**=======================================================================LINEAR**

 **LINEAR**

 **PROGRAM LINEAR LINEAR**

 **============== LINEAR**

 **VERSION 74-1 (MAY 1974) LINEAR**

 **VERSION 75-1 (APRIL 1975) LINEAR**

 **VERSION 76-2 (OCTOBER 1976) LINEAR**

 **VERSION 77-1 (JANUARY 1977) LINEAR**

 **VERSION 78-1 (JULY 1978) LINEAR**

 **VERSION 79-1 (JULY 1979) CDC-7600 AND CRAY-1 VERSION. LINEAR**

 **VERSION 80-1 (MAY 1980) IBM, CDC AND CRAY VERSION. LINEAR**

 **VERSION 80-2 (DECEMBER 1980) LINEAR**

 **VERSION 81-1 (MARCH 1981) LINEAR**

 **VERSION 82-1 (JANUARY 1982) IMPROVED COMPUTER COMPATIBILITY. LINEAR**

 **VERSION 83-1 (JANUARY 1983) \*MAJOR RE-DESIGN. LINEAR**

 **\*PAGE SIZE INCREASED - 1002 TO 3006. LINEAR**

 **\*ELIMINATED COMPUTER DEPENDENT CODING.LINEAR**

 **\*NEW, MORE COMPATIBLE I/O UNIT NUMBER.LINEAR**

 **\*ADDED OPTION TO KEEP ALL ORIGINAL LINEAR**

 **ENERGY POINTS FROM EVALUATION. LINEAR**

 **\*ADDED STANDARD ALLOWABLE ERROR OPTIONLINEAR**

 **(CURRENTLY 0.1 PER-CENT). LINEAR**

 **VERSION 83-2 (OCTOBER 1983) IMPROVED BASED ON USER COMMENTS. LINEAR**

 **VERSION 84-1 (APRIL 1984) IMPROVED BASED ON USER COMMENTS. LINEAR**

 **VERSION 84-2 (JUNE 1984) \*UPDATED FOR ENDF/B-6 FORMATS. LINEAR**

 **\*SPECIAL I/O ROUTINES TO GUARANTEE LINEAR**

 **ACCURACY OF ENERGY. LINEAR**

 **\*DOUBLE PRECISION TREATMENT OF ENERGY LINEAR**

 **(REQUIRED FOR NARROW RESONANCES). LINEAR**

 **VERSION 85-1 (AUGUST 1985) \*FORTRAN-77/H VERSION LINEAR**

 **VERSION 86-1 (JANUARY 1986)\*ENDF/B-6 FORMAT LINEAR**

 **VERSION 87-1 (JANUARY 1987)\*DOUBLE PRECISION TREATMENT OF CROSS LINEAR**

 **SECTION LINEAR**

 **VERSION 88-1 (JULY 1988) \*OPTION...INTERNALLY DEFINE ALL I/O LINEAR**

 **FILE NAMES (SEE, SUBROUTINE FILEIO LINEAR**

 **FOR DETAILS). LINEAR**

 **\*IMPROVED BASED ON USER COMMENTS. LINEAR**

 **VERSION 89-1 (JANUARY 1989)\*PSYCHOANALYZED BY PROGRAM FREUD TO LINEAR**

 **INSURE PROGRAM WILL NOT DO ANYTHING LINEAR**

 **CRAZY. LINEAR**

 **\*UPDATED TO USE NEW PROGRAM CONVERT LINEAR**

 **KEYWORDS. LINEAR**

 **\*ADDED LIVERMORE CIVIC COMPILER LINEAR**

 **CONVENTIONS. LINEAR**

 **VERSION 90-1 (JUNE 1990) \*EXTENDED TO LINEARIZE PHOTON LINEAR**

 **INTERACTION DATA, MF=23 AND 27 LINEAR**

 **\*ADDED FORTRAN SAVE OPTION LINEAR**

 **\*UPDATED BASED ON USER COMMENTS. LINEAR**

 **\*NEW MORE CONSISTENT ENERGY OUTPUT LINEAR**

 **ROUTINE. LINEAR**

 **\*WARNING...INPUT PARAMETER FORMAT LINEAR**

 **HAS BEEN CHANGED...SEE DESCRIPTION LINEAR**

 **BELOW. LINEAR**

 **VERSION 91-1 (JULY 1991) \*ADDED INTERPOLATION LAW 6 - ONLY USED LINEAR**

 **FOR CHARGED PARTICLE CROSS SECTIONS LINEAR**

 **FOR COULOMB PENETRABILITIES. LINEAR**

 **VERSION 92-1 (JANUARY 1992)\*ADDED NU-BAR (TOTAL, DELAYED, PROMPT) LINEAR**

 **POLYNOMIAL OR TABULATED ALL CONVERTED LINEAR**

 **TO LINEARLY INTERPOLABLE LINEAR**

 **\*INCREASED PAGE SIZE FROM 3006 TO 5010 LINEAR**

 **POINTS. LINEAR**

 **\*ALL ENERGIES INTERNALLY ROUNDED PRIOR LINEAR**

 **TO CALCULATIONS. LINEAR**

 **\*COMPLETELY CONSISTENT I/O AND ROUNDINGLINEAR**

 **ROUTINES - TO MINIMIZE COMPUTER LINEAR**

 **DEPENDENCE. LINEAR**

 **VERSION 92-2 (JULY 1992) \*CORRECTED CONVERSION OF NU-BAR FROM LINEAR**

 **POLYNOMIAL TO TABULATED - COPY LINEAR**

 **SPONTANEOUS NU-BAR (BY DEFINITION LINEAR**

 **THE SPONTANEOUS NU-BAR IS NOT AN LINEAR**

 **ENERGY DEPENDENT QUANTITY). LINEAR**

 **VERSION 93-1 (MARCH 1993) \*UPDATED FOR USE WITH LAHEY COMPILER LINEAR**

 **ON IBM-PCS. LINEAR**

 **\*INCREASED PAGE SIZE FROM 5010 TO LINEAR**

 **30000 POINTS LINEAR**

 **VERSION 94-1 (JANUARY 1994)\*VARIABLE ENDF/B DATA FILENAMES LINEAR**

 **TO ALLOW ACCESS TO FILE STRUCTURES LINEAR**

 **(WARNING - INPUT PARAMETER FORMAT LINEAR**

 **HAS BEEN CHANGED) LINEAR**

 **\*CLOSE ALL FILES BEFORE TERMINATING LINEAR**

 **(SEE, SUBROUTINE ENDIT) LINEAR**

 **VERSION 96-1 (JANUARY 1996) \*COMPLETE RE-WRITE LINEAR**

 **\*IMPROVED COMPUTER INDEPENDENCE LINEAR**

 **\*ALL DOUBLE PRECISION LINEAR**

 **\*ON SCREEN OUTPUT LINEAR**

 **\*UNIFORM TREATMENT OF ENDF/B I/O LINEAR**

 **\*IMPROVED OUTPUT PRECISION LINEAR**

 **\*DEFINED SCRATCH FILE NAMES LINEAR**

 **\*ALWAYS INCLUDE THERMAL VALUE LINEAR**

 **\*INCREASED PAGE SIZE FROM 30000 TO LINEAR**

 **60000 POINTS LINEAR**

 **VERSION 99-1 (MARCH 1999) \*CORRECTED CHARACTER TO FLOATING LINEAR**

 **POINT READ FOR MORE DIGITS LINEAR**

 **\*UPDATED TEST FOR ENDF/B FORMAT LINEAR**

 **VERSION BASED ON RECENT FORMAT CHANGELINEAR**

 **\*GENERAL IMPROVEMENTS BASED ON LINEAR**

 **USER FEEDBACK LINEAR**

 **VERSION 99-2 (JUNE 1999) \*ASSUME ENDF/B-VI, NOT V, IF MISSING LINEAR**

 **MF=1, MT-451. LINEAR**

 **VERS. 2000-1 (FEBRUARY 2000)\*ADDED MF = 9 AND 10 LINEARIZATION LINEAR**

 **\*GENERAL IMPROVEMENTS BASED ON LINEAR**

 **USER FEEDBACK LINEAR**

 **VERS. 2002-1 (MAY 2002) \*OPTIONAL INPUT PARAMETERS LINEAR**

 **VERS. 2004-1 (JAN. 2004) \*GENERAL UPDATE BASED ON USER FEEDBACKLINEAR**

 **VERS. 2005-1 (JAN. 2005) \*ALWAYS KEEP ORIGINAL TABULATED LINEAR**

 **NU-BAR POINTS. LINEAR**

 **VERS. 2006-1 (FEB. 2006) \*CORRECTED INT=6 NEAR THRESHOLD LINEAR**

 **\*NO SUBDIVIDE BELOW MINIMUM XCLOW LINEAR**

 **VERS. 2007-1 (JAN. 2007) \*CHECKED AGAINST ALL ENDF/B-VII. LINEAR**

 **\*INCREASED PAGE SIZE FROM 60,000 TO LINEAR**

 **600,000 POINTS LINEAR**

 **VERS. 2007-2 (DEC. 2007) \*72 CHARACTER FILE NAMES. LINEAR**

 **VERS. 2010-1 (Apr. 2010) \*Skipped leading cross section = 0 LINEAR**

 **up to effective start, unless keepingLINEAR**

 **ALL original energy points. LINEAR**

 **\*Replaced ETHRES by ESTART - it is LINEAR**

 **not a threshold - just a minimum LINEAR**

 **energy - if a section starts above LINEAR**

 **this energy with a positive cross LINEAR**

 **section, an additional point will LINEAR**

 **inserted with cross section = 0. LINEAR**

 **VERS. 2012-1 (Aug. 2012) \*Minor Updates based on User Feedback.LINEAR**

 **\*Added CODENAME LINEAR**

 **\*32 and 64 bit Compatible LINEAR**

 **\*Added ERROR stops. LINEAR**

 **VERS. 2012-2 (Nov. 2012) \*Never thin nu-bar. LINEAR**

 **VERS. 2013-1 (Nov. 2013) \*Extended OUT9. LINEAR**

 **VERS. 2015-1 (Jan. 2015) \*Allow Imaginary Anomolous Scattering LINEAR**

 **Factor to be Negative (MF/MT=27/506).LINEAR**

 **\*Replaced ALL 3 way IF Statements. LINEAR**

 **VERS. 2016-1 (June 2016) \*Cosmetic changes based on FREUD LINEAR**

 **psychoanalysis. LINEAR**

 **VERS. 2017-1 (May 2017) \*Updated based on user feedback. LINEAR**

 **\*Inceased page size to 3,000,000. LINEAR**

 **\*All floating input parameters changedLINEAR**

 **to character input + IN9 conversion. LINEAR**

 **VERS. 2018-1 (Dec. 2018) \*Updated based on user feedback. LINEAR**

 **\*Added on-line output for ALL ENDERRORLINEAR**

 **VERS. 2019-1 (June 2019) \*Additional Interpolation Law Tests LINEAR**

 **\*Checked Maximum Tabulated Energy to LINEAR**

 **insure it is the same for all MTs - LINEAR**

 **if not, print WARNING messages. LINEAR**

 **\*Corrected END Histogram linearized - LINEAR**

 **Previously assumed Y = 0 and deleted LINEAR**

 **now whatever the value it is includedLINEAR**

 **VERS. 2020-1 (Dec. 2020) \*Major Re-write of Convergence LINEAR**

 **\*Replaced INCORE9 by INCORE10. LINEAR**

 **\*Added Target Isomer Flag LINEAR**

 **\*Keep iterating toward MAX & MIN LINEAR**

 **VERS. 2021-1 (Mar. 2021) \*Complete re-write of convergence. LINEAR**

 **\*Optionlly add MF/MT=1/451 comments LINEAR**

 **\*Updated from FORTRAN 2018 LINEAR**

 **\*Minimum Cross Section is no longer LINEAR**

 **an input option = set to 1.0d-30. LINEAR**

 **LINEAR**

 **OWNED, MAINTAINED AND DISTRIBUTED BY LINEAR**

 **------------------------------------ LINEAR**

 **THE NUCLEAR DATA SECTION LINEAR**

 **INTERNATIONAL ATOMIC ENERGY AGENCY LINEAR**

 **P.O. BOX 100 LINEAR**

 **A-1400, VIENNA, AUSTRIA LINEAR**

 **EUROPE LINEAR**

 **LINEAR**

 **ORIGINALLY WRITTEN BY LINEAR**

 **------------------------------------ LINEAR**

 **Dermott E. Cullen LINEAR**

 **LINEAR**

 **PRESENT CONTACT INFORMATION LINEAR**

 **--------------------------- LINEAR**

 **Dermott E. Cullen LINEAR**

 **1466 Hudson Way LINEAR**

 **Livermore, CA 94550 LINEAR**

 **U.S.A. LINEAR**

 **Telephone 925-443-1911 LINEAR**

 **E. Mail RedCullen1@Comcast.net LINEAR**

 **Website RedCullen1.net/HOMEPAGE.NEW LINEAR**

 **LINEAR**

 **AUTHORS MESSAGE LINEAR**

 **--------------- LINEAR**

 **THE REPORT DESCRIBED ABOVE IS THE LATEST PUBLISHED DOCUMENTATION LINEAR**

 **FOR THIS PROGRAM. HOWEVER, THE COMMENTS BELOW SHOULD BE CONSIDEREDLINEAR**

 **THE LATEST DOCUMENTATION INCLUDING ALL RECENT IMPROVEMENTS. PLEASELINEAR**

 **READ ALL OF THESE COMMENTS BEFORE IMPLEMENTATION. LINEAR**

 **LINEAR**

 **AT THE PRESENT TIME WE ARE ATTEMPTING TO DEVELOP A SET OF COMPUTERLINEAR**

 **INDEPENDENT PROGRAMS THAT CAN EASILY BE IMPLEMENTED ON ANY ONE LINEAR**

 **OF A WIDE VARIETY OF COMPUTERS. IN ORDER TO ASSIST IN THIS PROJECTLINEAR**

 **IT WOULD BE APPECIATED IF YOU WOULD NOTIFY THE AUTHOR OF ANY LINEAR**

 **COMPILER DIAGNOSTICS, OPERATING PROBLEMS OR SUGGESTIONS ON HOW TO LINEAR**

 **IMPROVE THIS PROGRAM. HOPEFULLY, IN THIS WAY FUTURE VERSIONS OF LINEAR**

 **THIS PROGRAM WILL BE COMPLETELY COMPATIBLE FOR USE ON YOUR LINEAR**

 **COMPUTER. LINEAR**

 **LINEAR**

 **PURPOSE LINEAR**

 **------- LINEAR**

 **THIS PROGRAM IS DESIGNED TO CONVERT ENDF/B FILE 3, 23 AND 27 DATA LINEAR**

 **TO LINEAR-LINEAR INTERPOLABLE FORM. ANY SECTION THAT IS ALREADY LINEAR**

 **LINEAR-LINEAR INTERPOLABLE WILL BE THINNED. LINEAR**

 **LINEAR**

 **IN THE FOLLOWING DISCUSSION FOR SIMPLICITY THE ENDF/B TERMINOLOGY LINEAR**

 **---ENDF/B TAPE---WILL BE USED. IN FACT THE ACTUAL MEDIUM MAY BE LINEAR**

 **TAPE, CARDS, DISK OR ANY OTHER MEDIUM. LINEAR**

 **LINEAR**

 **ENDF/B FORMAT LINEAR**

 **------------- LINEAR**

 **THIS PROGRAM ONLY USES THE ENDF/B BCD OR CARD IMAGE FORMAT (AS LINEAR**

 **OPPOSED TO THE BINARY FORMAT) AND CAN HANDLE DATA IN ANY VERSION LINEAR**

 **OF THE ENDF/B FORMAT (I.E., ENDF/B-1, 2, 3, 4, 5, 6 FORMAT). LINEAR**

 **LINEAR**

 **IT IS ASSUMED THAT THE DATA IS CORRECTLY CODED IN THE ENDF/B LINEAR**

 **FORMAT AND NO ERROR CHECKING IS PERFORMED. IN PARTICULAR IT IS LINEAR**

 **ASSUMED THAT THE MAT, MF AND MT ON EACH LINE IS CORRECT. SEQUENCE LINEAR**

 **NUMBERS (COLUMNS 76-80) ARE IGNORED ON INPUT, BUT WILL BE LINEAR**

 **CORRECTLY OUTPUT ON ALL LINES. THE FORMAT OF SECTION MF=1, MT=451 LINEAR**

 **AND ALL SECTIONS OF MF=3 MUST BE CORRECT. THE PROGRAM COPIES ALL LINEAR**

 **OTHER SECTION OF DATA AS HOLLERITH AND AS SUCH IS INSENSITIVE TO LINEAR**

 **THE CORRECTNESS OR INCORRECTNESS OF ALL OTHER SECTIONS. LINEAR**

 **LINEAR**

 **OUTPUT FORMAT LINEAR**

 **------------- LINEAR**

 **IN THIS VERSION OF LINEAR ALL ENERGIES WILL BE OUTPUT IN LINEAR**

 **F (INSTEAD OF E) FORMAT IN ORDER TO ALLOW ENERGIES TO BE WRITTEN LINEAR**

 **WITH UP TO 9 DIGITS OF ACCURACY. IN PREVIOUS VERSIONS THIS WAS AN LINEAR**

 **OUTPUT OPTION. HOWEVER USE OF THIS OPTION TO COMPARE THE RESULTS LINEAR**

 **OF ENERGIES WRITTEN IN THE NORMAL ENDF/B CONVENTION OF 6 DIGITS LINEAR**

 **TO THE 9 DIGIT OUTPUT FROM THIS PROGRAM DEMONSTRATED THAT FAILURE LINEAR**

 **TO USE THE 9 DIGIT OUTPUT CAN LEAD TO LARGE ERRORS IN THE DATA LINEAR**

 **DUE TO TRUNCATION OF ENERGIES TO 6 DIGITS DURING OUTPUT. LINEAR**

 **LINEAR**

 **CONTENTS OF OUTPUT LINEAR**

 **------------------ LINEAR**

 **ENTIRE EVALUATIONS ARE OUTPUT, NOT JUST THE LINEARIZED DATA LINEAR**

 **CROSS SECTIONS, E.G. ANGULAR AND ENERGY DISTRIBUTIONS ARE ALSO LINEAR**

 **INCLUDED. LINEAR**

 **LINEAR**

 **DOCUMENTATION LINEAR**

 **------------- LINEAR**

 **THE FACT THAT THIS PROGRAM HAS OPERATED ON THE DATA IS DOCUMENTED LINEAR**

 **BY THE ADDITION OF 3 COMMENT LINES AT THE END OF EACH HOLLERITH LINEAR**

 **SECTION IN THE FORM LINEAR**

 **LINEAR**

 **\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* PROGRAM LINEAR (2021-1) \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* LINEAR**

 **FOR ALL DATA GREATER THAN 1.00000-30 IN ABSOLUTE VALUE LINEAR**

 **DATA LINEARIZED TO WITHIN AN ACCURACY OF 0.1 PER-CENT LINEAR**

 **LINEAR**

 **THE ORDER OF SIMILAR COMMENTS (FROM RECENT, SIGMA1 AND GROUPIE) LINEAR**

 **REPRESENTS A COMPLETE HISTORY OF ALL OPERATIONS PERFORMED ON LINEAR**

 **THE DATA BY THESE PROGRAMS. LINEAR**

 **LINEAR**

 **THESE COMMENT LINES ARE ONLY ADDED TO EXISTING HOLLERITH SECTIONS,LINEAR**

 **I.E., THIS PROGRAM WILL NOT CREATE A HOLLERITH SECTION. THE FORMATLINEAR**

 **OF THE HOLLERITH SECTION IN ENDF/B-V DIFFERS FROM THE THAT OF LINEAR**

 **EARLIER VERSIONS OF ENDF/B. BY READING AN EXISTING MF=1, MT=451 LINEAR**

 **IT IS POSSIBLE FOR THIS PROGRAM TO DETERMINE WHICH VERSION OF LINEAR**

 **THE ENDF/B FORMAT THE DATA IS IN. WITHOUT HAVING A SECTION OF LINEAR**

 **MF=1, MT=451 PRESENT IT IS IMPOSSIBLE FOR THIS PROGRAM TO LINEAR**

 **DETERMINE WHICH VERSION OF THE ENDF/B FORMAT THE DATA IS IN, AND LINEAR**

 **AS SUCH IT IS IMPOSSIBLE FOR THE PROGRAM TO DETERMINE WHAT FORMAT LINEAR**

 **SHOULD BE USED TO CREATE A HOLLERITH SECTION. LINEAR**

 **LINEAR**

 **REACTION INDEX LINEAR**

 **-------------- LINEAR**

 **THIS PROGRAM DOES NOT USE THE REACTION INDEX WHICH IS GIVEN IN LINEAR**

 **SECTION MF=1, MT=451 OF EACH EVALUATION. LINEAR**

 **LINEAR**

 **THIS PROGRAM DOES NOT UPDATE THE REACTION INDEX IN MF=1, MT=451. LINEAR**

 **THIS CONVENTION HAS BEEN ADOPTED BECAUSE MOST USERS DO NOT LINEAR**

 **REQUIRE A CORRECT REACTION INDEX FOR THEIR APPLICATIONS AND IT WASLINEAR**

 **NOT CONSIDERED WORTHWHILE TO INCLUDE THE OVERHEAD OF CONSTRUCTING LINEAR**

 **A CORRECT REACTION INDEX IN THIS PROGRAM. HOWEVER, IF YOU REQUIRE LINEAR**

 **A REACTION INDEX FOR YOUR APPLICATIONS, AFTER RUNNING THIS PROGRAMLINEAR**

 **YOU MAY USE PROGRAM DICTIN TO CREATE A CORRECT REACTION INDEX. LINEAR**

 **LINEAR**

 **SECTION SIZE LINEAR**

 **------------ LINEAR**

 **SINCE THIS PROGRAM USES A LOGICAL PAGING SYSTEM THERE IS NO LIMIT LINEAR**

 **TO THE NUMBER OF POINTS IN ANY SECTION, E.G., THE TOTAL CROSS LINEAR**

 **SECTION MAY BE REPRESENTED BY 200,000 DATA POINTS. LINEAR**

 **LINEAR**

 **FOR ANY LINEARIZED SECTION THAT CONTAINS 60000 OR FEWER POINTS LINEAR**

 **THE ENTIRE OPERATION WILL BE PERFORMED IN CORE AND THE LINEARIZED LINEAR**

 **DATA WILL BE OUTPUT DIRECTLY TO THE ENDF/B FORMAT. FOR ANY SECTIONLINEAR**

 **THAT CONTAINS MORE POINTS THE DATA WILL BE LINEARIZED A PAGE AT A LINEAR**

 **TIME (1 PAGE = 60000 POINTS) AND OUTPUT TO SCRATCH. AFTER THE LINEAR**

 **ENTIRE SECTION HAS BEEN LINEARIZED THE DATA WILL BE READ BACK FROMLINEAR**

 **SCRATCH AND OUTPUT TO THE ENDF/B FORMAT. LINEAR**

 **LINEAR**

 **SELECTION OF DATA LINEAR**

 **----------------- LINEAR**

 **THE PROGRAM SELECTS DATA TO BE LINEARIZED BASED EITHER ON EITHER LINEAR**

 **MAT (ENDF/B MAT NO.) OR ZA AS WELL AS MF AND MT NUMBERS. THIS LINEAR**

 **PROGRAM ALLOWS UP TO 100 MAT/MF/MT OR ZA/MF/MT RANGES TO BE LINEAR**

 **SPECIFIED BY INPUT PARAMETERS. THE PROGRAM WILL ASSUME THAT THE LINEAR**

 **ENDF/B TAPE IS IN MAT ORDER, REGARDLESS OF THE CRITERIA USED LINEAR**

 **TO RETRIEVE MATERIALS. IF RETRIEVAL IS BY MAT RANGE THE PROGRAM LINEAR**

 **WILL TERMINATE WHEN A MAT IS FOUND THAT IS ABOVE ALL REQUESTED LINEAR**

 **MAT RANGES. IF RETRIEVAL IS BY ZA RANGE THE PROGRAM WILL SEARCH LINEAR**

 **THE ENTIRE ENDF/B TAPE. LINEAR**

 **LINEAR**

 **PROGRAM OPERATION LINEAR**

 **----------------- LINEAR**

 **EACH SECTION OF DATA IS CONSIDERED SEPARATELY. EACH SECTION OF LINEAR**

 **ENDF/B DATA TO LINEARIZE IS REPRESENTED BY A TABLE OF ENERGY LINEAR**

 **VS. CROSS SECTION AND ANY ONE OF FIVE ALLOWABLE INTERPOLATION LAWSLINEAR**

 **BETWEEN ANY TWO TABULATED POINTS. THIS PROGRAM WILL REPLACE EACH LINEAR**

 **SECTION OF DATA CROSS SECTIONS BY A NEW TABLE OF ENERGY VS. LINEAR**

 **CROSS SECTION IN WHICH THE INTERPOLATION LAW IS ALWAYS LINEAR IN LINEAR**

 **ENERGY AND CROSS SECTION BETWEEN ANY TWO TABULATED POINTS. LINEAR**

 **LINEAR**

 **DATA IS READ AND LINEARIZED A PAGE AT A TIME (ONE PAGE CONTAINS LINEAR**

 **60000 DATA POINTS). IF THE FINAL LINEARIZED SECTION CONTAINS TWO LINEAR**

 **PAGES OR LESS, DATA POINTS IT WILL BE ENTIRELY CORE RESIDENT LINEAR**

 **AFTER IT HAS BEEN LINEARIZED AND WILL BE WRITTEN DIRECTLY FROM LINEAR**

 **CORE TO THE OUTPUT TAPE. IF THE LINEARIZED SECTION IS LARGER THAN LINEAR**

 **TWO PAGES, AFTER EACH PAGE IS LINEARIZED IT WILL BE WRITTEN TO LINEAR**

 **SCRATCH. AFTER THE ENTIRE SECTION HAS BEEN LINEARIZED IT WILL LINEAR**

 **BE READ BACK FROM SCRATCH, TWO PAGES AT A TIME, AND WRITTEN TO LINEAR**

 **THE OUTPUT TAPE. LINEAR**

 **LINEAR**

 **KEEP EVALUATED DATA POINTS LINEAR**

 **-------------------------- LINEAR**

 **SOMETIMES IT IS CONVENIENT TO KEEP ALL ENERGY POINTS WHICH WERE LINEAR**

 **PRESENT IN THE ORIGINAL EVALUATION AND TO MERELY SUPPLEMENT THESE LINEAR**

 **POINTS WITH ADDITIONAL ENERGY POINTS IN ORDER TO LINEARIZE THE LINEAR**

 **CROSS SECTIONS. FOR EXAMPLE, IT IS OFTEN CONVENIENT TO KEEP THE LINEAR**

 **THERMAL VALUE (AT 0.0253 EV) OR THE VALUE AT 14.1 MEV. LINEAR**

 **LINEAR**

 **THE CURRENT VERSION OF THIS PROGRAM WILL ALLOW THE USER TO KEEP LINEAR**

 **ALL ORIGINAL EVALUATED DATA POINTS BY SPECIFYING 1 IN COLUMNS LINEAR**

 **34-44 OF THE FIRST INPUT LINE. THIS WILL TURN OFF THE BACKWARD LINEAR**

 **THINNING (SEE UCRL-50400, VOL. 17, PART A FOR EXPLANATION) AND LINEAR**

 **RESULT IN ALL ORIGINAL ENERGY POINTS BEING KEPT. CAUTION SHOULD LINEAR**

 **BE EXERCISED IN USING THIS OPTION SINCE IT CAN RESULT IN A LINEAR**

 **CONSIDERABLE INCREASE IN THE NUMBER OF DATA POINTS OUTPUT BY LINEAR**

 **THIS CODE. LINEAR**

 **LINEAR**

 **FOR ALL USERS WHO ARE NOT INTERESTED IN THIS OPTIONS NO CHANGES LINEAR**

 **ARE REQUIRED IN THE INPUT TO THIS PROGRAM, I. E. IF COLUMNS LINEAR**

 **34-44 ARE BLANK (AS FOR ALL PREVIOUS VERSIONS OF THIS CODE) THE LINEAR**

 **PROGRAM WILL OPERATE EXACTLY AS IT DID BEFORE. LINEAR**

 **LINEAR**

 **ALLOWABLE ERROR LINEAR**

 **--------------- LINEAR**

 **ALLOWABLE ERROR MUST ALWAYS BE SPECIFIED IN THE INPUT TO THIS LINEAR**

 **PROGRAM AS A FRACTION, NOT A PER-CENT. FOR EXAMPLE, INPUT THE LINEAR**

 **ALLOWABLE FRACTIONAL ERROR 0.001 IN ORDER TO OBTAIN DATA THAT IS LINEAR**

 **ACCURATE TO WITHIN 0.1 PER-CENT. LINEAR**

 **LINEAR**

 **THE CONVERSION OF THE DATA FROM THE GENERAL INTERPOLATION FORM TO LINEAR**

 **LINARLY INTERPOLABLE FORM CANNOT BE PERFORMED EXACTLY. HOWEVER, ITLINEAR**

 **CAN BE PERFORMED TO VIRTUALLY ANY REQUIRED ACCURACY AND MOST LINEAR**

 **IMPORTANTLY CAN BE PERFORMED TO A TOLERANCE THAT IS SMALL COMPAREDLINEAR**

 **TO THE UNCERTAINTY IN THE CROSS SECTIONS THEMSELVES. AS SUCH THE LINEAR**

 **CONVERSION OF CROSS SECTIONS TO LINEARLY INTERPOLABLE FORM CAN BE LINEAR**

 **PERFORMED WITH ESSENTIALLY NO LOSE OF INFORMATION. LINEAR**

 **LINEAR**

 **THE ALLOWABLE ERROR MAY BE ENERGY INDEPENDENT (CONSTANT) OR ENERGYLINEAR**

 **DEPENDENT. THE ALLOWABLE ERROR IS DESCRIBED BY A TABULATED LINEAR**

 **FUNCTION OF UP TO 20 (ENERGY,ERROR) PAIRS AND LINEAR INTERPOLATIONLINEAR**

 **BETWEEN TABULATED POINTS. IF ONLY ONE TABULATED POINT IS GIVEN THELINEAR**

 **ERROR WILL BE CONSIDERED CONSTANT OVER THE ENTIRE ENERGY RANGE. LINEAR**

 **WITH THIS ENERGY DEPENDENT ERROR ONE MAY OPTIMIZE THE OUTPUT FOR LINEAR**

 **ANY GIVEN APPLICATION BY USING A SMALL ERROR IN THE ENERGY RANGE LINEAR**

 **OF INTEREST AND A LESS STRINGENT ERROR IN OTHER ENERGY RANGES. LINEAR**

 **LINEAR**

 **DEFAULT ALLOWABLE ERROR LINEAR**

 **----------------------- LINEAR**

 **IN ORDER TO INSURE CONVERGENCE OF THE LINEARIZING ALGORITHM THE LINEAR**

 **ALLOWABLE ERROR MUST BE POSITIVE. IF THE USER INPUTS AN ERROR LINEAR**

 **THAT IS NOT POSITIVE IT WILL AUTOMATICALLY BE SET TO THE DEFAULT LINEAR**

 **VALUE (CURRENTLY 0.001, CORRESPONDING TO 0.1 PER-CENT) AND LINEAR**

 **INDICATED AS SUCH IN THE OUTPUT LISTING. LINEAR**

 **LINEAR**

 **COULOMB PENETRABILITY (INTERPOLATION LAW = 6) LINEAR**

 **-------------------------------------------- LINEAR**

 **INTRODUCED FOR ENDF/B-VI. THIS IS DEFINED AS, LINEAR**

 **LINEAR**

 **SIG(E) = C1\*EXP(-C2/SQRT(E - T)) LINEAR**

 **LINEAR**

 **THIS PROGRAM ONLY CONSIDERS EXOTHERMIC REACTIONS - T = 0 LINEAR**

 **LINEAR**

 **SIG(E) = C1\*EXP(-C2/SQRT(E)) LINEAR**

 **LINEAR**

 **WARNING...THIS INTERPOLATION LAW SHOULD ONLY BE USED FOR REACTIONSLINEAR**

 **WHICH HAVE A POSITIVE Q-VALUE (EXOTHERMIC REACTIONS), LINEAR**

 **SINCE HERE WE ONLY CONSIDER T = 0.0 IN THE FORMALISM. LINEAR**

 **IN ALL OTHER CASES A WARNING MESSAGE WILL BE PRINTED. LINEAR**

 **LINEAR**

 **INPUT FILES LINEAR**

 **----------- LINEAR**

 **UNIT DESCRIPTION LINEAR**

 **---- ----------- LINEAR**

 **2 INPUT LINES (BCD - 80 CHARACTERS/RECORD) LINEAR**

 **10 ORIGINAL ENDF/B DATA (BCD - 80 CHARACTERS/RECORD) LINEAR**

 **LINEAR**

 **OUTPUT FILES LINEAR**

 **------------ LINEAR**

 **UNIT DESCRIPTION LINEAR**

 **---- ----------- LINEAR**

 **3 OUTPUT REPORT (BCD - 120 CHARACTERS/RECORD) LINEAR**

 **11 FINAL ENDF/B DATA (BCD - 80 CHARACTERS/RECORD) LINEAR**

 **LINEAR**

 **SCRATCH FILES LINEAR**

 **------------- LINEAR**

 **UNIT DESCRIPTION LINEAR**

 **---- ----------- LINEAR**

 **12 SCRATCH FILE (BINARY - 180000 WORDS/RECORD LINEAR**

 **LINEAR**

 **OPTIONAL STANDARD FILE NAMES (SEE SUBROUTINE FILEIO) LINEAR**

 **---------------------------------------------------- LINEAR**

 **UNIT FILE NAME LINEAR**

 **---- ---------- LINEAR**

 **2 LINEAR.INP LINEAR**

 **3 LINEAR.LST LINEAR**

 **10 ENDFB.IN LINEAR**

 **11 ENDFB.OUT LINEAR**

 **12 (SCRATCH) LINEAR**

 **LINEAR**

 **LINEAR**

 **INPUT PARAMETERS LINEAR**

 **---------------- LINEAR**

 **FOR VERSIONS EARLIER THAN 90-1 THIS PROGRAM ONLY ALLOWED THE USER LINEAR**

 **TO SPECIFY BY INPUT PARAMETERS WHICH MATERIALS (MAT) TO PROCESS. LINEAR**

 **FOR EACH REQUESTED MATERIAL NEUTRON INTERACTION CROSS SECTIONS LINEAR**

 **(MF=3) WOULD BE LINEARIZED AND THE REMAINDER OF THE MATERIAL LINEAR**

 **WOULD BE COPIED. LINEAR**

 **LINEAR**

 **FOR VERSIONS 90-1 AND LATER THIS PROGRAM WILL ALLOW THE USER TO LINEAR**

 **TO SPECIFY BY INPUT PARAMETERS EXACTLY WHAT SECTIONS OF DATA LINEAR**

 **TO PROCESS. FOR EACH SECTION OF DATA, SPECIFIED BY MAT, MF, MT LINEAR**

 **RANGES, SECTIONS OF MF=3, 23 AND 27 WILL BE LINEARIZED AND ALL LINEAR**

 **OTHER REQUESTED SECTIONS WILL BE COPIED. ALL SECTIONS WHICH ARE LINEAR**

 **NOT EXPLICITLY REQUESTED WILL BE SKIPPED AND WILL NOT APPEAR ON LINEAR**

 **ENDF/B FILE OUTPUT BY THIS PROGRAM. LINEAR**

 **LINEAR**

 **WITH THIS NEW PROCEDURE YOU CAN MINIMIZE THE SIZE OF THE ENDF/B LINEAR**

 **FILE OUTPUT BY THIS PROGRAM, E.G., IF YOU ONLY WANT NEUTRON LINEAR**

 **CROSS SECTIONS FOR SUBSEQUENT PROCESSING YOU NEED ONLY REQUEST LINEAR**

 **ONLY MF=3 DATA. LINEAR**

 **LINEAR**

 **HOWEVER, YOU MUST UNDERSTAND THAT ONLY THOSE SECTIONS WHICH YOU LINEAR**

 **EXPLICITLY REQUEST WILL APPEAR ON THE ENDF/B FILE OUTPUT BY LINEAR**

 **THIS PROGRAM. FOR EXAMPLE, IF YOU WISH TO DOCUMENT EXACTLY LINEAR**

 **HOW YOU LINEARIZED THE DATA BY INCLUDING COMMENTS IN MF=1, MT=451 LINEAR**

 **THEN YOU MUST EXPLICITLY REQUEST THAT MF=1, MT=451 BE PROCESSED LINEAR**

 **FOR EACH MATERIAL THAT YOU REQUEST. SIMILAR IF YOU WANT THE LINEAR**

 **ENTIRE EVALUATION YOU MUST REQUEST ALL MF AND MT TO BE OUTPUT. LINEAR**

 **LINEAR**

 **LINE COLS. DESCRIPTION LINEAR**

 **---- ----- ----------- LINEAR**

 **1 1-11 SELECTION CRITERIA (0=MAT, 1=ZA) LINEAR**

 **12-22 MONITOR MODE SELECTOR LINEAR**

 **= 0 - NORMAL OPERATION LINEAR**

 **= 1 - MONITOR PROGRESS OF LINEARIZING OF THE DATA. LINEAR**

 **EACH TIME A PAGE OF DATA POINTS IS WRITTEN TO LINEAR**

 **THE SCRATCH FILE PRINT OUT THE TOTAL NUMBER OF LINEAR**

 **POINTS ON SCRATCH AND THE LOWER AND UPPER LINEAR**

 **ENERGY LIMITS OF THE PAGE (THIS OPTION MAY BE LINEAR**

 **USED IN ORDER TO MONITOR THE EXECUTION SPEED LINEAR**

 **OF LONG RUNNING JOBS). LINEAR**

 **23-33 MINIMUM CROSS SECTION OF INTEREST (BARNS). LINEAR**

 **(IF 0.0 OR LESS IS INPUT THE PROGRAM WILL LINEAR**

 **USE 1.0E-10). ENERGY INTERVALS WILL NOT BE LINEAR**

 **SUB-DIVIDED IF THE ABSOLUTE VALUE OF THE CROSS LINEAR**

 **SECTION WITHIN THE INTERVAL IS LESS THAN THIS VALUE. LINEAR**

 **AN EXCEPTION TO THIS RULE IS NEAR THRESHOLDS ENERGY LINEAR**

 **INTERVALS WILL BE SUB-DIVIDED UNTIL CONVERGENCE LINEAR**

 **REGARDLESS OF THE MAGNITUDE OF THE CROSS SECTION. LINEAR**

 **34-44 KEEP ORIGINAL EVALUATED DATA POINTS. LINEAR**

 **= 0 - NO. LINEAR**

 **= 1 - YES - ADDITIONAL POINTS MAY BE ADDED IN ORDER LINEAR**

 **TO LINEARIZE DATA, BUT ALL ORIGINAL LINEAR**

 **DATA POINTS WILL BE INCLUDED IN THE LINEAR**

 **RESULTS. LINEAR**

 **2 1-72 ENDF/B INPUT DATA FILENAME LINEAR**

 **(STANDARD OPTION = ENDFB.IN) LINEAR**

 **3 1-72 ENDF/B OUTPUT DATA FILENAME LINEAR**

 **(STANDARD OPTION = ENDFB.OUT) LINEAR**

 **4-N 1- 6 LOWER MAT OR ZA LIMIT LINEAR**

 **7- 8 LOWER MF LIMIT LINEAR**

 **9-11 LOWER MT LIMIT LINEAR**

 **12-17 UPPER MAT OR ZA LIMIT LINEAR**

 **18-19 UPPER MF LIMIT LINEAR**

 **20-22 UPPER MT LIMIT LINEAR**

 **UP TO 100 RANGES MAY BE SPECIFIED, ONLY ONE RANGE LINEAR**

 **PER LINE. THE LIST OF RANGES IS TERMINATED BY A LINEAR**

 **BLANK LINE. IF THE UPPER MAT LIMIT OF ANY REQUEST LINEAR**

 **IS LESS THAN THE LOW LIMIT IT WILL BE SET EQUAL TO LINEAR**

 **THE LOWER LIMIT. IF THE UPPER LIMIT IS STILL ZERO LINEAR**

 **IT WILL BE SET EQUAL TO 999999. IF THE UPPER MF OR LINEAR**

 **MT LIMIT IS ZERO IT WILL BE SET TO 99 OR 999 LINEAR**

 **RESPECTIVELY. LINEAR**

 **VARY 1-11 ENERGY FOR ERROR LAW LINEAR**

 **12-22 ALLOWABLE FRACTIONAL ERROR FOR ERROR LAW. LINEAR**

 **THE ACCEPTABLE LINEARIZING ERROR MAY BE SPECIFIED TO LINEAR**

 **BE EITHER ENERGY INDEPENDENT (DEFINED BY A SINGLE LINEAR**

 **ERROR), OR ENERGY DEPENDENT (DEFINED BY UP TO 20 LINEAR**

 **ENERGY, ERROR PAIRS). FOR THE ENERGY DEPENDENT CASE LINEAR**

 **LINEAR INTERPOLATION WILL BE USED TO DEFINE THE ERRORLINEAR**

 **AT ENERGIES BETWEEN THOSE AT WHICH IT IS TABULATED. LINEAR**

 **IN ALL CASES THE ERROR LAW IS TERMINATED BY A BLANK LINEAR**

 **LINE. IF ONLY ONE ENERGY, ERROR PAIR IS GIVEN THE LINEAR**

 **THE LAW WILL BE CONSIDERED TO BE ENERGY INDEPENDENT. LINEAR**

 **IF MORE THAN ONE PAIR IS GIVEN IT WILL BE CONSIDERED LINEAR**

 **TO BE ENERGY DEPENDENT (NOTE, ENERGY INDEPENDENT LINEAR**

 **FORM WILL RUN FASTER THAN THE EQUIVALENT ENERGY LINEAR**

 **DEPENDENT FORM). FOR AN ENERGY DEPENDENT ERROR LAW LINEAR**

 **ALL ENERGIES MUST BE ASCENDING ENERGY ORDER. FOR LINEAR**

 **CONVERGENCE OF THE LINEARIZING ALGORITHM ALL ERRORS LINEAR**

 **MUST BE POSITIVE. IF AN ALLOWABLE ERROR IS NOT LINEAR**

 **POSITIVE IT WILL BE SET EQUAL TO THE STANDARD OPTION LINEAR**

 **(CURRENTLY 0.001, CORRESPONDING TO 0.1 PER-CENT). LINEAR**

 **IF THE FIRST ERROR LINE IS BLANK IT WILL TERMINATE LINEAR**

 **THE ERROR LAW AND THE ERROR WILL BE TREATED AS LINEAR**

 **ENERGY INDEPENDENT, EQUAL TO THE STANDARD OPTION LINEAR**

 **(CURRENTLY 0.1 PER-CENT). (SEE EXAMPLE INPUT 4). LINEAR**

 **LINEAR**

 **EXAMPLE INPUT NO. 1 LINEAR**

 **------------------- LINEAR**

 **RETRIEVE DATA BY ZA IN ORDER TO FIND ALL URANIUM ISOTOPES AND LINEAR**

 **THORIUM 232. RETRIEVE ALL NEUTRON INTERACTION CROSS SECTIONS LINEAR**

 **(MF=3). ALL ENERGY INTERVALS IN WHICH THE CROSS SECTION IS LINEAR**

 **AT LEAST 1 MICRO-BARN (1.0E-06 BARNS) WILL BE SUBDIVIDED. LINEAR**

 **BACKWARD THINNING WILL BE PERFORMED. FROM 0 TO 100 EV LINEARIZE LINEAR**

 **TO WITHIN 0.1 PER-CENT ACCURACY. FROM 100 EV TO 1 KEV VARY LINEAR**

 **ACCURACY BETWEEN 0.1 AND 1.0 PER-CENT. ABOVE 1 KEV USE 1 LINEAR**

 **PER-CENT ACCURACY. LINEAR**

 **LINEAR**

 **EXPLICITLY SPECIFY THE STANDARD FILENAMES. LINEAR**

 **LINEAR**

 **IN THIS CASE THE FOLLOWING 11 INPUT LINES ARE REQUIRED LINEAR**

 **LINEAR**

 **1 0 1.00000- 6 0 LINEAR**

 **ENDFB.IN LINEAR**

 **ENDFB.OUT LINEAR**

 **92000 3 0 92999 3999 LINEAR**

 **90232 3 0 0 3 0 (UPPER LIMIT AUTOMATICALLY SET TO 90232 3999)LINEAR**

 **(END OF REQUEST LIST) LINEAR**

 **0.00000+ 0 1.00000-03 LINEAR**

 **1.00000+ 2 1.00000-03 LINEAR**

 **1.00000+ 3 1.00000-02 LINEAR**

 **1.00000+ 9 1.00000-02 LINEAR**

 **(END OF ERROR LAW) LINEAR**

 **LINEAR**

 **EXAMPLE INPUT NO. 2 LINEAR**

 **------------------- LINEAR**

 **SAME AS THE ABOVE CASE, EXCEPT LINEARIZE ALL DATA TO WITHIN THE LINEAR**

 **STANDARD ACCURACY (CURRENTLY 0.1 PER-CENT). IN ORDER TO USE THE LINEAR**

 **STANDARD ACCURACY YOU NEED NOT SPECIFY ANY ERROR LAW AT ALL. IN LINEAR**

 **THIS CASE INCLUDE THE HOLLERITH SECTION, MF=1, MT=451, FOR EACH LINEAR**

 **MATERIAL. LINEAR**

 **LINEAR**

 **LEAVE THE DEFINITION OF THE FILENAMES BLANK - THE PROGRAM WILL LINEAR**

 **THEN USE STANDARD FILENAMES. LINEAR**

 **LINEAR**

 **IN THIS CASE THE FOLLOWING 9 INPUT LINES ARE REQUIRED LINEAR**

 **LINEAR**

 **1 0 1.00000- 6 0 LINEAR**

 **(USE DEFAULT FILENAME = ENDFB.IN) LINEAR**

 **(USE DEFAULT FILENAME = ENDFB.OUT) LINEAR**

 **92000 1451 92999 1451 LINEAR**

 **92000 3 0 92999 3999 LINEAR**

 **90232 1451 0 1451 LINEAR**

 **90232 3 0 0 3 0 (UPPER LIMIT AUTOMATICALLY SET TO 90232 3999)LINEAR**

 **(END OF REQUEST LIST) LINEAR**

 **(0.1 PER-CENT ERROR, END OF ERROR LAW) LINEAR**

 **LINEAR**

 **EXAMPLE INPUT NO. 3 LINEAR**

 **------------------- LINEAR**

 **LINEARIZE ALL MATERIALS ON AN ENDF/B TAPE TO WITHIN AN ACCURACY LINEAR**

 **OF 0.5 PER-CENT (0.005 AS A FRACTION). IN THIS CASE YOU NEED NOT LINEAR**

 **SPECIFY THE MAT, MF, MT RANGES. LINEAR**

 **LINEAR**

 **READ THE ENDF/B DATA FROM \ENDFB6\ZA092238 AND WRITE THE ENDF/B LINEAR**

 **DATA TO \ENDFB6\LINEAR\ZA092238. LINEAR**

 **LINEAR**

 **IN THIS CASE THE FOLLOWING 6 INPUT LINES ARE REQUIRED LINEAR**

 **LINEAR**

 **(MAT, 1.0E-10 BARNS, THIN)LINEAR**

 **\ENDFB6\ZA092238 LINEAR**

 **\ENDFB6\LINEAR\ZA092238 LINEAR**

 **(RETRIEVE ALL DATA, END REQUEST LIST) LINEAR**

 **5.00000-03 LINEAR**

 **(END OF ERROR LAW) LINEAR**

 **LINEAR**

 **NOTE THAT IN THIS CASE IF THE INPUT HAD SPECIFIED AN EQUIVALENT LINEAR**

 **ENERGY DEPENDENT ERROR LAW BY GIVING A NUMBER OF ENERGY POINTS LINEAR**

 **AT EACH OF WHICH THE ERROR IS 0.5 PER-CENT THE PROGRAM WOULD TAKE LINEAR**

 **LONGER TO RUN (I.E., ONLY USE AN ENERGY DEPENDENT ERROR LAW WHEN LINEAR**

 **IT IS NECESSARY). LINEAR**

 **LINEAR**

 **EXAMPLE INPUT NO. 4 LINEAR**

 **------------------- LINEAR**

 **IN ORDER TO LINEARIZE ALL MATERIALS ON AN ENDF/B TAPE TO THE LINEAR**

 **STANDARD OPTION OF 0.1 PER-CENT IT IS ADEQUATE TO INPUT A SET LINEAR**

 **OF COMPLETELY BLANK LINES WHICH WILL AUTOMATICALLY INVOKE ALL LINEAR**

 **OF THE STANDARD OPTIONS. LINEAR**

 **LINEAR**

 **LEAVE THE DEFINITION OF THE FILENAMES BLANK - THE PROGRAM WILL LINEAR**

 **THEN USE STANDARD FILENAMES. LINEAR**

 **LINEAR**

 **IN THIS CASE THE FOLLOWING THREE INPUT LINES ARE REQUIRED LINEAR**

 **LINEAR**

 **(MAT, 1.0E-10 BARNS, THIN)LINEAR**

 **(USE DEFAULT FILENAME = ENDFB.IN) LINEAR**

 **(USE DEFAULT FILENAME = ENDFB.OUT) LINEAR**

 **(RETRIEVE ALL DATA, END REQUEST LIST) LINEAR**

 **(0.1 PER-CENT ERROR, END OF ERROR LAW) LINEAR**

 **LINEAR**

 **=======================================================================LINEAR**