```
====================================================================== Mixer
                                                                       Mixer
     PROGRAM MIXER                                                     Mixer
     =============                                                     Mixer
     VERSION 76-1 (NOVEMBER 1976)                                      Mixer
     VERSION 81-1 (APRIL 1981)  *IBM VERSION                           Mixer
     VERSION 82-1 (AUGUST 1982) *COMPUTER INDEPENDENT VERSION          Mixer
     VERSION 84-1 (JUNE 1984)   *SPECIAL I/O ROUTINES TO GUARANTEE     Mixer
                                 ACCURACY OF ENERGY.                   Mixer
                                *DOUBLE PRECISION TREATMENT OF ENERGY  Mixer
                                 (REQUIRED FOR NARROW RESONANCES).     Mixer
     VERSION 86-1 (JANUARY 1986)*FORTRAN-77/H VERSION                  Mixer
     VERSION 88-1 (JULY 1988)   *OPTION...INTERNALLY DEFINE ALL I/O    Mixer
                                 FILE NAMES (SEE, SUBROUTINE FILIO1    Mixer
                                 AND FILIO2 FOR DETAILS).              Mixer
                                *IMPROVED BASED ON USER COMMENTS.      Mixer
     VERSION 89-1 (JANUARY 1989)*PSYCHOANALYZED BY PROGRAM FREUD TO    Mixer
                                 INSURE PROGRAM WILL NOT DO ANYTHING   Mixer
                                 CRAZY.                                Mixer
                                *UPDATED TO USE NEW PROGRAM CONVERT    Mixer
                                 KEYWORDS.                             Mixer
                                *ADDED LIVERMORE CIVIC COMPILER        Mixer
                                 CONVENTIONS.                          Mixer
     VERSION 92-1 (JANUARY 1992)*UPDATED BASED ON USER COMMENTS        Mixer
                                *ADDED PHOTON CROSS SECTIONS           Mixer
                                *ADDED FORTRAN SAVE OPTION             Mixer
                                *OUTPUT IN ENDF/B-VI FORMAT            Mixer
                                *COMPLETELY CONSISTENT I/O ROUTINES -  Mixer
                                 TO MINIMIZE COMPUTER DEPENDENCE.      Mixer
                                *NOTE, CHANGE IN INPUT PARAMETER       Mixer
                                 FORMAT.                               Mixer
     VERSION 94-1 (JANUARY 1994)*VARIABLE ENDF/B DATA FILENAMES        Mixer
                                 TO ALLOW ACCESS TO FILE STRUCTURES    Mixer
                                 (WARNING - INPUT PARAMETER FORMAT     Mixer
                                 HAS BEEN CHANGED)                     Mixer
                                *CLOSE ALL FILES BEFORE TERMINATING    Mixer
                                 (SEE, SUBROUTINE ENDIT)               Mixer
                                *INCREASED INCORE PAGE SIZE FROM       Mixer
                                 1002 TO 4008.                         Mixer
     VERSION 96-1 (JANUARY 1996) *COMPLETE RE-WRITE                    Mixer
                                 *IMPROVED COMPUTER INDEPENDENCE       Mixer
                                 *ALL DOUBLE PRECISION                 Mixer
                                 *ON SCREEN OUTPUT                     Mixer
                                 *UNIFORM TREATMENT OF ENDF/B I/O      Mixer
                                 *IMPROVED OUTPUT PRECISION            Mixer
                                 *DEFINED SCRATCH FILE NAMES           Mixer
                                 *INCREASED INCORE PAGE SIZE FROM      Mixer
                                  4008 TO 12000.                       Mixer
     VERSION 99-1 (MARCH 1999)   *CORRECTED CHARACTER TO FLOATING      Mixer
                                  POINT READ FOR MORE DIGITS           Mixer
                                 *UPDATED TEST FOR ENDF/B FORMAT       Mixer
                                  VERSION BASED ON RECENT FORMAT CHANGE Mixer
                                 *GENERAL IMPROVEMENTS BASED ON        Mixer
                                  USER FEEDBACK                        Mixer
     VERSION 99-2 (JUNE 1999)    *ASSUME ENDF/B-VI, NOT V, IF MISSING  Mixer
                                  MF=1, MT-451.                        Mixer
     VERS. 2000-1 (FEBRUARY 2000)*GENERAL IMPROVEMENTS BASED ON        Mixer
                                  USER FEEDBACK                        Mixer
     VERS. 2002-1 (MAY 2002)     *OPTIONAL INPUT PARAMETERS            Mixer
     VERS. 2004-1 (MARCH 2004)   *ADDED INCLUDE FOR COMMON             Mixer
                                 *INCREASED INCORE PAGE SIZE FROM      Mixer
                                  12000 TO 60000.                      Mixer
     VERS. 2005-1 (OCT. 2005)    *CORRECTED MERGE ERROR                Mixer
     VERS. 2007-1 (JAN. 2007)    *CHECKED AGAINST ALL ENDF/B-VII       Mixer
                                 *INCREASED INCORE PAGE SIZE FROM      Mixer
                                  60,000 TO 240,000.                   Mixer
     VERS. 2007-2 (DEC. 2007)    *72 CHARACTER FILE NAMES.             Mixer
     VERS. 2008-1 (JUNE 2008)    *ADDED GRAMS OR ATOMS INPUT           Mixer
     VERS. 2010-1 (Apr. 2010)    *General update based on user feedback Mixer
     VERS. 2012-1 (Aug. 2012)    *Added CODENAME                       Mixer
                                 *32 and 64 bit Compatible             Mixer
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                          *Added ERROR stop                          Mixer
VERS. 2015-1 (Jan. 2015)  *Extended OUT9.                            Mixer
                          *Replaced ALL 3 way IF Statements.         Mixer
VERS. 2017-1 (May  2017)  *Increse max. points to 1,200,000          Mixer
                          *updated based on user feedbsck.           Mixer
                          *All floating input parameters changed     Mixer
                           to character input + IN9 conversion.      Mixer
VERS. 2018-1 (Jan. 2018)  *Added on-line output for ALL ENDERROR     Mixer
VERS. 2019-1 (June 2019)  *Additional Interpolation Law Tests        Mixer
                          *Added WARNING if ANY MT ends below        Mixer
                           Maximum Tabulated Energy of ANY other     Mixer
                           MT = the ENDF Data is NOT uniquely        Mixer
                           defined above this energy.                Mixer
                          *Corrected ERROR that could set last       Mixer
                           (highest energy) cross section = 0.0      Mixer
                                                                     Mixer
Acknowledgement 2019                                                 Mixer
--------------------                                                 Mixer
I thank Daniel Lopez Aldama (Agency of Nuclear Energy and Advanced   Mixer
Technologies, Havana, Cuba), for finding and fixing an ERROR in      Mixer
MIXER that could result in the last MIXED energy point (highest      Mixer
energy output) ERROREOUSLY setting the  cross section = 0.0. This    Mixer
problem has been corrected in 2019-1.                                Mixer
                                                                     Mixer
Defining High Energy Data                                            Mixer
-------------------------                                            Mixer
Starting with MIXER (2019-1), it will no longer automatically        Mixer
extend MTs as CONSTANT above the energy range where they are         Mixer
tabulated to the Maximum Tabulated Energy of any other MT in MIX.    Mixer
Above this energy the ENDF MIX is not UNIQUELY defined - in this     Mixer
case it was potentially TOTALLY MISLEADING users of MIXER in that    Mixer
it was doing "invisiable evaluation"  - starting with 2019-1         Mixer
MIXER will,                                                          Mixer
1) Extend the cross section = 0.                                     Mixer
2) Print WARNING messages idenifying the Maximum Tabulated Energy    Mixer
   of ANY MT - and which MTs stop below this energy.                 Mixer
3) Print a final WARNING that the MIX is NO UNIQUELY defined         Mixer
   above the LOWEST common tabulated energy fot any MT.              Mixer
                                                                     Mixer
OWNED, MAINTAINED AND DISTRIBUTED BY                                 Mixer
------------------------------------                                 Mixer
THE NUCLEAR DATA SECTION                                             Mixer
INTERNATIONAL ATOMIC ENERGY AGENCY                                   Mixer
P.O. BOX 100                                                         Mixer
A-1400, VIENNA, AUSTRIA                                              Mixer
EUROPE                                                               Mixer
                                                                     Mixer
ORIGINALLY WRITTEN BY                                                Mixer
-------------------------------------                                Mixer
Dermott E. Cullen                                                    Mixer
                                                                     Mixer
PRESENT CONTACT INFORMATION                                          Mixer
---------------------------                                          Mixer
Dermott E. Cullen                                                    Mixer
1466 Hudson Way                                                      Mixer
Livermore, CA 94550                                                  Mixer
U.S.A.                                                               Mixer
Telephone  925-443-1911                                              Mixer
E. Mail    RedCullen1@Comcast.net                                    Mixer
Website    RedCullen1.net/HOMEPAGE.NEW                               Mixer
                                                                     Mixer
PURPOSE                                                              Mixer
-------                                                              Mixer
THIS PROGRAM IS DESIGNED TO CALCULATE THE ENERGY DEPENDENT CROSS     Mixer
SECTION FOR A COMPOSITE MIXTURE OF UP TO 10 DIFFERENT MATERIALS.     Mixer
                                                                     Mixer
THE PRESENT VERSION WILL ONLY CALCULATE THE CROSS SECTION FOR ONE    Mixer
FINAL REACTION (ENDF/B SECTION), E.G. TOTAL CROSS SECTION, BUT NOT   Mixer
ANY OTHER REACTION.                                                  Mixer
                                                                     Mixer
NOTE, THIS PROGRAM WILL NOT COMBINE ALL REACTIONS FOR A MIXTURE      Mixer
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OF MATERIALS DURING A SINGLE RUN - ONLY ONE REACTION WILL BE       Mixer
CREATED PER RUN.                                                   Mixer
                                                                   Mixer
EVALUATED DATA FORMAT                                              Mixer
---------------------                                              Mixer
THE CROSS SECTIONS ARE READ FROM THE ENDF/B FORMAT AND THE         Mixer
COMPOSITE CROSS SECTION IS CONVERTED TO AN EQUIVALENT BARNS/ATOM   Mixer
FORM AND OUTPUT IN THE ENDF/B FORMAT WITH AN EQUIVALENT ATOMIC     Mixer
WEIGHT. THE USER MUST SPECIFY THE COMPOSITION BY GIVING THE ZA,    Mixer
MT AND GRAMS OR ATOMS OF EACH CONSTITUENT. IN ADDITION THE USER    Mixer
IDENTIFY THE COMPOSITE CROSS SECTION BY SPECIFYING THE ZA, MAT     Mixer
AND MT TO BE USED IN THE ENDF/B FORMATTED OUTPUT.                  Mixer
                                                                   Mixer
SINCE ONLY THE CROSS SECTIONS IN FILE 3 AND 23 ARE USED, AND THE   Mixer
FORMAT FOR FILE 3/23 IS THE SAME IN ALL VERSIONS ON ENDF/B, THIS   Mixer
PROGRAM MAY BE USED WITH ANY VERSION OF ENDF/B DATA (I.E.,         Mixer
ENDF/B-I, II, III, IV, V OR VI). DURING A SINGLE RUN IT MAY EVEN   Mixer
BE USED TO READ AND COMBINE EVALUATIONS WHICH ARE IN DIFFERENT     Mixer
VERSIONS OF THE ENDF/B FORMAT.                                     Mixer
                                                                   Mixer
ENDF/B FORMATTED OUTPUT WILL BE IN THE ENDF/B-VI FORMAT REGARDLESS Mixer
OF THE FORMAT OF THE INPUT ENDF/B DATA. THIS WILL ONLY EFFECT THE  Mixer
HOLLERITH SECTION (MF=1, MT=451). THE FORMAT OF CROSS SECTIONS     Mixer
(MF=3) IS THE SAME IN ALL VERSION OF THE ENDF/B FORMAT.            Mixer
                                                                   Mixer
IN ORDER TO GUARANTEE PROPER OPERATION OF THIS PROGRAM THE DATA    Mixer
MUST BE PROPERLY CODED IN THE ENDF/B FORMAT. NO ERROR CHECKING IS  Mixer
PERFORMED. IT IS PARTICULARLY IMPORTANT THAT THE FOLLOWING DATA    Mixer
BE CORRECT                                                         Mixer
                                                                   Mixer
(1) ZA, MF, MT - MUST BE CORRECT IN ORDER TO ALLOW PROGRAM TO      Mixer
    SELECT THE APPROPRIATE SECTIONS TO BE COMBINED.                Mixer
(2) AWRE - ATOMIC WEIGHT RATIO MUST BE CORRECT TO ALLOW PROGRAM    Mixer
    TO CONVERT THE USER SPECIFIED GRAMS INTO ATOMS FOR             Mixer
    PROPER ATOM RATIO MIXING.                                      Mixer
(3) (ENERGIES, CROSS SECTIONS) - MUST BE CORRECT, LINEARLY         Mixer
                                                 ========          Mixer
    INTERPOLABLE, IN ASCENDING ENERGY ORDER OF (E, BARNS).         Mixer
    ============                                                   Mixer
                                                                   Mixer
    TO CONVERT ENDF/B FORMATTED DATA TO THE REQUIRED INPUT FORM    Mixer
    THE FOLLOWING PROGRAMS MAY BE USED,                            Mixer
    LINEAR - CONVERT TABULATED CROSS SECTIONS TO LINEARLY          Mixer
             INTERPOLABLE FORM.                                    Mixer
    RECENT - RECONSTRUCT RESONANCE CONTRIBUTION, ADD TO BACKGROUND Mixer
             CROSS SECTION AND OUTPUT THE COMBINATION IN LINEARLY  Mixer
             INTERPOLABLE FORM.                                    Mixer
    SIGMA1 - DOPPLER BROADEN CROSS SECTIONS TO ANY TEMPERATURE AND Mixer
             OUTPUT THE RESULT IN LINEARLY INTERPOLABLE FORM.       Mixer
                                                                   Mixer
DOCUMENTATION                                                      Mixer
-------------                                                      Mixer
THE FACT THAT THIS PROGRAM HAS COMBINED THE DATA IS DOCUMENTED     Mixer
IN THE OUTPUT ENDF/B FORMAT IN THE HOLLERITH SECTION BY FIRST      Mixer
IDENTIFYING THE VERSION OF THIS PROGRAM THAT WAS USED, IN THE FORM Mixer
                                                                   Mixer
********************( PROGRAM MIXER 2019-1) ********************** Mixer
                                                                   Mixer
THIS IS FOLLOWED BY THE TWO LINE IDENTIFICATION INPUT BY THE USER. Mixer
THIS IS FOLLOWED BY COMPOSITION INPUT BY THE USER.                 Mixer
                                                                   Mixer
NEUTRON OR PHOTON DATA                                             Mixer
----------------------                                             Mixer
THIS PROGRAM WILL ALLOW YOU TO PROCESS EITHER NEUTRON OR PHOTON    Mixer
CROSS SECTIONS - BUT YOU CANNOT MIX THE TWO TYPES TOGETHER. BY     Mixer
INPUT YOU CAN SPECIFY THE OUTPUT MF = 3 (NEUTRONS) OR 23 (PHOTONS) Mixer
WHATEVER TYPE YOU SPECIFIED FOR OUTPUT IS THE ONLY TYPE OF DATA    Mixer
WHICH WILL BE PROCESSED BY THIS PROGRAM.                           Mixer
                                                                   Mixer
DEFINING THE COMPOSITION                                           Mixer
------------------------                                           Mixer
```

THE USER MAY SPECIFY UP TO 10 DIFFERENT SECTIONS OF DATA TO BE COMBINED, EACH SECTION IDENTIFIED BY ZA AND MT NUMBER. THE AMOUNT OF EACH MATERIAL IS SPECIFIED BY DEFINING THE NUMBER OF GRAMS OF EACH MATERIAL IN THE COMPOSITE MIXTURE. THIS CAN BE DERIVED FROM THE VOLUME FRACTION SIMPLY BY MULTIPLYING THE STP DENSITY OF EACH MATERIAL BY ITS VOLUME FRACTION. NOTE, DO NOT INPUT ATOM FRACTIONS.

THE LIST OF SECTIONS TO BE COMBINED MAY BE SPECIFIED IN ANY ORDER, I.E. THEY NEED NOT BE IN ZA ORDER OR THE ORDER THAT THE EVALUATED DATA APPEARS ON THE ENDF/B FORMATTED TAPE.

IF ANY REQUESTED SECTION OF DATA IS NOT FOUND ON THE ORIGINAL ENDF/B FORMATTED FILE, THE PROGRAM WILL PRINT A LIST OF THE MISSING SECTIONS AND TERMINATE. IF ALL REQUESTED SECTIONS ARE FOUND THE PROGRAM WILL PRODUCE A COMPOSITE SECTION USING THE UNION OF ALL ENERGIES FOUND IN ANY SECTION. THE COMPOSITE SECTION WILL NOT BE THINNED.

PRIOR TO LATER USE IN ANY APPLICATION THE NUMBER OF ENERGY POINTS IN THE COMPOSITE CROSS SECTION MAY BE MINIMIZED BY USING PROGRAM LINEAR, UCRL-50400, VOL. 17, PART B TO THIN THE DATA.

ONLY LINEARLY INTERPOLABLE DATA

THE CROSS SECTIONS TO BE COMBINED MUST BE IN LINEARLY INTERPOLABLE TABULATED FORM (I. E., FILE 3 OR 23, INTERPOLATION LAW 2).

TO CONVERT TABULATED CROSS SECTIONS TO LINEARLY INTERPOLABLE FORM SEE, PROGRAM LINEAR, UCRL-50400, VOL. 17, PART A.

TO CONVERT RESONANCE PARAMETERS TO LINEARLY INTERPOLABLE FORM SEE, PROGRAM RECENT, UCRL-50400, VOL. 17, PART C.

TO DOPPLER BROADEN LINEARLY INTERPOLABLE DATA TO ANY TEMPERATURE SEE PROGRAM SIGMA1, UCRL-50400, VOL. 17, PART B.

PAGING SYSTEM

THERE IS NO LIMIT TO THE THE NUMBER OF DATA POINTS IN EACH OF THE SECTIONS TO BE COMBINED, NOR IS THERE A LIMIT TO THE NUMBER OF DATA POINTS IN THE COMPOSITE MIXTURE CROSS SECTION.

ALL REQUIRED SECTIONS OF DATA ARE READ FROM THE ORIGINAL ENDF/B FORMATTED FILE. ANY SECTION OF 60000 OR FEWER POINTS WILL BE TOTALLY CORE RESIDENT. LARGER SECTIONS ARE LOADED INTO A PAGING SYSTEM USING A SCRATCH FILE WITH ONLY 60000 POINTS PER SECTION CORE RESIDENT AT ANY ONE TIME. SIMILARLY THE COMPOSITE SECTION WILL BE TOTALLY CORE RESIDENT IF IT CONTAINS 60000 OR FEWER POINTS AND LARGER COMPOSITE SECTIONS WILL BE LOADED INTO A PAGING SYSTEM WHERE ONLY 60000 POINTS ARE CORE RESIDENT AT ANY TIME. SINC A PAGING SYSTEM MAY BE USED BY ANY SECTION OF DATA THERE IS NO LIMIT TO THE SIZE OF EITHER THE ORIGINAL SECTIONS, NOR TO THE COMPOSITE SECTION, E.G. A SECTION MAY CONTAIN 100,000 ENERGIES AND CROSS SECTIONS TO DESCRIBE A GIVEN REACTION.

PAGE SIZE

THE PAGE SIZE USED IN THIS PROGRAM IS DEFINED BY THE PARAMETER NPAGE AND THE DIMENSIONS OF THE ARRAYS XTAB AND YTAB. IN ORDER TO ADAPT THIS PROGRAM FOR USE ON ANY COMPUTER THE PAGE SIZE MAY BE INCREASED OR DECREASED BUT THE FOLLOWING RULES MUST BE FOLLOWED
====

(1) NPAGE - MUST BE A MULTIPLE OF 3 IN ORDER TO ALLOW THE PROGRAM TO READ FULL CARDS OF ENDF/B DATA (3 POINTS PER LINE). FAILURE TO FOLLOW THIS RULE CAN LEAD TO LOSS OF DATA AND/OR PROGRAM ERRORS DURING EXECUTION.
(3) YTAB - THE DIMENSION OF YTAB MUST BE (NPAGE,11).
(4) XTAB - THE DIMENSION OF XTAB MUST BE (NPAGE,11).

DOPPLER BROADENING

THE COMPOSITE CROSS SECTION OUTPUT FROM THIS PROGRAM SHOULD NOT BE DOPPLER BROADENED USING PROGRAM SIGMA1, OR THE EQUIVALENT. THE ATOMIC WEIGHT USED TO IDENTIFY THE COMPOSITE MIXTURE IS BASED ON THE ATOM FRACTION OF EACH CONSTITUENT AND CANNOT BE USED TO CHARACTERIZE THE BROADENING OF ANY GIVEN RESONANCE IN THE MIXTURE DUE TO THE CONTRIBUTION OF ONE CONSTITUENT. IN ORDER TO CONSIDER DOPPLER BROADENING FIRST USE PROGRAM SIGMA1 TO BROADEN THE CROSS SECTION FOR EACH OF THE CONSTITUENTS AND THEN COMBINE THE BROADENED DATA USING PROGRAM MIXER.

EXAMPLE USE

THE OUTPUT FROM THIS PROGRAM HAS BEEN FOUND TO BE EXTREMELY USEFUL IN THE FOLLOWING APPLICATIONS...

(1) CALCULATE A COMPOSITE TOTAL CROSS SECTON FOR LATER USE AS A WEIGHTING FUNCTION IN SELF-SHIELDING THE CROSS SECTIONS OF EACH CONSTITUENT OF THE MIXTURE SEPARATELY.

    PROGRAM GROUPIE CAN USE THE CALCULATED COMPOSITE TOTAL CROSS SECTION AS THE TOTAL CROSS SECTION FOR EACH CONSTITUENT OF THE MIXTURE IN ORDER TO CALCULATE SELF-SHIELDED CROSS SECTION FOR EACH CONSTITUENT OF THE MIXTURE.

(2) CALCULATE COMPOSITE TOTAL AND FISSION CROSS SECTIONS IN ORDER TO CALCULATE THE TRANSMISSION AND SELF-INDICATION THROUGH COMPOSITE MATERIALS. GENERALLY IN THIS CASE THE TOTAL CROSS SECTION WILL BE CALCULATED FOR THE COMPOSITION OF THE SAMPLE AND THE FISSION CROSS SECTION WILL BE CALCULATED FOR THE COMPOSITION OF THE FISSION CHAMBER (WHICH GENERALLY WILL HAVE A DIFFERENT COMPOSITION THAN THE SAMPLE).

    PROGRAM VIRGIN CAN USE THE OUTPUT FROM THIS PROGRAM TO PERFORM TRANSMISSION AND SELF-INDICATION CALCULATIONS. PROGRAM VIRGIN WILL ANALYTICALLY CALCULATE THE UNCOLLIDED (I.E. VIRGIN) FLUX TRANSMITTED AND REACTION RATE DUE TO ANY TABULATED LINEARLY INTERPOLABLE INCIDENT SPECTRUM. RESULTS WILL BE PRESENTLY FOR UP TO 10 DIFFERENT SAMPLE THICKNESSES AND BINNED INTO ENERGY GROUPS IN ORDER TO SIMULATE AN EXPERIMENTAL MEASUREMENT.

(3) THE OUTPUT FROM THIS PROGRAM IS VERY USEFUL TO PLOT IN ORDER TO SEE THE IMPORTANCE OF SPECIFIC CROSS SECTION FEATURES IN THE COMPOSITE CROSS SECTION.

    PROGRAM COMPLOT CAN BE USED TO PLOT THE OUTPUT FROM THIS PROGRAM AND IF REQUIRED EXAMINE ANY PARTICULAR ENERGY RANGE IN DETAIL. IN ORDER TO DO THIS THE (ZA, MT) EQUIVALENCE OPTION OF PROGRAM COMPLOT SHOULD BE USED. TO COMPARE ANY CONSTITUENT CROSS SECTION TO THE COMPOSITE CROSS SECTION THE INPUT TO COMPLOT SHOULD EQUATE THE (ZA,MT) OF THE COMPOSITE TO THE (ZA,MT) OF ONE CONSTITUENT AND THE MULTIPLIER INPUT TO COMPLOT SHOULD BE THE ATOM FRACTION FOR THE CONSTITUENT (THE ATOM FRACTIONS ARE DEFINED IN THE OUTPUT LISTING FROM PROGRAM MIXER).

INPUT FILES

UNIT	DESCRIPTION
2	INPUT CARDS (BCD - 80 CHARACTERS/RECORD)
10	ORIGINAL EVALUATED DATA IN ENDF/B FORMAT (BCD - 80 CHARACTERS/RECORD)

OUTPUT FILES

UNIT	DESCRIPTION

```
  3   OUTPUT LISTING (BCD - 120 CHARACTERS/RECORD)                Mixer
 11   COMPOSITE EVALUATED DATA IN ENDF/B FORMAT                   Mixer
             (BCD - 80 CHARACTERS/RECORD)                        Mixer
                                                                 Mixer
SCRATCH FILES                                                    Mixer
-------------                                                    Mixer
UNIT  DESCRIPTION                                                Mixer
----  -----------                                                Mixer
 12   SCRATCH FILE FOR EACH OF THE 10 SECTIONS WHICH              Mixer
 13   WILL BE ADDED TOGETHER TO DEFINE THE FINAL                  Mixer
  .   SECTION (BINARY - 60000 AND 480000 WORDS/RECORD)           Mixer
  . .                                                            Mixer
  . .                                                            Mixer
 20 .                                                            Mixer
 21 .                                                            Mixer
 22   SCRATCH FILE FOR COMBINED SECTION.                          Mixer
      (BINARY - 2004 WORDS/RECORD)                               Mixer
                                                                 Mixer
STANDARD FILE NAMES (SEE SUBROUTINES FILIO1 AND FILIO2)          Mixer
---------------------------------------------------------------  Mixer
UNIT  FILE NAME                                                  Mixer
----  ----------                                                 Mixer
  2   MIXER.INP                                                  Mixer
  3   MIXER.LST                                                  Mixer
 10   ENDFB.IN                                                   Mixer
 11   ENDFB.OUT                                                  Mixer
12-22 (SCRATCH)                                                  Mixer
                                                                 Mixer
INPUT CARDS                                                      Mixer
-----------                                                      Mixer
LINE  COLS.  FORMAT  NAME    DESCRIPTION                         Mixer
----  -----  ------  ------- ----------                          Mixer
 1-2   1-66 16A4,A2  TITLE   TWO LINE TITLE DESCRIBING PROBLEM   Mixer
                            (THIS TITLE IS USED TO IDENTIFY THE Mixer
                            OUTPUT LISTING AND IS ALSO WRITTEN  Mixer
                            IN MF=1, MT=451 (HOLLERITH SECTION) Mixer
                            OF THE ENDF/B FORMATTED OUTPUT TO   Mixer
                            IDENTIFY THE COMPOSITE MIXTURE).    Mixer
   3   1-72                 ENDF/B INPUT DATA FILENAME          Mixer
                            (STANDARD OPTION = ENDFB.IN)        Mixer
   4   1-72                 ENDF/B OUTPUT DATA FILENAME         Mixer
                            (STANDARD OPTION = ENDFB.OUT)       Mixer
   5   1-11    I11   IZAOUT  ZA IDENTIFICATION FOR COMBINATION  Mixer
   5  12-17    I6    MATOUT  MAT IDENTIFICATION FOR COMBINATION Mixer
   5  18-19    I2    MFOUT   MF IDENTIFICATION FOR COMBINATION  Mixer
   5  20-22    I3    MTOUT   MT IDENTIFICATION FOR COMBINATION  Mixer
   5  23-33    I11   DEFINE INPUT DENSITY                       Mixer
                     = 0 = GRAMS = BACKWARDS COMPATIBLE         Mixer
                     > 0 = ATOMS = NEW IN 2008                  Mixer
 6-N   1-11    I11   IZAGET  ZA (1000*Z+A) OF MATERIAL          Mixer
 6-N  12-22    I11   MTGET   MT OF REACTION                     Mixer
 6-N  23-33  E11.4   DENSE   MATERIAL DENSITY (ATOMS OR GRAMS)  Mixer
                                                                 Mixer
THE SIXTH LINE IS REPEATED FOR EACH SECTION (FROM 2 TO 10).      Mixer
SINCE THE ENDF/B FORMATTED OUTPUT IS IN BARNS/ATOM FORM A MINIMUM Mixer
OF TWO SECTIONS MUST BE COMBINED (I.E., IF ONLY ONE SECTION IS   Mixer
SPECIFIED THE OUTPUT WOULD BE IDENTICAL TO THE INPUT AND AS SUCH Mixer
THE PROGRAM WILL CONSIDER THIS TO BE AN ERROR AND NOT PERFORM THE Mixer
CALCULATION). THE LIST OF SECTIONS IS TERMINATED BY A BLANK LINE. Mixer
                                                                 Mixer
THE LIST OF SECTIONS TO BE COMBINED MAY BE SPECIFIED IN ANY      Mixer
ORDER, I.E. THEY NEED NOT BE IN ZA ORDER OR THE ORDER THAT THE   Mixer
EVALUATED DATA APPEARS ON THE ENDF/B FORMATTED TAPE.             Mixer
                                                                 Mixer
EXAMPLE INPUT NO. 1                                              Mixer
-------------------                                              Mixer
CREATE THE TOTAL CROSS SECTION (MT=1) FOR STAINLESS STEEL AND    Mixer
IDENTIFY THE COMBINED MATERIAL WITH ZA=26800 AND MAT=4000,       Mixer
THE COMPOSITION BY VOLUME OF THE STEEL WILL BE...                Mixer
                                                                 Mixer
THE DATA FROM \ENDFB6\K300\LIBRARY.DAT AND WRITE DATA TO         Mixer
```

```
\MIXER\STEEL.DAT                                                        Mixer
                                                                        Mixer
IRON      - 74.8 PER-CENT                                               Mixer
CHROMIUM  - 16.0                                                        Mixer
NICKEL    -  6.0                                                        Mixer
MANGANESE -  2.0                                                        Mixer
SILICON   -  1.0                                                        Mixer
CARBON    -  0.2                                                        Mixer
                                                                        Mixer
THE INPUT MUST SPECIFY THE COMPOSITION BY GRAMS OR ATOMS. THIS IS       Mixer
DEFINED AS THE PRODUCT OF THE STANDARD DENSITY (GRAMS)                  Mixer
TIMES THE VOLUME FRACTION. FOR THIS EXAMPLE THE FOLLOWING 12            Mixer
INPUT CARDS ARE REQUIRED....                                            Mixer
                                                                        Mixer
STAINLESS STEEL. COMPOSITION BY PER-CENT VOLUME IS 74.8-IRON,           Mixer
16-CHROME, 6-NICKEL, 2-MANGANESE, 1-SILICON, 0.2-CARBON                 Mixer
\ENDFB6\K300\LIBRARY.DAT                                                Mixer
\MIXER\STEEL.DAT                                                        Mixer
     26800  4000 3  1          0                                       Mixer
     26000          1 5.88676    (NOTE, GRAMS INPUT FOR EACH           Mixer
     24000          1 1.150448    CONSTITUENT, E.G. FOR IRON THE       Mixer
     28000          1 0.533928    STP DENSITY IS 7.87 GRAMS.           Mixer
     25055          1 0.1486      THE INPUT VALUE OF 5.88676 IS        Mixer
     14000          1 0.0233      0.748 X 7.87,I.E.  VOLUME            Mixer
      6012          1 0.0044958   FRACTION TIMES STP DENSITY).         Mixer
                                (BLANK LINE TERMINATES INPUT LIST)      Mixer
                                                                        Mixer
EXAMPLE INPUT NO. 2                                                     Mixer
-------------------                                                     Mixer
THE SAME EXAMPLE AS THE ABOVE PROBLEM, ONLY USE THE STANDARD            Mixer
ENDF/B DATA FILENAMES - ENDFB.IN AND ENDFB.OUT (THIS CAN BE             Mixer
DONE BY LEAVING THE THIRD AND FOURTH INPUT LINES BLANK).                Mixer
FOR THIS EXAMPLE THE FOLLOWING 12 INPUT CARDS ARE REQUIRED....         Mixer
                                                                        Mixer
STAINLESS STEEL. COMPOSITION BY PER-CENT VOLUME IS 74.8-IRON,           Mixer
16-CHROME, 6-NICKEL, 2-MANGANESE, 1-SILICON, 0.2-CARBON                 Mixer
(NOTE - THIS LINE IS REALLY BLANK)                                      Mixer
(NOTE - THIS LINE IS REALLY BLANK)                                      Mixer
     26800  4000 3  1                                                  Mixer
     26000          1 5.88676    (NOTE, GRAMS INPUT FOR EACH           Mixer
     24000          1 1.150448    CONSTITUENT, E.G. FOR IRON THE       Mixer
     28000          1 0.533928    STP DENSITY IS 7.87 GRAMS.           Mixer
     25055          1 0.1486      THE INPUT VALUE OF 5.88676 IS        Mixer
     14000          1 0.0233      0.748 X 7.87,I.E.  VOLUME            Mixer
      6012          1 0.0044958   FRACTION TIMES STP DENSITY).         Mixer
                                (BLANK LINE TERMINATES INPUT LIST)      Mixer
                                                                        Mixer
======================================================================= Mixer
```