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======================================================================= Activate
                                                                        Activate
      PROGRAM ACTIVATE                                                   Activate
      VERS. 2000-1 (APRIL 2000)   *INITIAL VERSION.                      Activate
      VERS. 2002-1 (MAY 2002)     *OPTIONAL INPUT PARAMETERS             Activate
      VERS. 2004-1 (JAN. 2004)    *CORRECTED ERROR - FIRST RECORD AFTER  Activate
                                   MF=10 WAS MISSING.                    Activate
                                  *ADDED INCLUDE TO DEFINE COMMON        Activate
                                  *INCREASED MAX. POINTS FROM 100,000    Activate
                                   TO 1,000,000.                         Activate
      VERS. 2007-1 (JAN. 2007)    *CHECKED AGAINST ALL ENDF/B-VII        Activate
                                                                        Activate
      Acknowledgement 2004                                              Activate
      --------------------                                              Activate
      Currently almost all improvements to this code are based upon     Activate
      feedback from code users who report problems. This feedback       Activate
      benefits ALL users of this code, and ALL users are encouraged     Activate
      to report problems.                                               Activate
                                                                        Activate
      Improvements on the 2004 version of this code based on user       Activate
      feedback including,                                               Activate
      1) Andrej Trkov - reported that the first record of the section   Activate
                   after an inserted MF=10 was missing.                 Activate
                                                                        Activate
      OWNED, MAINTAINED AND DISTRIBUTED BY                              Activate
      -----------------------------------                              Activate
      THE NUCLEAR DATA SECTION                                         Activate
      INTERNATIONAL ATOMIC ENERGY AGENCY                               Activate
      P.O. BOX 100                                                     Activate
      A-1400, VIENNA, AUSTRIA                                          Activate
      EUROPE                                                           Activate
                                                                        Activate
      ORIGINALLY WRITTEN BY                                            Activate
      ----------------------------------                               Activate
      DERMOTT E. CULLEN                                                Activate
      UNIVERSITY OF CALIFORNIA                                         Activate
      LAWRENCE LIVERMORE NATIONAL LABORATORY                           Activate
      L-159                                                            Activate
      P.O. BOX 808                                                     Activate
      LIVERMORE, CA 94550                                              Activate
      U.S.A.                                                           Activate
      TELEPHONE  925-423-7359                                          Activate
      E. MAIL    CULLEN1@LLNL.GOV                                      Activate
      WEBSITE    HTTP://WWW.LLNL.GOV/CULLEN1                           Activate
                                                                        Activate
      AUTHORS MESSAGE                                                  Activate
      ---------------                                                  Activate
      THE REPORT DESCRIBED ABOVE IS THE LATEST PUBLISHED DOCUMENTATION  Activate
      FOR THIS PROGRAM. HOWEVER, THE COMMENTS BELOW SHOULD BE CONSIDERED Activate
      THE LATEST DOCUMENTATION INCLUDING ALL RECENT IMPROVEMENTS. PLEASE Activate
      READ ALL OF THESE COMMENTS BEFORE IMPLEMENTATION.                Activate
                                                                        Activate
      AT THE PRESENT TIME WE ARE ATTEMPTING TO DEVELOP A SET OF COMPUTER Activate
      INDEPENDENT PROGRAMS THAT CAN EASILY BE IMPLEMENTED ON ANY ONE    Activate
      OF A WIDE VARIETY OF COMPUTERS. IN ORDER TO ASSIST IN THIS PROJECT Activate
      IT WOULD BE APPECIATED IF YOU WOULD NOTIFY THE AUTHOR OF ANY      Activate
      COMPILER DIAGNOSTICS, OPERATING PROBLEMS OR SUGGESTIONS ON HOW TO  Activate
      IMPROVE THIS PROGRAM. HOPEFULLY, IN THIS WAY FUTURE VERSIONS OF    Activate
      THIS PROGRAM WILL BE COMPLETELY COMPATIBLE FOR USE ON YOUR        Activate
      COMPUTER.                                                        Activate
                                                                        Activate
      PURPOSE                                                          Activate
      -------                                                          Activate
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THIS PROGRAM IS DESIGNED TO CREATE FILE 10 ACTIVATION CROSS   Activate
SECTIONS BY COMBINING FILE 3 CROSS SECTIONS AND FILE 9 MULTIPLIERS Activate
                                                                  Activate
IN THE FOLLOWING DISCUSSION FOR SIMPLICITY THE ENDF/B TERMINOLOGY Activate
---ENDF/B TAPE---WILL BE USED. IN FACT THE ACTUAL MEDIUM MAY BE   Activate
TAPE, CARDS, DISK OR ANY OTHER MEDIUM.   Activate
                                                                  Activate
ASSUMPTIONS   Activate
-----------   Activate
IT IS ASSUMED THAT THE FILE 3 AND 9 DATA HAVE BEEN LINEARIZED   Activate
BEFORE THIS CODE IS USED - FILE 3 AND 9 DATA CAN BE LINEARIZED   Activate
USING PROGRAM LINEAR.   Activate
                                                                  Activate
IT IS ASSUMED THAT THE FILE 9 MULTIPLIERS ARE FAIRLY SMOOTH VERSUS Activate
ENERGY, AND THAT THE ACTIVATION CROSS SECTIONS FOR FILE 10 CAN BE Activate
DEFINED AT EXACTLY THE SAME ENERGIES AS THE FILE 3 CROSS SECTIONS, Activate
AND THAT THESE NEED MERELY BE MULTIPLIED BY THE FILE 9 TO DEFINE   Activate
THE FILE 10 ACTIVATION CROSS SECTIONS.   Activate
                                                                  Activate
ENDF/B FORMAT   Activate
------------   Activate
THIS PROGRAM ONLY USES THE ENDF/B BCD OR CARD IMAGE FORMAT (AS   Activate
OPPOSED TO THE BINARY FORMAT) AND CAN HANDLE DATA IN ANY VERSION   Activate
OF THE ENDF/B FORMAT (I.E., ENDF/B-I, II,III, IV, V OR VI FORMAT). Activate
                                                                  Activate
IT IS ASSUMED THAT THE DATA IS CORRECTLY CODED IN THE ENDF/B   Activate
FORMAT AND NO ERROR CHECKING IS PERFORMED. IN PARTICULAR IT IS   Activate
ASSUMED THAT THE MAT, MF AND MT ON EACH LINE IS CORRECT. SEQUENCE Activate
NUMBERS (COLUMNS 76-80) ARE IGNORED ON INPUT, BUT WILL BE   Activate
CORRECTLY OUTPUT ON ALL LINES. THE FORMAT OF SECTION MF=1, MT=451 Activate
AND ALL SECTIONS OF MF=3 MUST BE CORRECT. THE PROGRAM COPIES ALL   Activate
OTHER SECTION OF DATA AS HOLLERITH AND AS SUCH IS INSENSITIVE TO   Activate
THE CORRECTNESS OR INCORRECTNESS OF ALL OTHER SECTIONS.   Activate
                                                                  Activate
OUTPUT FORMAT   Activate
------------   Activate
ALL ENERGIES WILL BE OUTPUT IN F (INSTEAD OF E) FORMAT IN ORDER   Activate
TO ALLOW ENERGIES TO BE WRITTEN WITH UP TO 9 DIGITS OF ACCURACY.   Activate
COMPARISON OF THE NORMAL ENDF/B CONVENTION OF 6 DIGITS TO THE 9   Activate
DIGIT OUTPUT FROM THIS PROGRAM DEMONSTRATED THAT FAILURE TO USE   Activate
THE 9 DIGIT OUTPUT CAN LEAD TO LARGE ERRORS IN THE DATA DUE TO   Activate
TRUNCATION OF ENERGIES TO 6 DIGITS DURING OUTPUT.   Activate
                                                                  Activate
CONTENTS OF OUTPUT   Activate
------------------   Activate
ENTIRE EVALUATIONS ARE OUTPUT, NOT JUST THE PROCESSED DATA, E.G., Activate
ANGULAR AND ENERGY DISTRIBUTIONS ARE ALSO INCLUDED.   Activate
                                                                  Activate
DOCUMENTATION   Activate
-------------   Activate
THE FACT THAT THIS PROGRAM HAS OPERATED ON THE DATA IS DOCUMENTED Activate
BY THE ADDITION OF 3 COMMENT LINES AT THE END OF EACH HOLLERITH   Activate
SECTION IN THE FORM   Activate
                                                                  Activate
***************** PROGRAM ACTIVATE (2007-1) ****************   Activate
FILE 10 ACTIVATION CROSS SECTIONS HAVE BEEN DEFINED BY COMBINING   Activate
FILE 3 CROSS SECTIONS AND FILE 9 MULTIPLIERS. FILE 9 DELETED.   Activate
                                                                  Activate
THE ORDER OF SIMILAR COMMENTS (FROM RECENT, SIGMA1 AND GROUPIE)   Activate
REPRESENTS A COMPLETE HISTORY OF ALL OPERATIONS PERFORMED ON   Activate
THE DATA BY THESE PROGRAMS.   Activate
                                                                  Activate
THESE COMMENT LINES ARE ONLY ADDED TO EXISTING HOLLERITH SECTIONS, Activate

I.E., THIS PROGRAM WILL NOT CREATE A HOLLERITH SECTION. THE FORMAT
OF THE HOLLERITH SECTION IN ENDF/B-V DIFFERS FROM THE THAT OF
EARLIER VERSIONS OF ENDF/B. BY READING AN EXISTING MF=1, MT=451
IT IS POSSIBLE FOR THIS PROGRAM TO DETERMINE WHICH VERSION OF
THE ENDF/B FORMAT THE DATA IS IN. WITHOUT HAVING A SECTION OF
MF=1, MT=451 PRESENT IT IS IMPOSSIBLE FOR THIS PROGRAM TO
DETERMINE WHICH VERSION OF THE ENDF/B FORMAT THE DATA IS IN, AND
AS SUCH IT IS IMPOSSIBLE FOR THE PROGRAM TO DETERMINE WHAT FORMAT
SHOULD BE USED TO CREATE A HOLLERITH SECTION.

REACTION INDEX

THIS PROGRAM DOES NOT USE THE REACTION INDEX WHICH IS GIVEN IN
SECTION MF=1, MT=451 OF EACH EVALUATION.

THIS PROGRAM DOES NOT UPDATE THE REACTION INDEX IN MF=1, MT=451.
THIS CONVENTION HAS BEEN ADOPTED BECAUSE MOST USERS DO NOT
REQUIRE A CORRECT REACTION INDEX FOR THEIR APPLICATIONS AND IT WAS
NOT CONSIDERED WORTHWHILE TO INCLUDE THE OVERHEAD OF CONSTRUCTING
A CORRECT REACTION INDEX IN THIS PROGRAM. HOWEVER, IF YOU REQUIRE
A REACTION INDEX FOR YOUR APPLICATIONS, AFTER RUNNING THIS PROGRAM
YOU MAY USE PROGRAM DICTIN TO CREATE A CORRECT REACTION INDEX.

SECTION SIZE

SECTIONS OF MF=9 MULTIPLIERS ARE LIMITED TO A MAXIMUM OF 10,000
ENERGY POINTS.

THERE IS NO LIMIT ON THE NUMBER OF ENERGY POINTS IN MF=3 AND 10
TABLES.

SELECTION OF DATA

THE PROGRAM PROCESSES ALL ENDF/B DATA ON A SERIES OF ENDF/B TAPES.

PROGRAM OPERATION

PASS #1

THE ENTIRE MAT IS COPIED TO A SCRATCH FILE IN THE ENDF/B ASCII
FORMAT AND WHILE COPYING IT TO SCRATCH MF=3, 9, AND 10 ARE ALSO
COPIED TO SEPERATE SCRATCH FILES, I.E., THERE ARE A TOTAL OF 4
SCRATCH FILES - SEE THEIR DEFINITIONS BELOW.

PASS #2

IF NO MF=9 MULTIPLIERS ARE FOUND DURING PASS #1, THE ENTIRE MAT
IS COPIED FROM SCRATCH TO THE OUTPUT FILE, WITHOUT ANY CHECKS.

IF MF=9 MULTIPLIERS ARE FOUND THEY ARE USED WITH MF=3 CROSS
SECTIONS TO CREATE MF=10 ACTIVATION CROSS SECTIONS.

FOR ANY SECTION OF MF=10 DATA FOR WHICH NO MF=9 MULTIPLIERS ARE
FOUND, THE ORIGINAL MF=10 IS OUTPUT.

FOR CONSISTENCY ALL MF=9 MULTIPLIERS ARE DELETED, I.E., THEY ARE
NOT INCLUDED IN THE OUTPUT.

KEEP EVALUATED DATA POINTS

THE FILE 10 OUTPUT WILL BE AT EXACTLY THE SAME ENERGY POINTS AS
THE FILE 3 CROSS SECTIONS USED TO DEFINE THE FILE 10 ACTIVATION
CROSS SECTIONS.

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     INPUT FILES
     -----------
     UNIT  DESCRIPTION
     ----  -----------
       2   INPUT LINES (BCD - 80 CHARACTERS/RECORD)
      10   ORIGINAL ENDF/B DATA (BCD - 80 CHARACTERS/RECORD)

     OUTPUT FILES
     ------------
     UNIT  DESCRIPTION
     ----  -----------
       3   OUTPUT REPORT (BCD - 120 CHARACTERS/RECORD)
      11   FINAL ENDF/B DATA (BCD - 80 CHARACTERS/RECORD)

     SCRATCH FILES
     ------------
     UNIT  DESCRIPTION
     ----  -----------
      12   SCRATCH FILE FOR ALL MAT (BCD - 80 CHARACTERS/RECORD)
      14   SCRATCH FILE FOR MF=3 DATA (BCD - 80 CHARACTERS/RECORD)
      15   SCRATCH FILE FOR MF=9 DATA (BCD - 80 CHARACTERS/RECORD)
      16   SCRATCH FILE FOR MF=10 DATA (BCD - 80 CHARACTERS/RECORD)

     OPTIONAL STANDARD FILE NAMES (SEE SUBROUTINE FILEIO)
     ---------------------------------------------------
     UNIT  FILE NAME
     ----  ----------
       2   ACTIVATE.INP
       3   ACTIVATE.LST

      10   ENDFB.IN
      11   ENDFB.OUT
      12   (SCRATCH)
      14   (SCRATCH)
      15   (SCRATCH)

     INPUT PARAMETERS
     ----------------

     LINE  COLS.  DESCRIPTION
     ----  -----  -----------
       1   1-60   ENDF/B INPUT DATA FILENAME
                  (STANDARD OPTION = ENDFB.IN)
       2   1-60   ENDF/B OUTPUT DATA FILENAME
                  (STANDARD OPTION = ENDFB.OUT)

     ANY NUMBER OF PAIRS OF INPUT LINES MAY BE USED, TO PROCESS ANY
     NUMBER OF ENDF/B TAPES, ONE AFTER ANOTHER.

     EXAMPLE INPUT NO. 1
     -------------------
     PROCESS ENDF/B TAPES NAMED, TAPE121, TAPE122, AND TAPE123, AND
     NAME THE OUTPUT FILES ACTIVATE121, ACTIVATE122, AND ACTIVATE123.

     IN THIS CASE THE FOLLOWING 6 INPUT LINES ARE REQUIRED

TAPE121
ACTIVATE121
TAPE122
ACTIVATE122
TAPE123
ACTIVATE123
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                                                                        Activate
     EXAMPLE INPUT NO. 2                                                Activate
     --------------------                                               Activate
     SAME AS THE ABOVE CASE, EXCEPT THAT IN THIS CASE THE ORIGINAL      Activate
     3 TAPES ARE IN A DIRECTORY NAMED \ENDFB6\ORIGINAL, AND THE         Activate
     RESULTS WILL BE WRITTEN INTO A DIRECTORY NAMED \ENDFB6\ACTIVATE.   Activate
                                                                        Activate
     IN THIS CASE THE FOLLOWING 6 INPUT LINES ARE REQUIRED             Activate
                                                                        Activate
 \ENDFB6\ORIGINAL\TAPE121                                               Activate
 \ENDFB6\ACTIVATE\ACTIVATE121                                          Activate
 \ENDFB6\ORIGINAL\TAPE122                                               Activate
 \ENDFB6\ACTIVATE\ACTIVATE122                                          Activate
 \ENDFB6\ORIGINAL\TAPE123                                               Activate
 \ENDFB6\ACTIVATE\ACTIVATE123                                          Activate
                                                                        Activate
=======================================================================  Activate
```