```
======================================================================= Fixup
                                                                        Fixup
     PROGRAM FIXUP                                                      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-6 SUMMATION RULES AND      Fixup
                                  DEFINED MF AND MT NUMBERS. PROGRAM    Fixup
                                  WILL NOW USE MF=1, MT=451 TO DEFINE   Fixup
                                  THE ENDF FORMAT OF THE DATA (E.G.,    Fixup
                                  ENDF-6 OR EARLIER) AND USE THE        Fixup
                                  CORRECT SUMMATION RULES FOR EACH      Fixup
                                  VERSION OF THE ENDF FORMAT. IF        Fixup
                                  MF=1, MT=451 IS NOT PRESENT PROGRAM   Fixup
                                  WILL USE ENDF-6 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 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
                                 *UNIFORM TREATMENT OF ENDF 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
```

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                          *UPDATED TEST FOR ENDF FORMAT          Fixup
                           VERSION BASED ON RECENT FORMAT CHANGE Fixup
                          *GENERAL IMPROVEMENTS BASED ON         Fixup
                           USER FEEDBACK                         Fixup
VERSION 99-2 (JUNE 1999)  *ASSUME ENDF-6, NOT 5, 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 DATA   Fixup
                          *INCREASED PAGE SIZE FROM 60,000 TO    Fixup
                           600,000 DATA POINTS.                  Fixup
VERS. 2007-2 (OCT. 2007)  *ADDED MT=16 AS SUM MT=875 THRU 891    Fixup
                          *72 CHARACTER FILE NAMES               Fixup
VERS. 2010-1 (Apr. 2010)  *Defining cross sections by summation  Fixup
                           to now mandatory - either build-in    Fixup
                           rules or by user input.               Fixup
VERS. 2011-1 (March 2011) *Added new MT # to allowed and         Fixup
                           summation rules.                      Fixup
VERS. 2012-1 (Aug.  2012) *Corrected definition of MT=3 to avoid Fixup
                           double counting of MT=18.             Fixup
                          *Extended incident particle list to    Fixup
                           include photon (ZA = 0).              Fixup
                          *Added CODENAME                        Fixup
                          *32 and 64 bit Compatible              Fixup
                          *Added ERROR stops.                    Fixup
VERS. 2015-1 (Jan.  2015) *Extended OUT9.                        Fixup
                          *Replaced ALL 3 way IF Statements      Fixup
                                                                 Fixup
VERS. 2015-2 (Oct.  2015) *Threshold Correction no longer        Fixup
                           allowed = TOO DANGEROUS!!!            Fixup
VERS. 2017-1 (May   2017) *Updated based on user feekback        Fixup
                          *Increased tables to 3,000,000.        Fixup
                          *All floating input parameters changed Fixup
                           to character input + IN9 conversion.  Fixup
                          *Ignore attempts to "correct" reaction Fixup
                           threshold = cannot be done for        Fixup
                           temperature dependent (MF=3) data.    Fixup
VERS. 2017-2 (Oct.  2017) *Updated to insure sharp edges for     Fixup
                           photon interaction cross sections     Fixup
                           MF=23.                                Fixup
                          *Updated for ELECTRONS to create,      Fixup
                           MF/MT=23/501 = Total                  Fixup
                           MF/MT=23/522 = Total ionization       Fixup
                          *Updated to define MF=26 and electron  Fixup
                           Cross Sections MT=526, 527, 528 as    Fixup
                           LEGAL MF/MT Combinations.             Fixup
VERS. 2018-1 (Jan.  2018) *Decreased PAGE size from 2,700,000    Fixup
                           to 1,800,000 - PAGE was too BIG for   Fixup
                           many computers - forcing the code     Fixup
                           to run VERY SLOWLY - smaller size     Fixup
                           improves running time.                Fixup
                          *Added on-line output for ALL ENDERROR 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
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Dermott E. Cullen                                                   Fixup
                                                                    Fixup
PRESENT CONTACT INFORMATION                                         Fixup
---------------------------                                         Fixup
Dermott E. Cullen                                                   Fixup
1466 Hudson Way                                                     Fixup
Livermore, CA 94550                                                 Fixup
U.S.A.                                                              Fixup
Telephone  925-443-1911                                             Fixup
E. Mail    RedCullen1@Comcast.net                                   Fixup
Website    RedCullen1.net/HOMEPAGE.NEW                              Fixup
                                                                    Fixup
PURPOSE                                                             Fixup
=======                                                             Fixup
THIS PROGRAM IS DESIGNED TO READ EVALUATED DATA IN THE ENDF         Fixup
FORMAT, PERFORM CORRECTIONS AND OUTPUT THE RESULT IN THE ENDF       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 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
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
                                                                    Fixup
    2017/5/20 - This option (2) is no longer allowed                Fixup
                                                                    Fixup
    WARNING: Threshold Correction is no longer allowed.             Fixup
             This option has resulted in far too much               Fixup
             misinterpretation and as such it is judged to          Fixup
             be too dangerous to be allowed in this code.           Fixup
             For example, the Laboratory frame of reference         Fixup
             threshold is temperature dependent = it is not         Fixup
             uniquely defined by Q value and atomic weight.         Fixup
             ThIS OPTION is IGNORED.                                Fixup
                                                                    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
```

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     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
                                                                    Fixup
     2017/5/20 - This option (2) is no longer allowed               Fixup
                                                                    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 DATA FILE AND WILL NOT BE IN THE OUTPUT ENDF        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     Fixup
     TIMES THAT EACH CONTRIBUTING CROSS SECTION MUST BE USED.       Fixup
     THE USED MAY SPECIFY THAT THE SUMMATION RULES ARE TO BE READ   Fixup
     AS INPUT (IMOPS(5)=1) OR THAT THE BUILT IN SUMMATION RULES     Fixup
     ARE TO BE USED (IMOPS(5)=2). THE BUILT IN SUMMATION RULES ARE  Fixup
     DESIGNED TO USE ENDF CONVENTIONS AND TO MINIMIZE THE NUMBER    Fixup
     OF TIMES THAT EACH CROSS SECTION IS USED.                      Fixup
  (6) INSURE THAT ALL CROSS SECTIONS ARE NON-NEGATIVE (I.E. ARE     Fixup
     ZERO OR POSITIVE). DURING READING ALL NEGATIVE CROSS SECTIONS  Fixup
     WILL BE SET EQUAL TO ZERO AND TREATED AS SUCH DURING ALL       Fixup
     SUBSEQUENT SUMMATIONS AND ENDF OUTPUT.                         Fixup
     NOTE...THIS OPTION SHOULD NEVER BE USED WITH DATA CONTAINING   Fixup
     BACKGROUND CROSS SECTIONS WHICH MAY BE NEGATIVE. ONLY AFTER    Fixup
     THE RESONANCE CONTRIBUTION HAS BEEN ADDED TO THE BACKGROUND    Fixup
     TO DEFINE THE ACTUAL CROSS SECTION IS IT VALID TO ELIMINATE    Fixup
     NEGATIVE CROSS SECTIONS.                                       Fixup
     NOTE...THIS OPTION MAY BE USED TO DELETE NEGATIVE ELASTIC      Fixup
     CROSS SECTIONS THAT MAY RESULT FROM RECONSTRUCTING CROSS       Fixup
     SECTIONS FROM SINGLE LEVEL BREIT-WIGNER PARAMETERS. IF THE     Fixup
     TOTAL CROSS SECTION IS THEN RECONSTRUCTED USING THE CORRECTED  Fixup
     ELASTIC CROSS SECTION THE TOTAL WILL BE POSITIVE DUE TO THE    Fixup
     CONTRIBUTIONS OF CAPTURE AND FISSION (THUS AVOIDING NUMERICAL  Fixup
     INSTABILITY PROBLEMS DURING SELF-SHIELDING CALCULATIONS).      Fixup
  (7) WITHIN EACH SECTION OF CROSS SECTIONS DELETE ENERGIES THAT     Fixup
     ARE NOT IN ASCENDING ENERGY ORDER (ENERGY REPETITION IS O.K.)  Fixup
  (8) WITHIN EACH SECTION OF CROSS SECTIONS ELIMINATE DUPLICATE      Fixup
     POINTS (SUCCESSIVE POINTS WITH THE SAME ENERGY-CROSS SECTION). Fixup
  (9) TEST THAT ALL SECTIONS ARE IN ASCENDING MAT/MF/MT ORDER.       Fixup
     IF NOT, NO CORRECTIVE ACTION WILL BE TAKEN, ONLY AN ERROR      Fixup
     MESSAGE WILL BE OUTPUT.                                        Fixup
 (10) CHECK MF/MT FOR EACH SECTION TO INSURE THAT THEY ARE DEFINED  Fixup
     IN THE ENDF FORMAR MANUAL. IF THEY ARE NOT DEFINED AN ERROR    Fixup
     MESSAGE IS PRINTED, BUT NO CORRECTIVE ACTION IS TAKEN.         Fixup
 (11) ALLOW SECTIONS WHICH ARE NOT PRESENT IN THE ORIGINAL (INPUT)  Fixup
     EVALUATION TO BE CREATED. NORMALLY THIS PROGRAM WILL ONLY      Fixup
     RECONSTRUCT AND OUTPUT SECTIONS IF THE SECTION IS PRESENT      Fixup
     IN THE ORIGINAL EVALUATION. THIS PROCEDURE IS FOLLOWED BECAUSE Fixup
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    NORMALLY THE PROGRAM DOES NOT KNOW HOW TO DEFINE THE CONTENTS  Fixup
    OF THE FIRST TWO LINES OF THE SECTION (E.G., Q-VALUE,          Fixup
    TEMPERATURE, INITIAL AND FINAL STATES). THIS OPTION MAY BE     Fixup
    USED TO ALLOW THE PROGRAM TO READ AND SAVE A TABLE DEFINING    Fixup
    THE CONTENTS OF THE FIRST TWO LINES OF EACH SECTION TO BE      Fixup
    CREATED.                                                       Fixup
    NOTE...IF A SECTION IS PRESENT ANY COMMAND TO CREATE IT WILL   Fixup
    BE IGNORED.                                                    Fixup
(12)ALLOW ENERGY POINTS TO BE INSERTED. THE PROGRAM CAN READ UP    Fixup
    TO 50, ENERGIES, MAT, MT AND USE LINEAR INTERPOLATION TO       Fixup
    INSERT ENERGY POINTS INTO TABLES AS THEY ARE READ, E.G.,       Fixup
    INSERT AN ENERGY POINT AT THERMAL ENERGY (0.0253 EV). IF       Fixup
    AN MAT AND/OR MT IS ZERO THIS IMPLIES = ALL - INSERT THE       Fixup
    ENERGY IN ALL TABLES.                                          Fixup
(13)PUT ALLOW CROSS SECTIONS ON A UNIFORM ENERGY GRID = EACH       Fixup
    SECTION (MT) OF CROSS SECTIONS WILL INCLUDE ALL ENERGIES       Fixup
    WHICH APPEAR IN AT LEAST ONE SECTION OF DATA. PARAMETERS       Fixup
    (MT=251 THROUGH 255) ARE NOT INCLUDED IN THE UNIFORM ENERGY    Fixup
    GRID.                                                          Fixup
(14)DELETE SECTION IF CROSS SECTION = 0 AT ALL ENERGIES. THIS      Fixup
    SOUNDS LIKE AN ABSURD OPTION, BUT IS REQUIRED BECAUSE SUCH     Fixup
    SECTIONS EXIST IN ENDF/B-VI DATA.                              Fixup
                                                                   Fixup
CREATING RATIOS AND PRODUCTS                                       Fixup
============================                                       Fixup
IN ORDER TO CREATE RATIOS AND PRODUCTS = NEW MT NUMBERS, YOU MUST  Fixup
DO TWO THINGS,                                                     Fixup
                                                                   Fixup
1) DEFINE EACH NEW MT NUMBER AS A RATIO OR PRODUCT OF TWO MT       Fixup
   NUMBERS.                                                        Fixup
                                                                   Fixup
2) USE THE CREATE MT NUMBER OPTION AND INPUT THE FIRST TWO LINES   Fixup
   OF THE SECTION                                                  Fixup
                                                                   Fixup
WARNING - UNLESS YOU DO BOTH OF THESE YOU WILL NOT OBTAIN OUTPUT   Fixup
IN THE ENDF FORMAT.                                                Fixup
                                                                   Fixup
TWO SPECIAL MT NUMBERS HAVE BEEN DEFINED BY CSEWG INVOLVING        Fixup
RATIOS AND PRODUCTS,                                               Fixup
                                                                   Fixup
ALPHA (MT=254)= CAPTURE (MT=102)/FISSION (MT=18)                   Fixup
                                                                   Fixup
ETA (MT=255)  = NU-BAR (MT=452)*FISSION (MT=18)/ABSORPTION (MT=27) Fixup
                                                                   Fixup
ABSORPTION (MT=27) = FISSION (MT=18) + SUM (MT=102 THROUGH 116)    Fixup
                                                                   Fixup
AS YET THERE IS NO STANDARD DEFINITION OF MT NUMBERS FOR RATIO     Fixup
OR PRODUCT DATA. YOU ARE FREE TO USE ANY MT NUMBERS NORMALLY NOT   Fixup
USED IN THE ENDF. HOWEVER, IT WILL THEN BE YOUR RESPONSIBILITY     Fixup
TO PROPERLY INTERPRET THE RESULTS, I.E., NOBODY ELSE WILL HAVE     Fixup
ANY IDEA HOW TO INTERPRET A TABLE OF DATA ASSOCIATED WITH THE MT   Fixup
NUMBERS YOU HAVE USED.                                             Fixup
                                                                   Fixup
THIS PROGRAM CAN BE ONLY DIRECTLY DEFINE RATIOS AND PRODUCTS       Fixup
USING TWO MT NUMBERS = BINARY OPERATIONS, E.G., DEFINE THE CAPTURE Fixup
TO FISSION RATIO, OR DEFINE THE PRODUCT NU-BAR*FISSION.            Fixup
                                                                   Fixup
THIS PROGRAM CANNOT DIRECTLY DEFINE RATIO OR PRODUCT OF A SUM OF   Fixup
SECTIONS TO THE SUM OF ANOTHER SET OF SECTIONS. HOWEVER, THIS CAN  Fixup
BE DONE INDIRECTLY BY FIRST DEFINING A DUMMY MT NUMBER (ANY MT     Fixup
NUMBER NOT NORMALLY USED IN ENDF) TO BE A SUM OF SECTIONS AND      Fixup
A SECOND DUMMY MT NUMBER TO BE A SECOND SUM OF SECTIONS. YOU CAN   Fixup
THEN DEFINE RATIO OR PRODUCT YOU REQUIRE TO BE THE RATIO OF THESE  Fixup
TWO DUMMY MT NUMBERS.                                              Fixup
                                                                   Fixup
FOR EXAMPLE, TO DEFINE ETA,                                        Fixup
1) FIRST DEFINE (MT=27) = (MT=27) + (SUM OF MT=102 THROUGH 116)    Fixup
2) NEXT DEFINE (MT=333) = (MT=452)*(MT=18)                         Fixup
3) LAST DEFINE (MT=255) = (MT=333)/(MT=27)                         Fixup
DO NOT FORGET TO TURN ON THE CREATE SECTION OPTION (ON THE FIRST   Fixup
INPUT LINE) AND INPUT THE FIRST TWO LINES OF SECTION MT=255 -      Fixup
```

OTHERWISE YOU WILL NOT GET ANY ENDF FORMATTED OUTPUT. Fixup

Fixup

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

Fixup

ENDF FORMAT Fixup
========== Fixup
THIS PROGRAM MAY BE USED WITH DATA IN ANY VERSION OF THE ENDF Fixup
FORMAT (I.E. ENDF-1, 2, 3, 4, 5 OR 6 FORMAT). SINCE A Fixup
PAGING SYSTEM IS USED STORE CROSS SECTION TABLES ON SCRATCH FILES Fixup
THERE IS NO LIMIT TO THE SIZE OF TABLES (E.G. THE TOTAL CROSS Fixup
SECTION MAY BE REPRESENTED BY 200,000 TABULATED POINTS). Fixup

Fixup

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

Fixup

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

Fixup

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

Fixup

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

Fixup

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

Fixup

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

Fixup

PASS1 Fixup
===== Fixup

```
READ ALL CROSS SECTIONS FROM ITAPE. DELETED ANY SECTIONS. CREATE   Fixup
ANY SECTIONS. CHECK/CORRECT THEM AND WRITE THEM TO SCRATCH FILE.   Fixup
DATA IS READ INTO ARRAY A, TRANSFERRED TO ARRAY C (AFTER EDITING)  Fixup
AND OUTPUT TO ISCRC FROM ARRAY C.                                  Fixup
ITAPE  - UNIT ORIGINAL ENDF DATA IS READ FROM.                     Fixup
ISCRC  - SCRATCH UNIT THAT EDITED DATA IS WRITTEN ON.              Fixup
TABA   - ARRAY INTO WHICH ORIGINAL DATA IS READ.                   Fixup
TABC   - ARRAY INTO WHICH EDITED DATA IS TRANSFERRED TO AND        Fixup
         FROM WHICH IT IS WRITTEN TO ISCRC.                        Fixup
                                                                   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 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 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 FORMAT.                           Fixup
 11    FINAL DATA IN THE ENDF 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    1-72     A72    ENDF INPUT DATA FILENAME                    Fixup
                       (STANDARD OPTION = ENDFB.IN)                Fixup
  3    1-72     A72    ENDF 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    UP TO 10 LOWER AND UPPER MT RANGES WHICH    Fixup
               FORM    WILL BE USED TO DEFINE THE RECONSTRUCTED    Fixup
                       CROSS SECTION OR TO DEFINE MT RANGES WHICH  Fixup
                       ARE EXCLUDED FROM THRESHOLD TESTS.          Fixup
                                                                   Fixup
                       EACH MT NUMBER IS DEFINED BY A CONTINUOUS   Fixup
                       STRING OF DIGITS, POSSIBILITY PRECEEDED BY  Fixup
                       A - (MINUS SIGN). EACH MT NUMBER MUST BE    Fixup
```

```
 BLANK OR OTHERWISE (NOT A DIGIT) DELIMITED. Fixup
                                             Fixup
 COLUMNS 6-72 MAY CONTAIN STRINGS OF DIGITS  Fixup
 THE FIRST DIGIT STRING OF EACH PAIR MAY BE  Fixup
 PRECEEDED BY A - (MINUS SIGN).              Fixup
                                             Fixup
 EACH LINE WILL BE INTERPRETED AS FOLLOWS,   Fixup
                                             Fixup
*SUMMATION (OR DIFFERENCES)                  Fixup
 --------------------------                  Fixup
 COLUMNS 1-5 = S OR BLANK FOLLOWED BY THE    Fixup
 MT NUMBER TO BE DEFINED BY SUMMATION        Fixup
                                             Fixup
 COLUMNS 6-72 = UP TO 10 MT RANGE (PAIRS OF  Fixup
 MT NUMBERS) TO BE USED TO DEFINED THE SUM.  Fixup
 IF THE FIRST MT NUMBER OF A PAIR IS         Fixup
 NEGATIVE THE RANGE OF MT NUMBERS IS         Fixup
 SUBTRACTED - AT LEAST ONE RANGE MUST BE     Fixup
 SPECIFIED.                                  Fixup
                                             Fixup
*DELETIONS                                   Fixup
 ---------                                   Fixup
 COLUMNS 1-5 = D FOLLOWED BY BLANKS          Fixup
                                             Fixup
 COLUMNS 6-72 CONTAIN UP TO 10 MT RANGE      Fixup
 (PAIRS OF MT NUMBERS), EACH RANGE DEFINING  Fixup
 A RANGE OF MT NUMBERS TO BE DELETED - AT    Fixup
 LEAST ONE RANGE MUST BE SPECIFIED.          Fixup
                                             Fixup
*EXCLUSION FROM THRESHOLD TESTS              Fixup
 ------------------------------              Fixup
 COLUMNS 1=5 = T FOLLOWED BY BLANKS          Fixup
                                             Fixup
 COLUMNS 6-72 CONTAIN UP TO 10 MT RANGE      Fixup
 (PAIRS OF MT NUMBERS), EACH RANGE DEFINING  Fixup
 A RANGE OF MT NUMBERS WHOSE THRESHOLD       Fixup
 ENERGY WILL NOT BE CHECKED - AT LEAST ONE   Fixup
 RANGE MUST BE SPECIFIED.                    Fixup
                                             Fixup
*RATIO                                       Fixup
 -----                                       Fixup
 COLUMNS 1-5 = R FOLLOWED BY THE MT NUMBER   Fixup
 TO BE DEFINED BY A RATIO                    Fixup
                                             Fixup
 COLUMNS 6-72 CONTAINS 2 MT NUMBERS TO BE    Fixup
 USED TO DEFINE THE RATIO.                   Fixup
                                             Fixup
*PRODUCT                                     Fixup
 -----                                       Fixup
 COLUMNS 1-5 = * FOLLOWED BY THE MT NUMBER   Fixup
 TO BE DEFINED BY A PRODUCT                  Fixup
                                             Fixup
 COLUMNS 6-72 CONTAINS 2 MT NUMBERS TO BE    Fixup
 USED TO DEFINE THE PRODUCT.                 Fixup
                                             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
                           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
NEW     (MT= 16) = THE SUM OF MT=875 THROUGH 891                       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 CHANGE 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 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
   16=(875,891)                                                    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, 18)+( 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
```