```
======================================================================= Legend
                                                                        Legend
     PROGRAM LEGEND                                                     Legend
     VERSION 80-1 (SEPTEMBER 1980)                                      Legend
     VERSION 84-1 (NOVEMBER 1984)                                       Legend
     VERSION 86-1 (JANUARY 1986) *CORRECTED BASED ON USER COMMENTS      Legend
                                 *FORTRAN-77/H VERSION                  Legend
     VERSION 87-1 (JANUARY 1987) *CORRECTED BASED ON USER COMMENTS      Legend
     VERSION 88-1 (JULY 1988)    *OPTION...INTERNALLY DEFINE ALL I/O    Legend
                                  FILE NAMES (SEE, SUBROUTINE FILEIO    Legend
                                  FOR DETAILS).                         Legend
                                 *IMPROVED BASED ON USER COMMENTS.      Legend
     VERSION 89-1 (JANUARY 1989) *PSYCHOANALYZED BY PROGRAM FREUD TO    Legend
                                  INSURE PROGRAM WILL NOT DO ANYTHING   Legend
                                  CRAZY.                                Legend
                                 *UPDATED TO USE NEW PROGRAM CONVERT    Legend
                                  KEYWORDS.                             Legend
                                 *ADDED LIVERMORE CIVIC COMPILER        Legend
                                  CONVENTIONS.                          Legend
     VERSION 92-1 (JANUARY 1992) *FOR ANGULAR DISTRIBUTIONS CALCULATED  Legend
                                  FROM LEGENDRE COEFFICIENTS, INTERVAL  Legend
                                  HALF TO CONVERGENCE.                  Legend
                                 *UPDATED BASED ON USER COMMENTS        Legend
                                 *ADDED FORTRAN SAVE OPTION             Legend
                                 *ADDED SELECTED OF DATA TO PROCESS     Legend
                                  BY MAT/MF/MT/ENERGY RANGES.           Legend
                                 *WARNING...THE INPUT PARAMETER FORMAT  Legend
                                  HAS BEEN CHANGED - FOR DETAILS SEE    Legend
                                  BELOW.                                Legend
     VERSION 92-2 (SEPT. 1992)   *CORRECTED PROCESSING OF ISOTROPIC     Legend
                                  ANGULAR DISTRIBUTIONS                 Legend
     VERSION 94-1 (JANUARY 1994) *VARIABLE ENDF/B DATA FILENAMES        Legend
                                  TO ALLOW ACCESS TO FILE STRUCTURES    Legend
                                  (WARNING - INPUT PARAMETER FORMAT     Legend
                                  HAS BEEN CHANGED)                     Legend
                                 *CLOSE ALL FILES BEFORE TERMINATING    Legend
                                  (SEE, SUBROUTINE ENDIT)               Legend
     VERSION 96-1 (JANUARY 1996) *COMPLETE RE-WRITE                     Legend
                                 *IMPROVED COMPUTER INDEPENDENCE        Legend
                                 *ALL DOUBLE PRECISION                  Legend
                                 *ON SCREEN OUTPUT                      Legend
                                 *UNIFORM TREATMENT OF ENDF/B I/O       Legend
                                 *IMPROVED OUTPUT PRECISION             Legend
                                 *INCREASED MAX. POINTS FROM 5,000      Legend
                                  TO 20,000.                            Legend
     VERSION 99-1 (MARCH 1999)   *CORRECTED CHARACTER TO FLOATING       Legend
                                  POINT READ FOR MORE DIGITS            Legend
                                 *UPDATED TEST FOR ENDF/B FORMAT        Legend
                                  VERSION BASED ON RECENT FORMAT CHANGE Legend
                                 *GENERAL IMPROVEMENTS BASED ON         Legend
                                  USER FEEDBACK                         Legend
     VERS. 2000-1 (FEBRUARY 2000)*GENERAL IMPROVEMENTS BASED ON         Legend
                                  USER FEEDBACK                         Legend
     VERS. 2001-1 (MARCH 2001)   *UPDATED TO HANDLE COMBINATIONS OF     Legend
                                  LEGENDRE COEFFICIENTS AT LOW ENERGY   Legend
                                  AND TABULATED DATA AT HIGH ENERGY.    Legend
     VERS. 2002-1 (MAY 2002)     *OPTIONAL INPUT PARAMETERS             Legend
     VERS. 2004-1 (MARCH 2004)   *ADDED INCLUDE FOR COMMON              Legend
                                 *ZERO ANGULAR DISTRIBUTIONS ARE O.K.   Legend
                                  (PREVIOUSLY ZERO OR NEGATIVE WAS      Legend
                                   TREATED AS AN ERROR - ZERO IS O.K.   Legend
                                   FOR SOME REACTIONS OVER SOME COSINE  Legend
                                   RANGES)                              Legend
                                                                        Legend
     OWNED, MAINTAINED AND DISTRIBUTED BY                               Legend
     -----------------------------------                                Legend
     THE NUCLEAR DATA SECTION                                           Legend
     INTERNATIONAL ATOMIC ENERGY AGENCY                                 Legend
     P.O. BOX 100                                                       Legend
     A-1400, VIENNA, AUSTRIA                                            Legend
     EUROPE                                                             Legend
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                                                                      Legend
ORIGINALLY WRITTEN BY                                                 Legend
---------------------------------                                     Legend
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                                                                      Legend
PURPOSE                                                               Legend
-------                                                               Legend
CALCULATE LINEARLY INTERPOLABLE TABULATED ANGULAR DISTRIBUTIONS       Legend
STARTING FROM DATA IN THE ENDF/B FORMAT. ANGULAR DISTRIBUTIONS        Legend
MAY BE DESCRIBED IN THE ENDF/B FORMAT IN ONE OF THREE WAYS.           Legend
FOR EACH OF THESE THREE FORMS THE USER MAY CHOOSE (SEE, INPUT         Legend
OPTIONS) TO EITHER COPY EACH TYPE OF DATA OR TO PROCESS IT AT         Legend
AS FOLLOWS,                                                           Legend
                                                                      Legend
(1) ANGULAR DISTRIBUTION IS ISOTROPIC AT ALL ENERGIES (LTT=0)         Legend
-------------------------------------------------------------         Legend
IN THIS CASE THE INPUT DATA DOES NOT INCLUDE ANY ANGULAR              Legend
DISTRIBUTIONS. A SECTION MERELY CONTAINS A FLAG TO INDICATE           Legend
THE ANGULAR DISTRIBUTION IS ISOTROPIC AT ALL ENERGIES. IN THIS        Legend
CASE THE SECTION IS OUTPUT IN EXACTLY THE SAME FORM IN WHICH IT       Legend
WAS READ FROM THE INPUT.                                              Legend
                                                                      Legend
(2) ANGULAR DISTRIBUTIONS GIVEN BY LEGENDRE COEFFICIENTS (LTT=1)      Legend
----------------------------------------------------------------      Legend
LEGENDRE COEFFICIENTS ARE GIVEN AT A SERIES OF ENERGIES. AN           Legend
INTERPOLATION LAW IS GIVEN BETWEEN ENERGIES. THE INTERPOLATION        Legend
LAW BETWEEN ENERGIES IS COPIED AS INPUT (I.E., NO ATTEMPT IS          Legend
MADE TO LINEARIZE THE VARIATION WITH ENERGY). FOR EACH ENERGY AT      Legend
WHICH LEGENDRE COEFFICIENTS ARE GIVEN A LINEARLY INTERPOLABLE         Legend
ANGULAR DISITRIBUTION IS RECONSTRUCTED IN THE SYSTEM IN WHICH THE     Legend
THE COEFFICIENTS ARE GIVEN (I.E., CM OR LAB - NO ATTEMPT IS MADE      Legend
TO CONVERT FROM ONE SYSTEM TO THE OTHER). A MAXIMUM OF 50 LEGENDRE    Legend
COEFFICIENTS IS ALLOWED. REGARDLESS OF THE NUMBER OF COEFFICIENTS     Legend
INPUT THE PROGRAM WILL ONLY USE COEFFICIENTS UP TO THE LAST ORDER     Legend
AT WHICH THE COEFFICIENTS ARE NON-ZERO (E.G. IF COEFFICIENTS P1       Legend
THROUGH P12 ARE READ, BUT P9=P10=P11=P12=0.0, THE PROGRAM WILL        Legend
ONLY USE COEFFICIENTS UP TO P8). IF OVER 50 NON-ZERO COEFFICIENTS     Legend
ARE READ ONLY THE FIRST 50 WILL BE USED.                              Legend
                                                                      Legend
(2) ANGULAR DISTRIBUTIONS IS TABULATED (LTT=2)                        Legend
----------------------------------------------------------------      Legend
ANGULAR DISTRIBUTIONS ARE GIVEN AT A SERIES OF ENERGIES. AN           Legend
INTERPOLATION LAW IS GIVEN BETWEEN ENERGIES AND A SECOND              Legend
INTERPOLATION LAW IS GIVEN AT EACH ENERGY TO INTERPOLATE BETWEEN      Legend
THE POINTS IN EACH TABULATED DISTRIBUTION. AT EACH ENERGY THE         Legend
ANGULAR DISTRIBUTION WILL BE CONVERTED TO LINEARLY INTERPOLABLE       Legend
FORM. THE INTERPOLATION BETWEEN ENERGIES IS OUTPUT EXACTLY AS         Legend
INPUT. THE INTERPOLATION LAW AT EACH ENERGY IS OUTPUT TO INDICATE     Legend
THE NOW LINEARLY INTERPOLABLE ANGULAR DISTRIBUTION.                   Legend
                                                                      Legend
(3) LEGENDRE COEFFICIENTS AND TABULATED (LTT=3)                       Legend
----------------------------------------------------------------      Legend
ENDF-102 SAYS THIS SHOULD BE LTT=4, BUT ALL OF THE EVALUATIONS        Legend
IN ENDF/B-VI, RELEASE 7, USE LTT=3? THIS CODE WILL TREAT THESE        Legend
AS LTT=4 - SEE BELOW.                                                 Legend
                                                                      Legend
(4) LEGENDRE COEFFICIENTS AND TABULATED (LTT=4)                       Legend
----------------------------------------------------------------      Legend
THIS IS A COMBINATION OF (1) AND (2) DESCRIBED ABOVE. THE             Legend
LEGENDRE DATA IS ALWAYS GIVEN FIRST, FOR LOWER ENERGIES,              Legend
FOLLOWED BY TABULATED ANGULAR DISTRIBUTIONS, FOR HIGHER ENERGIES.     Legend
```

```
                                                                      Legend
THIS TYPE OF DATA CAN ONLY BE COPIED OR ALL CONVERTED TO              Legend
TABULATED (LTT=2).                                                    Legend
                                                                      Legend
POINT VALUES - NORMALIZED VS. UNNORMALIZED                            Legend
--------------------------------------------------------------------- Legend
THE VALUE OF AN ANGULAR DISTRIBUTION AT ANY COSINE WILL BE            Legend
CORRECTLY CALCULATED BY THIS CODE, BASED EITHER DIRECTLY ON THE       Legend
ANGULAR DISTRIBUTION, OR ON THE SUM OF THE CONTRIBUTING LEGENDRE      Legend
MOMENTS.                                                              Legend
                                                                      Legend
ENDF/B ANGULAR DISTRIBUTIONS ARE BY DEFINITION NORMALIZED WHEN        Legend
INTEGRATED OVER COSINE. THEREFORE THIS CODE WILL NORMALIZE EACH       Legend
ANGULAR DISTRIBUTION BEFORE IT IS OUTPUT. THE OUTPUT REPORT FROM      Legend
THIS CODE WILL INDICATE THE NORMALIZATION FACTOR USED.                Legend
                                                                      Legend
THE REASON THAT AN ANGULAR DISTRIBUTION MAY NOT BE NORMALIZED IS      Legend
DUE TO THE APPROXIMATION OF CREATING LINEARLY INTERPOLABLE            Legend
TABULATED ANGULAR DISTRIBUTIONS - THE MORE ACCURATELY THIS IS         Legend
DONE THE CLOSER THE NORMALIZATION FACTOR WILL BE TO UNITY. AS YOU     Legend
DECREASE THE ALLOWABLE ERROR THE NORMALIZED VALUES WILL APPROACH      Legend
THE CORRECT POINT VALUES CALCULATED BY THE CODE.                      Legend
                                                                      Legend
SINCE THE DATA IS NORMALIZED PRIOR TO OUTPUT THE RESULTS IN THE       Legend
ENDF/B FORMAT MAY DIFFER SLIGHTLY FROM VALUES REFERRED TO BE ERROR    Legend
MESSAGES, ETC. PRINTED BY THE CODE DURING EXECUTION. IN ALL CASES     Legend
THE VALUES PRINTED BY THE CODE IN ERROR MESSAGES, ETC. SHOULD BE      Legend
CONSIDERED TO BE THE CORRECT VALUES AND THE OUTPUT TABULATED          Legend
ANGULAR DISTRIBUTIONS APPROXIMATE DUE TO THE RE-NORMALIZATION -       Legend
TO RE-ITERATE, THE OUTPUT TABULATED VALUES ARE APPROXIMATE DUE        Legend
TO THE APPROXIMATIONS USED IN CONSTRUCTING LINEAR INTERPOLABLE        Legend
ANGULAR DISTRIBUTIONS TO WITHIN SOME ALLOWABLE TOLERANCE.             Legend
                                                                      Legend
ELIMINATION OF NEGATIVE VALUES                                        Legend
------------------------------                                        Legend
THE RECONSTRUCTED ANGULAR DISTRIBUTION WILL BE TESTED AND IF IT       Legend
IS NEGATIVE AT ONE OR MORE COSINES AN ERROR MESSAGE WILL BE OUTPUT    Legend
AND BASED ON THE INPUT OPTION SELECTED ONE OF THE FOLLOWING           Legend
CORRECTIVE ACTIONS WILL BE TAKEN (SEE, INPUT OPTIONS),                Legend
(1) NO CORRECTION                                                     Legend
(2) CHANGE INDIVIDUAL LEGENDRE COEFFICIENTS (EACH BY LESS THAN        Legend
    1.0 PER-CENT) UNTIL THE RECONSTRUCTED ANGULAR DISTRIBUTION        Legend
    IS POSITIVE (MINIMUM MORE THAN 1 MILLI-BARN). THE ALLOWABLE       Legend
    PER-CENT CHANGE IN COEFFICIENTS AND MINIMUM CROSS SECTION CAN     Legend
    BE CHANGED BY INPUT.                                              Legend
(3) CHANGE ALL LEGENDRE COEFFICIENTS TO FORCE DISTRIBUTION TO BE      Legend
    POSITIVE (MINIMUM MORE THAN 1 MILLI-BARN). WITH THIS OPTION       Legend
    THERE IS NO RESTRICTION ON THE AMOUNT THAT EACH COEFFICIENT       Legend
    IS CHANGED AND AS SUCH THIS OPTION SHOULD BE USED WITH            Legend
    CAUTION AND ONLY AS A LAST RESORT IF NO OTHER APPROACH CAN        Legend
    BE USED TO MAKE THE DISTRIBUTION POSITIVE.                        Legend
                                                                      Legend
OUTPUT                                                                Legend
------                                                                Legend
THE USER MAY REQUEST OUTPUT OF EITHER,                                Legend
(1) TABULATED VALUES - POSSIBLY CORRECTED TO ELIMINATE NEGATIVE       Legend
    VALUES. THE TABULATED DISTRIBUTION WILL BE NORMALIZED BEFORE      Legend
    OUTPUT.                                                           Legend
(2) LEGENDRE COEFFICIENTS - POSSIBLY CORRECTED TO ELIMINATE           Legend
    NEGATIVE VALUES AND WITHOUT HIGHER ORDER ZERO COEFFICIENTS.       Legend
    BY DEFINITION DISTRIBUTIONS DEFINED BY LEGENDRE COEFFICIENTS      Legend
    ARE NORMALIZED TO UNITY.                                          Legend
                                                                      Legend
(3) ANGULAR DISTRIBUTIONS GIVEN BY A TABULATION (LTT=2)               Legend
--------------------------------------------------------              Legend
TABULATED ANGULAR DISTRIBUTIONS ARE GIVEN AT A SERIES OF ENERGIES.    Legend
AN INTERPOLATION LAW IS GIVEN BETWEEN ENERGIES. THE INTERPOLATION     Legend
LAW BETWEEN ENERGIES IS COPIED AS INPUT (I.E., NO ATTEMPT IS          Legend
MADE TO LINEARIZE THE VARIATION WITH ENERGY). FOR EACH ENERGY AT      Legend
AT WHICH TABULATED DATA ARE GIVEN A LINEARLY INTERPOLABLE ANGULAR     Legend
DISTRIBUTION IS CONSTRUCTED IN THE SYSTEM IN WHICH THE TABULATED      Legend
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DATA ARE GIVEN (I.E., CM OR LAB - NO ATTEMPT IS MADE TO CONVERT    Legend
FROM ONE SYSTEM TO THE OTHER). A MAXIMUM OF 60000 POINTS IS ALLOWE Legend
TO REPRESENT THE ANGULAR DISTRIBUTION AT EACH ENERGY.              Legend
                                                                   Legend
ELIMINATION OF NEGATIVE VALUES                                     Legend
------------------------------                                     Legend
THE RECONSTRUCTED ANGULAR DISTRIBUTION WILL BE TESTED AND IF IT    Legend
IS NEGATIVE AT ONE OR MORE COSINES AN ERROR MESSAGE WILL BE OUTPUT Legend
AND BASED ON THE INPUT OPTION SELECTED ONE OF THE FOLLOWING        Legend
CORRECTIVE ACTIONS WILL BE TAKEN (SEE, INPUT OPTIONS),             Legend
(1) NO CORRECTION                                                  Legend
(2) CHANGE ALL TABULATED VALUES TO FORCE DISTRIBUTION TO BE        Legend
    POSITIVE (MINIMUM MORE THAN 1 MILLI-BARN). THE MINIMUM VALUE   Legend
    MAY BE CHANGED BY INPUT. WITH THIS OPTION THERE IS NO          Legend
    RESTRICTION ON THE AMOUNT THAT EACH VALUE IS CHANGED AND AS    Legend
    SUCH THIS OPTION SHOULD BE USED WITH CAUTION AND ONLY AS A     Legend
    LAST RESORT IF NO OTHER APPROACH CAN BE USED TO MAKE THE       Legend
    DISTRIBUTION POSITIVE.                                         Legend
                                                                   Legend
OUTPUT                                                             Legend
------                                                             Legend
THE OUTPUT WILL BE THE LINEARIZED ANGULAR DISTRIBUTION. THE        Legend
TABULATED DISTRIBUTION WILL BE NORMALIZED TO UNITY BEFORE OUTPUT.  Legend
                                                                   Legend
CORRECTING NEGATIVE ANGULAR DISTRIBUTION                           Legend
---------------------------------------                            Legend
IF AN ANGULAR DISTRIBUTION IS NEGATIVE AN ERROR MESSAGE WILL BE    Legend
PRINTED AND THE USER MAY DECIDE (BASED ON INPUT OPTION) TO,        Legend
(1) NOT PERFORM ANY CORRECTIVE ACTION.                             Legend
(2) FOR TABULATED DISTRIBUTIONS - ADD THE SAME VALUE TO EACH POINT Legend
    VALUE SUCH THAT WHEN THE DISTRIBUTION IS RE-NORMALIZED THE     Legend
    MINIMUM VALUE IS 0.001 (1 MILLI-BARN). THE MINIMUM VALUE CAN   Legend
    BE CHANGED BY INPUT. WARNING...EXCEPT FOR SELECTION OF THE     Legend
    MINIMUM VALUE (BY INPUT) THE USER HAS NO CONTROL OVER HOW      Legend
    MUCH THE DISTRIBUTION IS CHANGED. THEREFORE THIS OPTION SHOULD Legend
    BE USED WITH CAUTION.                                          Legend
(3) FOR LEGENDRE COEFFICIENTS ONE OF TWO OPTIONS MAY BE SELECTED,  Legend
(A) CHANGE INDIVIDUAL COEFFICIENTS (NO ONE COEFFICIENT BY MORE     Legend
    THAN 1 PER-CENT) TO MAKE THE DISTRIBUTION POSITIVE WITH A      Legend
    MINIMUM VALUE OF 0.001 (1 MILLI-BARN). THE MAXIMUM PER-CENT    Legend
    CHANGE IN EACH COEFFICIENT AND MINIMUM VALUE MAY BE CHANGED    Legend
    BY INPUT. INPUT THE PROGRAM CANNOT MAKE THE DISTRIBUTION       Legend
    POSITIVE BY CHANGING EACH COEFFICIENT BY UP TO THE MAXIMUM     Legend
    ALLOWABLE AMOUNT, THE ORIGINAL ANGULAR DISTRIBUTION OR         Legend
    COEFFICIENTS WILL BE OUTPUT. ONLY IN THE LATTER CASE SHOULD    Legend
    ONE CONSIDER USING OPTION (B) DESCRIBED BELOW.                 Legend
(B) LOGICALLY ADD THE SAME VALUE TO EACH POINT VALUE SUCH THAT     Legend
    WHEN THE DISTRIBUTION IS RE-NORMALIZED THE MINIMUM VALUE IS    Legend
    0.001 (1 MILLI-BARN). THIS IS EQUIVALENT AT INCREASING P0      Legend
    BY A CERTAIN AMOUNT AND RE-NORMALIZATION IS EQUIVALENT TO THEN Legend
    DIVIDING EACH COEFFICIENT BY A CERTAIN AMOUNT. THEREFORE,      Legend
    WHAT IS PHYSICALLY DONE BY THE PROGRAM IS TO DIVIDE EACH       Legend
    COEFFICIENT BY THE SAME AMOUNT. WARNING..EXCEPT FOR SELECTION  Legend
    OF THE MINIMUM VALUE (BY INPUT) THE USER HAS NO CONTROL OVER   Legend
    HOW MUCH THE DISTRIBUTION IS CHANGED. THEREFORE THIS OPTION    Legend
    SHOULD BE USED WITH CAUTION.                                   Legend
                                                                   Legend
WARNING MESSAGES FROM PROGRAM                                      Legend
-----------------------------                                      Legend
THE WARNING MESSAGES PRINTED BY THIS PROGRAM SHOULD ONLY BE        Legend
CONSIDERED TO BE EXACTLY THAT..WARNINGS..NOT AN ABSOLUTE JUDGEMENT Legend
BY THIS PROGRAM THAT THERE IS SOMETHING WRONG WITH THE DATA. WHEN  Legend
WARNING MESSAGES ARE PRINTED EXAMINE THE DATA AND EITHER TAKE NO   Legend
ACTION (IF YOU FEEL THAT THE DATA IS O.K.) OR CORRECT THE DATA     Legend
(IF YOU FEEL THAT THE DATA IS INCORRECT AND YOU CAN CORRECT IT).   Legend
                                                                   Legend
VALIDITY OF MODIFIED DATA                                          Legend
-------------------------                                          Legend
BEFORE BELIEVING AND USING DATA WHICH HAS BEEN MODIFIED (EITHER    Legend
TABULATED ANGULAR DISTRIBUTIONS OR LEGENDRE COEFFICIENTS) THE USER Legend
SHOULD INSURE THAT THE MODIFIED DATA IS PHYSICALLY MORE ACCEPTABLE Legend
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    THAN THE ORIGINAL DATA. IN ORDER TO DO THIS ONE OR MORE OF THE     Legend
    FOLLOWING METHODS SHOULD BE USED,                                  Legend
                                                                       Legend
    (1) USE THE ENERGY VARIATION TESTS BUILT-IN TO THIS PROGRAM AND    Legend
        EVALPLOT TO PLOT THE ENERGY DEPENDENCE OF THE LEGENDRE         Legend
        COEFFICIENTS IN ORDER TO IDENTIFY AND CORRECT (BY HAND...NOT   Legend
        BY THIS PROGRAM) ANY COEFFICIENTS WHICH HAVE UNREALISTIC       Legend
        ENERGY AND L ORDER VARIATIONS. THIS SHOULD ALWAYS BE DONE      Legend
        FIRST TO ELIMINATE MAJOR PROBLEMS BEFORE USING THIS PROGRAM    Legend
        TO AUTOMATICALLY MAKE MINOR CORRECTIONS.                       Legend
    (1) OUTPUT AND PLOT THE UNCORRECTED AND CORRECTED ANGULAR          Legend
        DISTRIBUTIONS. COMPARE THE PLOTS TO INSURE THAT THE CORRECTED  Legend
        DATA DOES NOT SERIOUSLY CHANGE THE ENERGY DEPENDENCE OF THE    Legend
        ANGULAR DISTRIBUTION.                                          Legend
    (2) IF PLOTTING CAPABILITY IS NOT AVAIALABLE, USE THE PRINTED OUT  Legend
        OF THIS PROGRAM TO DETERMINE HOW MUCH THE TABULATED ANGULAR    Legend
        DISTRIBUTION OR LEGENDRE COEFFICIENTS HAVE BEEN MODIFIED.      Legend
        GENERALLY IF ONE COEFFICIENT HAS BEEN ONLY SLIGHTLY MODIFIED   Legend
        THE DISTRIBUTION WILL BE ACCEPTABLE. HOWEVER IF MANY           Legend
        COEFFICIENTS HAVE BEEN MODIFIED THE RESULT WILL NOT BE         Legend
        RELIABLE.                                                      Legend
                                                                       Legend
    SEEING ANGULAR DISTRIBUTIONS AND LEGENDRE COEFFICIENTS             Legend
    ------------------------------------------------------             Legend
    PROGRAM EVALPLOT CAN BE USED TO PLOT ANGULAR DISTRIBUTION AND      Legend
    LEGENDRE COEFFICIENTS - WHEN IT COMES TO CHECKING THIS TYPE OF     Legend
    DATA THERE IS NO SUBSTITUTE FOR PLOTS OF THE DATA TO MAKE THE      Legend
    JOB EASY AND STRAIGHTFORWARD.                                      Legend
                                                                       Legend
    FOR LEGENDRE COEFFICIENTS EVALPLOT CAN BE USED TO SEE THE ENERGY   Legend
    DEPENDENCE OF EACH COEFFICIENT - THIS IS AN EXTREMELY EASY AND     Legend
    USEFUL WAY TO CHECK FOR ERRORS IN THE BASIC DATA.                  Legend
                                                                       Legend
    FOR ANGULAR DISTRIBUTION EVALPLOT CAN BE USED TO PLOT THEM AT      Legend
    EACH ENERGY THAT THEY ARE TABULATED - THIS IS ALSO AN EASY AND     Legend
    USEFUL WAY TO CHECK FOR ERRORS.                                    Legend
                                                                       Legend
    I/O UNIT DEFINITIONS                                               Legend
    --------------------                                               Legend
    UNIT  DESCRIPTION                                                  Legend
    ----  -----------                                                  Legend
      2   INPUT CARDS                                                  Legend
      3   OUTPUT REPORT                                                Legend
     10   ORIGINAL DATA IN ENDF/B FORMAT                               Legend
     11   FINAL DATA IN ENDF/B FORMAT                                  Legend
                                                                       Legend
    OPTIONAL STANDARD FILE NAMES (SEE SUBROUTINE FILIO1 AND FILIO2)    Legend
    ---------------------------------------------------------------    Legend
    UNIT  FILE NAME                                                    Legend
    ----  ----------                                                   Legend
      2   LEGEND.INP                                                   Legend
      3   LEGEND.LST                                                   Legend
     10   ENDFB.IN                                                     Legend
     11   ENDFB.OUT                                                    Legend
                                                                       Legend
    INPUT CARD                                                         Legend
    ----------                                                         Legend
CARD COLS.  FORMAT  DESCRIPTION                                        Legend
---- -----  ------ -----------                                        Legend
 1    1-11   E11.4 FRACTIONAL THINNING CRITERIA                        Legend
     12-22   I11   MAXIMUM NUMBER OF POINTS IN ANGULAR DISTRIBUTION    Legend
                   RECONSTRUCTED FROM LEGENDRE COEFFICIENTS (PRESENT  Legend
                   LIMITS ARE 11 TO 60000 POINTS)                     Legend
                  *THIS OPTION CAN BE USED TO RUN QUICK, BUT NOT      Legend
                   NECESSARILY SO ACCURATE CALCULATIONS - TO ROUGHLY  Legend
                   SEE WHAT THE ANGULAR DISTRIBUTIONS LOOK LIKE.      Legend
                  *IT IS RECOMMENDED THAT YOU USE 0 AS INPUT - IN     Legend
                   WHICH CASE THE PROGRAM WILL USE THE MAXIMUM        Legend
                   ALLOWABLE NUMBER OF POINTS = 60000.                Legend
     23-33   I11   TABULATED ANGULAR DISTRIBUTION TREATMENT           Legend
                   = 0 - COPY TABLES                                  Legend
```

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                  = 1 - LINEARIZE TABLES (OUTPUT TABLES)              Legend
                  = 2 - LINEARIZE AND THIN TABLES (OUTPUT TABLES)     Legend
     34-44   I11   LEGENDRE COEFFICIENT TREATMENT                      Legend
                  = 0 - COPY LEGENDRE COEFFICIENTS                    Legend
                  = 1 - RECONSTRUCT TABULATED ANGULAR DISTRIBUTION.   Legend
                        (OUTPUT TABLES).                              Legend
                  = 2 - RECONSTRUCT TABULATED ANGULAR DISTRIBUTION.   Legend
                        (OUTPUT LEGENDRE COEFFICIENTS).               Legend
     45-55   I11   NEGATIVE ANGULAR DISTRIBUTION TREATMENT.           Legend
                  = 0 - NO CORRECTION                                 Legend
                  = 1 - TABULATE DATA - NO CORRECTION.                Legend
                      - LEGENDRE DATA - CHANGE COEFFICIENTS           Legend
                        (NONE BY MORE THAN 1.0 PER-CENT - CAN BE      Legend
                        CHANGED BY INPUT).                            Legend
                  = 2 - FORCE DISTRIBUTIONS TO BE POSITIVE            Legend
                        (TABULATED OR LEGENDRE DATA).                 Legend
     56-66   I11   LEGENDRE COEFFICIENT VARIATION TEST FLAG.          Legend
                  = 0 - TEST TESTS.                                   Legend
                  = 1 - PERFORM TESTS,                                Legend
                        (A) LEGENDRE ORDER INCREASES WITH ENERGY.     Legend
                        (C) MONOTONIC VARIATION OF COEFFICIENTS       Legend
                            AS A FUNCTION OF ENERGY.                  Legend
                        (C) COEFFICIENTS DECREASE AS A FUNCTION OF    Legend
                            LEGENDRE ORDER.                           Legend
   2    1-60   60A1  ENDF/B INPUT DATA FILENAME                       Legend
                     (STANDARD OPTION = ENDFB.IN)                     Legend
   3    1-60   60A1  ENDF/B OUTPUT DATA FILENAME                      Legend
                     (STANDARD OPTION = ENDFB.OUT)                    Legend
 4-N    1- 6    I6   LOWER MAT LIMIT                                  Legend
        7- 8    I2   LOWER MF LIMIT                                   Legend
        9-11    I3   LOWER MT LIMIT                                   Legend
       12-17    I6   UPPER MAT LIMIT                                  Legend
       18-19    I2   UPPER MF LIMIT                                   Legend
       20-22    I3   UPPER MT LIMIT                                   Legend
       23-33  E11.4  LOWER ENERGY LIMIT                               Legend
       34-44  E11.4  UPPER ENERGY LIMIT                               Legend
       45-55  E11.4  MINIMUM ALLOWABLE VALUE OF ANGULAR DISTRIBUTION  Legend
       56-66  E11.4  ALLOWABLE FRACTION (NOT PER-CENT) CHANGE IN ANY  Legend
                     ONE LEGENDRE COEFFICIENT TO MAKE THE ANGULAR     Legend
                     DISTRIBUTION POSITIVE (AND AT LEAST EQUAL TO THE Legend
                     INPUT MINIMUM ALLOWABLE VALUE).                  Legend
                                                                      Legend
      *UP TO 100 MAT/MT/E RANGES MAY BE INPUT, EACH SPECIFYING AN     Legend
       ALLOWABLE MINIMUM SIGMA AND MAXIMUM CHANGE IN COEFFICIENTS.    Legend
      *INPUT IS TERMINATED BY A BLANK CARD.                           Legend
      *ALL MAY/MT/E RANGES NOT SPECIFIED BY INPUT WILL BE TREATED BY  Legend
       ALLOWING A MINIMUM SIGMA OF 0.001 (1 MILLI-BARN) AND A CHANGE  Legend
       IN EACH COEFFICIENT BY UP TO 0.01 (1 PER-CENT).                Legend
      *THESE MAT/MT/E RANGES ARE NOT USED TO CORRECT ALL ANGULAR      Legend
       DISTRIBUTIONS WHERE SIGMA IS LESS THAN THE MINIMUM. THEY ARE   Legend
       ONLY USED TO CORRECT DISTRIBUTION THAT ARE NEGATIVE AND TO     Legend
       INSURE THAT THE CROSS SECTION AT THE COSINES WHERE THE ANGULAR Legend
       DISTRIBUTION ARE INITIALLY NEGATIVE ARE CORRECTED TO BE POSITIVE Legend
       AND AT LEAST AS LARGE AS THE MINIMUM ALLOWABLE SIGMA (SPECIFIED Legend
       BY INPUT).                                                     Legend
                                                                      Legend
      EXAMPLE INPUT NO. 1                                             Legend
      ------------------                                              Legend
      PROCESS BOTH LEGENDRE COEFFICIENTS AND TABULATED DATA TO OBTAIN Legend
      ANGULAR DISTRIBUTION WHICH ARE ACCURATE TO WITHIN 0.1 PER-CENT  Legend
      AND OUTPUT UNCORRECTED TABULATED ANGULAR DISTRIBUTION USING     Legend
      A MAXIMUM OF 501 POINTS IN EACH TABULATED ANGULAR DISTRIBUTION. Legend
      SINCE LEGENDRE COEFFICIENTS WILL NOT BE CORRECTED THE INPUT NEED Legend
      NOT SPECIFY MAT/MT/E RANGES.                                    Legend
                                                                      Legend
      READ /ENDFB6/K300/LEAD.IN AND WRITE /ENDFB6/K300/LEAD.OUT       Legend
                                                                      Legend
      THE FOLLOWING 4 INPUT LINES ARE REQUIRED,                       Legend
                                                                      Legend
1.00000- 3        501          2          1          0                Legend
/ENDFB6/K300/LEAD.IN                                                  Legend
```

```
 /ENDFB6/K300/LEAD.OUT                                                  Legend
    (BLANK CARD TERMINATED INPUT)                                       Legend
                                                                        Legend
    EXAMPLE INPUT NO. 2                                                 Legend
    ------------------                                                  Legend
    PROCESS BOTH LEGENDRE COEFFICIENTS AND TABULATED DATA TO OBTAIN     Legend
    ANGULAR DISTRIBUTION WHICH ARE ACCURATE TO WITHIN 0.1 PER-CENT      Legend
    AND OUTPUT CORRECTED TABULATED ANGULAR DISTRIBUTION (ONLY THOSE     Legend
    RE-CONSTRUCTED FROM LEGENDRE COEFFICIENTS WILL BE CORRECTED).       Legend
    FOR ALL MAT/MT/E CORRECT NEGATIVE ANGULAR DISTRIBUTION TO A VALUE   Legend
    OF 0.01 (10 MILLI-BARNS) AND ALLOW LEGENDRE COEFFICIENTS TO BE      Legend
    CHANGED BY UP TO 0.02 (2 PER-CENT).                                 Legend
                                                                        Legend
    USE THE DEFAULT FILENAMES ENDFB.IN AND ENDFB.OUT (THIS CAN BE       Legend
    DONE BY LEAVING THE SECOND AND THIRD INPUT LINES BLANK).            Legend
                                                                        Legend
    THE FOLLOWING 5 INPUT LINES ARE REQUIRED,                           Legend
                                                                        Legend
 1.00000- 3        501          2          1          1                 Legend
                                                                        Legend
                                                                        Legend
    1 1  1  999999999 0.00000+ 0 3.00000+ 7 1.00000- 2 2.00000- 2       Legend
    (BLANK CARD TERMINATED INPUT)                                       Legend
                                                                        Legend
    EXAMPLE INPUT NO. 3                                                 Legend
    ------------------                                                  Legend
    PROCESS BOTH LEGENDRE COEFFICIENTS AND TABULATED DATA TO OBTAIN     Legend
    ANGULAR DISTRIBUTION WHICH ARE ACCURATE TO WITHIN 0.1 PER-CENT      Legend
    AND OUTPUT CORRECTED LEGENDRE COEFFICIENTS AND UNCORRECTED          Legend
    TABULATED ANGULAR DISTRIBUTIONS. FOR MAT=1800, MT=2 CORRECT         Legend
    NEGATIVE ANGULAR DISTRIBUTIONS TO INSURE THE MINIMUM IS 0.01        Legend
    (10 MILLI-BARNS) ALLOWING EACH LEGENDRE COEFFICIENT TO CHANGE BY    Legend
    UP TO 0.02 (2 PER-CENT). ALL OTHER MAT/MT/E WILL BE CORRECTED       Legend
    TO A MINIMUM OF 0.001 (1 MILLI-BARN) ALLOWING A 0.01 (1 PER-CENT)   Legend
    CHANGE (BUILT-IN OPTION).                                           Legend
                                                                        Legend
    READ /ENDFB6/K300/LEAD.IN AND WRITE /ENDFB6/K300/LEAD.OUT           Legend
                                                                        Legend
    THE FOLLOWING 5 INPUT LINES ARE REQUIRED,                           Legend
                                                                        Legend
 1.00000- 3        501          2          2          1                 Legend
 /ENDFB6/K300/LEAD.IN                                                   Legend
 /ENDFB6/K300/LEAD.OUT                                                  Legend
  1800 4  2  1800 4  2 0.00000+ 0 3.00000+ 7 1.00000- 2 2.00000- 2      Legend
    (BLANK CARD TERMINATED INPUT)                                       Legend
                                                                        Legend
    EXAMPLE INPUT NO. 4                                                 Legend
    ------------------                                                  Legend
    TO COPY TABULATED ANGULAR DISTRIBUTION AND CONVERT LEGENDRE         Legend
    COEFFICIENTS TO UNCORRECTED TABULAR DISTRIBUTIONS.                  Legend
                                                                        Legend
    USE THE DEFAULT FILENAMES ENDFB.IN AND ENDFB.OUT (THIS CAN BE       Legend
    DONE BY LEAVING THE SECOND AND THIRD INPUT LINES BLANK).            Legend
                                                                        Legend
    THE FOLLOWING 4 INPUT LINES ARE REQUIRED,                           Legend
                                                                        Legend
 1.00000- 3        501          0          1          0                 Legend
                                                                        Legend
                                                                        Legend
    (BLANK CARD TERMINATED INPUT)                                       Legend
                                                                        Legend
========================================================================= Legend
```