```
====================================================================== Activate
                                                                       Activate
      PROGRAM ACTIVATE                                                 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
      VERS. 2007-2 (DEC. 2007)     *72 CHARACTER FILE NAMES.           Activate
      VERS. 2010-1 (Apr. 2010)     *General update based on user feedback Activate
      VERS. 2012-1 (Aug. 2012)     *Added CODENAME                     Activate
                                   *Added ERROR stop                   Activate
                                   *32 and 64 bit Compatible           Activate
      VERS. 2015-1 (Jan. 2015)     *Corrected ERROR for missing or extra Activate
                                    SEND and MEND lines.               Activate
                                   *Changed MF=8 pointer from MF=9 to 10. Activate
                                   *INCREASED MAX. POINTS to 3,000,000.   Activate
                                   *Added Consistency checks, e.g.,    Activate
                                    Any MT in MF=9 requires data in MF=3. Activate
                                   *Extended OUT9 - OUT10 is not used.  Activate
                                   *Only processes ONE ENDF Tape - this Activate
                                    restriction is necessary to insure Activate
                                    compatibility with ALL PREPRO codes. Activate
                                   *Changed to current ENDF sequence    Activate
                                    number convention, e.g., reset number Activate
                                    for each section (MAT/MF/MT).      Activate
                                   *Replaced ALL 3 way IF statements.   Activate
                                                                       Activate
      Acknowledgement 2015                                             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 2015 version of this code based on user      Activate
      feedback, including IMPORTANT feedback from Andrej Trkov, up      Activate
      to and including Feb. 2015.                                      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
                                                                       Activate
      PRESENT CONTACT INFORMATION                                      Activate
      --------------------------                                      Activate
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      Livermore, CA 94550                                             Activate
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      E. Mail    RedCullen1@Comcast.net                               Activate
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                                                                       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.

AT THE PRESENT TIME WE ARE ATTEMPTING TO DEVELOP A SET OF COMPUTER
INDEPENDENT PROGRAMS THAT CAN EASILY BE IMPLEMENTED ON ANY ONE
OF A WIDE VARIETY OF COMPUTERS. IN ORDER TO ASSIST IN THIS PROJECT
IT WOULD BE APPECIATED IF YOU WOULD NOTIFY THE AUTHOR OF ANY
COMPILER DIAGNOSTICS, OPERATING PROBLEMS OR SUGGESTIONS ON HOW TO
IMPROVE THIS PROGRAM. HOPEFULLY, IN THIS WAY FUTURE VERSIONS OF
THIS PROGRAM WILL BE COMPLETELY COMPATIBLE FOR USE ON YOUR
COMPUTER.

PURPOSE
-------
THIS PROGRAM IS DESIGNED TO CREATE FILE 10 ACTIVATION CROSS
SECTIONS BY COMBINING FILE 3 CROSS SECTIONS AND FILE 9 MULTIPLIERS

IN THE FOLLOWING DISCUSSION FOR SIMPLICITY THE ENDF TERMINOLOGY
---ENDF TAPE---WILL BE USED. IN FACT THE ACTUAL MEDIUM MAY BE
TAPE, CARDS, DISK OR ANY OTHER MEDIUM.

ASSUMPTIONS
-----------
IT IS ASSUMED THAT THE FILE 3 AND 9 DATA HAVE BEEN LINEARIZED
BEFORE THIS CODE IS USED - FILE 3 AND 9 DATA CAN BE LINEARIZED
USING PROGRAM LINEAR.

IT IS ASSUMED THAT THE FILE 9 MULTIPLIERS ARE FAIRLY SMOOTH VERSUS
ENERGY, AND THAT THE ACTIVATION CROSS SECTIONS FOR FILE 10 CAN BE
DEFINED AT EXACTLY THE SAME ENERGIES AS THE FILE 3 CROSS SECTIONS,
AND THAT THESE NEED MERELY BE MULTIPLIED BY THE FILE 9 TO DEFINE
THE FILE 10 ACTIVATION CROSS SECTIONS.

ENDF FORMAT
-----------
THIS PROGRAM ONLY USES THE ENDF BCD OR CARD IMAGE FORMAT (AS
OPPOSED TO THE BINARY FORMAT) AND CAN HANDLE DATA IN ANY VERSION
OF THE ENDF FORMAT (I.E., ENDF-1, 2, 3, 4, 5 OR 6 FORMAT).

IT IS ASSUMED THAT THE DATA IS CORRECTLY CODED IN THE ENDF
FORMAT AND NO ERROR CHECKING IS PERFORMED. IN PARTICULAR IT IS
ASSUMED THAT THE MAT, MF AND MT ON EACH LINE IS CORRECT. SEQUENCE
NUMBERS (COLUMNS 76-80) ARE IGNORED ON INPUT, BUT WILL BE
CORRECTLY OUTPUT ON ALL LINES. THE FORMAT OF SECTION MF=1, MT=451
AND ALL SECTIONS OF MF=3 MUST BE CORRECT. THE PROGRAM COPIES ALL
OTHER SECTION OF DATA AS HOLLERITH AND AS SUCH IS INSENSITIVE TO
THE CORRECTNESS OR INCORRECTNESS OF ALL OTHER SECTIONS.

OUTPUT FORMAT
-------------
ALL ENERGIES WILL BE OUTPUT IN F (INSTEAD OF E) FORMAT IN ORDER
TO ALLOW ENERGIES TO BE WRITTEN WITH UP TO 9 DIGITS OF ACCURACY.
COMPARISON OF THE NORMAL ENDF CONVENTION OF 6 DIGITS TO THE 9
DIGIT OUTPUT FROM THIS PROGRAM DEMONSTRATED THAT FAILURE TO USE
THE 9 DIGIT OUTPUT CAN LEAD TO LARGE ERRORS IN THE DATA DUE TO
TRUNCATION OF ENERGIES TO 6 DIGITS DURING OUTPUT.

CONTENTS OF OUTPUT
------------------
ENTIRE EVALUATIONS ARE OUTPUT, NOT JUST THE PROCESSED DATA, E.G.,
ANGULAR AND ENERGY DISTRIBUTIONS ARE ALSO INCLUDED.

DOCUMENTATION
-------------
THE FACT THAT THIS PROGRAM HAS OPERATED ON THE DATA IS DOCUMENTED
BY THE ADDITION OF 3 COMMENT LINES AT THE END OF EACH HOLLERITH
SECTION IN THE FORM

***************** PROGRAM ACTIVATE (2015-1) ****************
FILE 10 ACTIVATION CROSS SECTIONS HAVE BEEN DEFINED BY COMBINING
FILE 3 CROSS SECTIONS AND FILE 9 MULTIPLIERS. FILE 9 DELETED.
```

THE ORDER OF SIMILAR COMMENTS (FROM RECENT, SIGMA1 AND GROUPIE)
REPRESENTS A COMPLETE HISTORY OF ALL OPERATIONS PERFORMED ON
THE DATA BY THESE PROGRAMS.

THESE COMMENT LINES ARE ONLY ADDED TO EXISTING HOLLERITH SECTIONS,
I.E., THIS PROGRAM WILL NOT CREATE A HOLLERITH SECTION. THE FORMAT
OF THE HOLLERITH SECTION IN ENDF-5 DIFFERS FROM THE THAT OF
EARLIER VERSIONS OF ENDF. BY READING AN EXISTING MF=1, MT=451
IT IS POSSIBLE FOR THIS PROGRAM TO DETERMINE WHICH VERSION OF
THE ENDF 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 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 3,000,000
ENERGY POINTS.

THERE IS NO LIMIT ON THE NUMBER OF ENERGY POINTS IN MF=3 AND 10
TABLES = THIS DATA IS READ AS CHARACTERS, ONE LINE AT A TIME.

SELECTION OF DATA

THE PROGRAM PROCESSES ALL ENDF DATA ON ONE ENDF TAPE.

2015 - IT NOW ONLY DOES ONE ENDF TAPE.

PROGRAM OPERATION

PASS #1

THE ENTIRE MAT IS COPIED TO A SCRATCH FILE IN THE ENDF 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.

```
    INPUT FILES

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

    OUTPUT FILES
    ------------
    UNIT  DESCRIPTION
    ----  -----------
      3   OUTPUT REPORT (BCD - 120 CHARACTERS/RECORD)
     11   FINAL ENDF 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   1-72   ENDF INPUT DATA FILENAME
                 (STANDARD OPTION = ENDFB.IN)
      2   1-72   ENDF OUTPUT DATA FILENAME
                 (STANDARD OPTION = ENDFB.OUT)

    ONE PAIR OF INPUT LINES MAY BE USED, TO PROCESS ANY ENDF TAPE.

    2015 - NOW ONLY DOES ONE ENDF TAPE.

    EXAMPLE INPUT NO. 1
    -------------------
    PROCESS ENDF TAPE NAMED ACTIVATE.IN AND NAME THE OUTPUT FILE
    ACTIVATE.OUT.

    IN THIS CASE THE FOLLOWING 2 INPUT LINES ARE REQUIRED
ACTIVATE.IN
ACTIVATE.OUT

    EXAMPLE INPUT NO. 2
    -------------------
    SAME AS THE ABOVE CASE, EXCEPT THAT IN THIS CASE THE ORIGINAL
    TAPE IS IN A DIRECTORY NAMED \ENDFB6\ORIGINAL, AND THE
    RESULTS WILL BE WRITTEN INTO A DIRECTORY NAMED \ENDFB6\ACTIVATE.

    IN THIS CASE THE FOLLOWING 6 INPUT LINES ARE REQUIRED
\ENDFB6\ORIGINAL\ACTIVATE.IN
\ENDFB6\ACTIVATE\ACTIVATE.OUT

    EXAMPLE INPUT NO. 3
```

```
       --------------------                                  Activate
       IF THERE IS NO ACTIVATE.INP FILE, OR THE FILENAMES ARE BLANK   Activate
       THIS CODE WILL USE THE DEFAULT NAMES,                 Activate
                                                             Activate
   ENDFB.IN                                                  Activate
   ENDFB.OUT                                                 Activate
                                                             Activate
===================================================================== Activate
```