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====================================================================== 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
                                 *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
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                            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
                                                                  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
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
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    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     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/B 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/B 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
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     MESSAGE WILL BE OUTPUT.                                          Fixup
(10) CHECK MF/MT FOR EACH SECTION TO INSURE THAT THEY ARE DEFINED     Fixup
     IN THE ENDF/B 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
     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.                                     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/B 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/B. 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/B) 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
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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/B 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/B FORMAT                                                          Fixup
=============                                                          Fixup
THIS PROGRAM MAY BE USED WITH DATA IN ANY VERSION OF THE ENDF/B        Fixup
FORMAT (I.E. ENDF/B-I, II, III, IV, V OR VI 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/B 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/B 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
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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/B 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/B 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/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   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
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     (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/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
```