                        - D = DELETE                                Fixup
                        - T = NO THRESHOLD ENERGY CORRECTIONS       Fixup
                        - R = RATIO                                 Fixup
                        - * = PRODUCT                               Fixup
```

6-72	FREE FORM	UP TO 10 LOWER AND UPPER MT RANGES WHICH WILL BE USED TO DEFINE THE RECONSTRUCTED CROSS SECTION OR TO DEFINE MT RANGES WHICH ARE EXCLUDED FROM THRESHOLD TESTS. EACH MT NUMBER IS DEFINED BY A CONTINUOUS STRING OF DIGITS, POSSIBILITY PRECEEDED BY A - (MINUS SIGN). EACH MT NUMBER MUST BE BLANK OR OTHERWISE (NOT A DIGIT) DELIMITED. COLUMNS 6-72 MAY CONTAIN STRINGS OF DIGITS THE FIRST DIGIT STRING OF EACH PAIR MAY BE PRECEEDED BY A - (MINUS SIGN). EACH LINE WILL BE INTERPRETED AS FOLLOWS, *SUMMATION (OR DIFFERENCES) --- COLUMNS 1-5 = S OR BLANK FOLLOWED BY THE MT NUMBER TO BE DEFINED BY SUMMATION COLUMNS 6-72 = UP TO 10 MT RANGE (PAIRS OF MT NUMBERS) TO BE USED TO DEFINED THE SUM. IF THE FIRST MT NUMBER OF A PAIR IS NEGATIVE THE RANGE OF MT NUMBERS IS SUBTRACTED - AT LEAST ONE RANGE MUST BE SPECIFIED. *DELETIONS --- COLUMNS 1-5 = D FOLLOWED BY BLANKS COLUMNS 6-72 CONTAIN UP TO 10 MT RANGE (PAIRS OF MT NUMBERS), EACH RANGE DEFINING A RANGE OF MT NUMBERS TO BE DELETED - AT LEAST ONE RANGE MUST BE SPECIFIED. *EXCLUSION FROM THRESHOLD TESTS --- COLUMNS 1=5 = T FOLLOWED BY BLANKS COLUMNS 6-72 CONTAIN UP TO 10 MT RANGE (PAIRS OF MT NUMBERS), EACH RANGE DEFINING A RANGE OF MT NUMBERS WHOSE THRESHOLD ENERGY WILL NOT BE CHECKED - AT LEAST ONE RANGE MUST BE SPECIFIED. *RATIO --- COLUMNS 1-5 = R FOLLOWED BY THE MT NUMBER TO BE DEFINED BY A RATIO COLUMNS 6-72 CONTAINS 2 MT NUMBERS TO BE USED TO DEFINE THE RATIO. *PRODUCT --- COLUMNS 1-5 = * FOLLOWED BY THE MT NUMBER TO BE DEFINED BY A PRODUCT COLUMNS 6-72 CONTAINS 2 MT NUMBERS TO BE USED TO DEFINE THE PRODUCT.	Fixup

			CONVENTIONS	Fixup
			----------	Fixup
			*UP TO 20 DELETIONS AND 20 SUMMATIONS OR	Fixup
			RATIOS OR PRODUCTS MAY BE SPECIFIED.	Fixup
			*ONLY 1 EXCLUSION FROM THRESHOLD TESTS	Fixup
			MAY BE SPECIFIED (THE 1 LINE MAY CONTAIN	Fixup
			UP TO 10 MT RANGES TO EXCLUDE FROM TESTS).	Fixup
			*INPUT IS TERMINATED BY INPUTTNG 0 OR	Fixup
			BLANK IN COLUMNS 1-72 (I.E. THE LAST	Fixup
			INPUT LINE MUST BE BLANK).	Fixup
			*THE UPPER LIMIT OF EACH RANGE MUST BE AT	Fixup
			LEAST AS BIG AS THE LOWER LIMIT (IN	Fixup
			ABSOLUTE VALUE).	Fixup
			*FOR RECONSTRUCTION POSITIVE MT RANGES WILL	Fixup
			BE ADDED TO THE SUM AND NEGATIVE MT RANGES	Fixup
			WILL BE SUBTRACTED.	Fixup
			*IF INPUT OPTION 2 (FIRST INPUT LINE) IS	Fixup
			0 THRESHOLD EXCLUSION IS NOT ALLOWED.	Fixup
			*IF INPUT OPTION 4 (FIRST INPUT LINE) IS	Fixup
			0 DELETIONS ARE NOT ALLOWED.	Fixup
			*IF INPUT OPTION 5 (FIRST INPUT LINE) IS	Fixup
			0 SUMMATIONS AND RATIOS ARE NOT ALLOWED.	Fixup
N-K			IF THE USER SPECIFIES THAT SECTIONS WHICH	Fixup
			ARE NOT PRESENT IN THE ORIGINAL EVALUATION	Fixup
			MAY BE CREATED, TWO LINES MUST BE INPUT FOR	Fixup
			EACH SECTION TO BE CREATED. THE TWO LINES	Fixup
			DEFINE (C1, C2, L1 AND L2) FOR EACH OF THE	Fixup
			FIRST TWO LINES OF THE SECTION TO BE	Fixup
			CREATED. THE FIRST LINE ALSO DEFINES (MAT	Fixup
			AND MT). (N1, N2) ARE ALWAYS ZERO ON THE	Fixup
			FIRST LINE AND WILL BE CALCULATED BY THE	Fixup
			PROGRAM FOR THE SECOND LINE.	Fixup
FIRST	1-11	E11.4	ZA OF SECTION TO BE CREATED	Fixup
LINE	12-22	E11.4	AWRE OF SECTION TO BE CREATED	Fixup
	23-33	I11	L1 OF SECTION TO BE CREATED	Fixup
	34-44	I11	L2 OF SECTION TO BE CREATED	Fixup
	45-48	I4	MAT OF SECTION TO BE CREATED	Fixup
	49-51	I3	MT OF SECTION TO BE CREATED	Fixup
SECOND	1-11	E11.4	C1 OF SECTION TO BE CREATED	Fixup
LINE	12-22	E11.4	C2 OF SECTION TO BE CREATED	Fixup
	23-33	I11	L1 OF SECTION TO BE CREATED	Fixup
	34-44	I11	L2 OF SECTION TO BE CREATED	Fixup
			*PAIRS OF LINES MAY BE IN ANY MAT/MT ORDER	Fixup
			(E.G., THEY NEED NOT BE IN ASCENDING	Fixup
			MAT/MT ORDER).	Fixup
			*UP TO 50 PAIRS OF LINES MAY BE USED TO	Fixup
			DEFINE SECTIONS TO BE CREATED. THE LIST	Fixup
			IS TERMINATED WHEN THE FIRST LINE OF A	Fixup
			PAIR CONTAINS A ZERO (OR BLANK) MAT AND/OR	Fixup
			MT.	Fixup
M-N			IF THE USER SPECIFIES THAT ENERGIES WHICH	Fixup
			ARE NOT PRESENT IN THE ORIGINAL EVALUATION	Fixup
			MAY BE INSERTED, ONE LINE MUST BE INPUT FOR	Fixup
			EACH ENERGY TO BE INSERTED.	Fixup
	1-11	E11.4	ENERGY TO BE INSERTED	Fixup
	12-15	I4	MAT IN WHICH TO INSERT ENERGY = 0 = ALL	Fixup
	16-18	I3	MT IN WHICH TO INSERT ENERGY = 0 = ALL	Fixup
			*UP TO 50 (ENERGY, MAT, MT) LINES MAY BE	Fixup
			USED. THE LIST IS TERMINATED BY A BLANK	Fixup
			LINE.	Fixup
			*INPUT MAY BE IN ANY (ENERGY, MAT, MT)	Fixup
			ORDER.	Fixup
			*ENERGY POINTS CAN ONLY BE INSERTED WITHIN	Fixup

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                     THE ORIGINAL ENERGY RANGE OF A SECTION -    Fixup
                     THIS OPTION CANNOT BE USED TO EXTEND THE    Fixup
                     CROSS SECTION EITHER BELOW OR ABOVE THE     Fixup
                     ORIGINAL TABULATED ENERGY RANGE.            Fixup
                                                                 Fixup
 EXAMPLE INPUT NO. 1                                             Fixup
 ==================                                              Fixup
 (1) USE OPTIONS 1-11 (ALL OPTIONS, EXCEPT INSERT ENERGY POINTS) Fixup
 (2) DELETE MT=900 (FOR EXAMPLE PURPOSES ONLY)                   Fixup
 (3) DEFINE THE FOLLOWING MT NUMBERS TO BE RECONSTRUCTED,        Fixup
     (MT=  4) = THE SUM OF MT= 51 THROUGH  91                    Fixup
     (MT=103) = THE SUM OF MT=700 THROUGH 718 (NOT 719)          Fixup
     (MT=104) = THE SUM OF MT=720 THROUGH 738 (NOT 739)          Fixup
     (MT=105) = THE SUM OF MT=740 THROUGH 758 (NOT 759)          Fixup
     (MT=106) = THE SUM OF MT=760 THROUGH 778 (NOT 779)          Fixup
     (MT=107) = THE SUM OF MT=780 THROUGH 798 (NOT 799)          Fixup
     (MT=101) = THE SUM OF MT=102 THROUGH 114                    Fixup
     (MT= 18) = (MT=19) + (MT=20 AND 21) + (MT=38)               Fixup
                (IF TOTAL FISSION, MT=18, IS NOT PRESENT, DEFINE Fixup
                IT BY SUMMING FIRST, SECOND, ETC. CHANCE - NOTE  Fixup
                THAT THIS MUST BE DONE IN THIS ORDER, SINCE THE  Fixup
                NEXT SUM INVOLVES USING MT=18.                   Fixup
     (MT= 27) = THE SUM OF MT= 18 AND 101                        Fixup
                (MT=101 RECONSTRUCTED ABOVE USED IN SUM).        Fixup
     (MT=  3) = THE SUM OF (MT=4)+(MT=6-9)+(MT=16-17)+(MT=22-37)+ Fixup
                (MT=41-45)                                       Fixup
                (MT=4 AND 27 RECONSTRUCTED ABOVE USED IN SUM).   Fixup
     (MT= 19) = (MT=18) - (MT=20 AND 21) - (MT=38)               Fixup
                (DEFINE FIRST CHANCE FISSION BY SUBTRACTION TO   Fixup
                ALLOW RESONANCE CONTRIBUTION FROM MT=18 TO BE    Fixup
                INCLUDED IN MT=19).                              Fixup
     (MT=  1) = THE SUM OF MT=2 AND 3                            Fixup
                (MT=3 RECONSTRUCTED ABOVE USED IN SUM).          Fixup
 (4) THRESHOLD ENERGIES OF THE FOLLOWING MT NUMBERS WILL NOT BE  Fixup
      TESTED OR CORRECTED.                                       Fixup
      MT=1, 4, 18, 19, 91, 103 THROUGH 114.                      Fixup
 (5) DEFINE MT=254 TO BE THE CAPTURE TO FISSION RATIO (MT=102/18) Fixup
 (6) CREATE MAT=1300/MT=254 - NOTE, THIS IS NECESSARY IN ORDER TO Fixup
     HAVE THE CAPTURE TO FISSION RATIO OUTPUT IN THE ENDF/B FORMAT Fixup
                                                                 Fixup
 NOTE, ON THE FOLLOWING INPUT LINES THE CHARACTERS = ( ) + , HAVE Fixup
 BEEN USED ONLY TO MAKE THE INPUT MORE READABLE - THESE CHARACTERS Fixup
 WILL BE SKIPPED BY THE PROGRAM IN READING INPUT - THE RESULTS   Fixup
 WOULD BE THE SAME IF THESE CHARACTERS WERE OMITTED, AS LONG AS  Fixup
 ALL OF THE MT NUMBERS ARE DELIMITED, I.E., THERE IS AT LEAST ONE Fixup
 NON-DIGITAL CHARACTER BETWEEN MT NUMBERS. NOTE, THAT - (MINUS   Fixup
 SIGN) IS IMPORTANT AND IS USED DURING INPUT TO DEFINE MT RANGES Fixup
 WHICH SHOULD BE SUBTRACTED, E.,G., SEE THE DEFINITION OF MT=19. Fixup
                                                                 Fixup
 READ FILE /ENDFB6/K300/LEAD.IN AND WRITE /ENDFB6/K300/LEAD.OUT  Fixup
                                                                 Fixup
 THE FOLLOWING 21 INPUT LINES ARE REQUIRED.                      Fixup
                                                                 Fixup
 11111111111                                                     Fixup
 /ENDFB6/K300/LEAD.IN                                            Fixup
 /ENDFB6/K300/LEAD.OUT                                           Fixup
 D900                                                            Fixup
    4=( 51, 91)                                                  Fixup
  103=(700,718)                                                  Fixup
  104=(720,738)                                                  Fixup
  105=(740,758)                                                  Fixup
  106=(760,778)                                                  Fixup
  107=(780,798)                                                  Fixup
```

```
 101=(102,114)                                                          Fixup
  18=( 19, 19)+( 20, 21)+( 38, 38)                                      Fixup
  27=( 18, 18)+(101,101)                                                Fixup
   3=(  4,  4)+(  6,  9)+( 16, 17)+( 22, 37)+( 41, 45)                  Fixup
  19=( 18, 18)-( 20, 21)-( 38, 38)                                      Fixup
   1=(  2,  3)                                                          Fixup
T    (  1,  1) (  4,  4) ( 18, 19) ( 91, 91) (103,114)                  Fixup
R254=(102/ 18)                                                         Fixup
            (BLANK LINE TO TERMINATE SUMMATION/DELETION RULES)         Fixup
 2.00400+ 3 0.00000+ 0          0          01300254                    Fixup
 0.00000+ 0 0.00000+ 0          0          0                           Fixup
            (BLANK LINE TO TERMINATE SECTION CREATION RULES)           Fixup
                                                                       Fixup
NOTE, THE DELETION AND THRESHOLD EXCLUSION LINES MAY APPEAR IN         Fixup
IN ANY ORDER. HOWEVER, SUMMATION AND RATIO RULES MUST APPEAR IN        Fixup
THE ORDER IN WHICH YOU WANT THEM TO BE EXECUTED - E.G., THE            Fixup
ABOVE INPUT WILL FIRST RECONSTRUCT MT=4, WHICH CAN THEN BE USED        Fixup
TO CONTRIBUTE TO THE FOLLOWING SUM TO DEFINE MT=3, WHICH IN TURN       Fixup
CAN THEN BE USED TO CONTRIBUTE TO THE FOLLOWING SUM TO DEFINE          Fixup
MT=1. IF THE ORDER OF THE INPUT LINES IS CHANGED SUCH THAT MT=3        Fixup
IS RECONSTRUCTED BEFORE MT=4, THE ORIGINAL MT=4 WILL BE USED IN        Fixup
THE SUMMATION TO DEFINE MT=3. THE SAME RULES APPLY TO CALCULATING      Fixup
RATIOS, IF EITHER THE NUMERATOR OR DENOMINATOR IS TO BE DEFINED        Fixup
BY SUMMATION, THIS SHOULD BE DONE BEFORE DEFINING THE RATIO BY         Fixup
INPUT PARAMETERS.                                                      Fixup
                                                                       Fixup
EXAMPLE INPUT NO. 2                                                    Fixup
==================                                                     Fixup
(1) USE OPTIONS 1-11 (ALL OPTIONS, EXCEPT INSERT ENERGY POINTS)        Fixup
(2) USE BUILT-IN TABLES FOR SUMMATION/DELETION/THRESHOLD EXCLUSION     Fixup
    (THIS ONLY REQUIRES COLUMNS 2, 4 AND 5 TO BE SET =2 ON THE         Fixup
    FIRST INPUT LINE. THE BUILT-IN RULES EXACTLY CORRESPOND TO         Fixup
    THE INPUT ABOVE UNDER EXAMPLE NO. 1, EXCEPT THAT NO MT NUMBERS     Fixup
    WILL BE DELETED.                                                   Fixup
(3) IF NOT PRESENT, CREATE MAT=1300/MT=1                               Fixup
                                                                       Fixup
USE THE STANDARD FILE NAMES ENDFB.IN AND ENDFB.OUT (THIS CAN BE        Fixup
DONE BY LEAVING THE SECOND AND THIRD INPUT LINES BLANK).               Fixup
                                                                       Fixup
THE FOLLOWING 6 INPUT LINES ARE REQUIRED.                              Fixup

                                                                       Fixup
12122111111                                                            Fixup
                                                                       Fixup
                                                                       Fixup
 2.00400+ 3 0.00000+ 0          0          01300  1                    Fixup
 0.00000+ 0 0.00000+ 0          0          0                           Fixup
            (BLANK LINE TO TERMINATE SECTION CREATION RULES)           Fixup
                                                                       Fixup
EXAMPLE INPUT NO. 3                                                    Fixup
==================                                                     Fixup
(1) USE OPTIONS 1-10 (ALL OPTIONS PRESENTLY IMPLEMENTED, EXCEPT        Fixup
    DO NOT ALLOW SECTION CREATION AND INSERT ENERGY POINTS).           Fixup
(2) USE BUILT-IN TABLES FOR SUMMATION/DELETION/THRESHOLD EXCLUSION     Fixup
    (THIS ONLY REQUIRES COLUMNS 2, 4 AND 5 TO BE SET =2 ON THE         Fixup
    FIRST INPUT LINE. THE BUILT-IN RULES EXACTLY CORRESPOND TO         Fixup
    THE INPUT ABOVE UNDER EXAMPLE NO. 1, EXCEPT THAT NO MT NUMBERS     Fixup
    WILL BE DELETED.                                                   Fixup
(3) DO NOT CREATE ANY SECTIONS.                                        Fixup
                                                                       Fixup
READ FILE /ENDFB6/K300/LEAD.IN AND WRITE /ENDFB6/K300/LEAD.OUT         Fixup
                                                                       Fixup
THE FOLLOWING 3 INPUT LINES ARE REQUIRED.                              Fixup
```

```
                                                                      Fixup
     1212211111                                                       Fixup
     /ENDFB6/K300/LEAD.IN                                             Fixup
     /ENDFB6/K300/LEAD.OUT                                            Fixup
                                                                      Fixup
     EXAMPLE INPUT NO. 4                                              Fixup
     ===================                                              Fixup
     SAME AS EXAMPLE NO. 3, ABOVE, EXCEPT INSERT AN ENERGY POINT AT   Fixup
     THERMAL FOR ALL REACTIONS WHICH SPAN THE THERMAL ENERGY RANGE.    Fixup
                                                                      Fixup
     USE THE STANDARD FILE NAMES ENDFB.IN AND ENDFB.OUT (THIS CAN BE  Fixup
     DONE BY LEAVING THE SECOND AND THIRD INPUT LINES BLANK).         Fixup
                                                                      Fixup
     THE FOLLOWING 5 INPUT LINES ARE REQUIRED.                        Fixup
                                                                      Fixup
     121221111101                                                     Fixup
                                                                      Fixup
                                                                      Fixup
      2.53000- 2   0  0                                              Fixup
                 (BLANK LINE TO TERMINATE ENERGY INSERTS)             Fixup
                                                                      Fixup
     WARNING                                                          Fixup
     =======                                                          Fixup
     ALTHOUGH THIS PROGRAM IS DESIGNED TO ALLOW REACTIONS TO BE DEFINED Fixup
     BY ADDING OR SUBTRACTING REACTIONS THE USER SHOULD ALWAYS TRY TO  Fixup
     DEFINE REACTIONS BY SUMMING TO AVOID NEGATIVE CROSS SECTIONS. FOR Fixup
     EXAMPLE, IT IS POSSIBLE TO CALCULATE MT=3 AND DEFINE MT=1 AS THE  Fixup
     SUM OF MT=2 AND 3 (THE RECOMMENDED APPROACH AS USED IN THE ABOVE  Fixup
     INPUT). ALTERATIVELY IT IS POSSIBLE TO CALCULATE MT=1 AND DEFINE  Fixup
     MT=3 AS MT=1 MINUS MT=2 (THIS APPROACH IS NOT RECOMMENDED).       Fixup
                                                                      Fixup
     THE ONLY BUILT-IN SUMMATION RULE THAT USES SUBTRACTION IS THE     Fixup
     CALCULATION OF THE FIRST CHANGE FISSION (MT=19) AS THE TOTAL      Fixup
     FISSION (MT=18) MINUS THE SECOND, THIRD AND FOURTH CHANGE FISSION Fixup
     (MT=20, 21, 38). THIS HAS BEEN DONE TO ALLOW THE RESONANCE        Fixup
     CONTRIBUTION, CALCULATED BY MANY CODES AND INCLUDED IN MT=18,     Fixup
     TO BE CONSISTENTLY INCLUDED IN THE FIRST CHANCE FISSION.          Fixup
                                                                      Fixup
==================================================================== Fixup
```