PROGRAM EVALPLOT

VERSION 75-1 (AUGUST 1975)  
VERSION 76-1 (JULY 1976)  
VERSION 77-1 (APRIL 1977)  
VERSION 78-1 (JULY 1978)  
VERSION 79-1 (FEBRUARY 1979)  
VERSION 80-1 (JULY 1980)  *IBM VERSION  
VERSION 80-2 (DECEMBER 1980)  
VERSION 81-1 (MARCH 1981)  
VERSION 81-2 (AUGUST 1981)  *IMPROVED ZOOM CAPABILITY  
VERSION 82-1 (JANUARY 1982)  *IMPROVED COMPUTER COMPATIBILITY  
VERSION 83-1 (JANUARY 1983)  *ELIMINATED COMPUTER DEPENDENT CODING  
VERSION 83-2 (OCTOBER 1983)  *ADDED PLOTTING OF HISTOGRAM DATA.  
VERSION 84-1 (DECEMBER 1984)  *ADDED PLOTS OF LEGENDRE COEFFICIENTS AS A FUNCTION OF ENERGY.  
VERSION 84-2 (DECEMBER 1984)  *ADDED SMALL PLOTTING MODE.  
VERSION 85-1 (AUGUST 1985)  *FORTRAN-77/H VERSION  
VERSION 86-1 (JANUARY 1986)  *ENDF/B-VI FORMAT  
VERSION 88-1 (JULY 1988)  *MAJOR REVISION TO MAKE CODE EASILY INTERFACEABLE TO ALMOST ANY PLOTTERTER.  
*WARNING...INPUT PARAMETERS FROM BEEN EVALPLOT CHANGED (SEE, DESCRIPTION BELOW)  
*COMPUTER INDEPENDENT SOFTWARE CHARACTERS.  
*C COLOR PLOTS.  
*MT NUMBER DEFINITIONS FROM DATA FILE READ BY PROGRAM  
*FORTRAN-77 REQUIRED (FORTRAN-H NOT SUPPORTED BY THIS PROGRAM).  
*OPTION...INTERNALLY DEFINE ALL I/O FILE NAMES (SEE, SUBROUTINE FILEIO FOR DETAILS).  
*IMPROVED BASED ON USER COMMENTS.  
VERSION 89-1 (JANUARY 1989)  *PSYCHOANALYZED BY PROGRAM FREUD TO INSURE PROGRAM WILL NOT DO ANYTHING CRAZY.  
*UPDATED TO USE NEW PROGRAM CONVERT KEYWORDS.  
*ADDED LIVERMORE CIVIC COMPILER CONVENTIONS.  
*FORTRAN-77/FORTRAN-H COMPATIBLE  
*SPECIAL ENDF/B MATERIAL DEFINITIONS (ZA.LT.1000) FROM DATA FILE READ BY PROGRAM.  
VERSION 89-2 (MARCH 1989)  *ADDED ENDF/B-V AND VI MT DEFINITIONS. PROGRAM WILL DETERMINE ENDF/B FORMAT BASED ON MF=1, MT=451 AND USE APPROPRIATE MT DEFINITIONS. IF NO MF=1, MT=451 PROGRAM WILL USE ENDF/B-V MT DEFINITIONS.  
VERSION 89-3 (JUNE 1989)  *3 CHARACTER FONTS  
VERSION 92-1 (JANUARY 1992)  *COMPLETE REWRITE OF CODE  
*ADDED PHOTON DATA, MF=23 AND 27 IDENTIFIED IN PLOT TITLES  
*ADDED PHOTON SAVE OPTION.  
*UPDATED BASED ON USER COMMENTS  
*ADDED RETRIEVAL BY UP TO 100 MAT/MF/MT OR ZA/MF/MT RANGES  
*WARNING...INPUT PARAMETER FORMAT HAS BEEN CHANGED...SEE DESCRIPTION BELOW.  
*ADDED MULTIPLICATION OF DISTRIBUTIONS IN MF=5 AND 15 BY PROBABILITY=YIELD.  
*INCREASED PAGE SIZE TO 12000 POINTS  
VERSION 92-3 (MAY 1992)  *CORRECTED DESCRIPTION OF INPUT
PARAMETERS AND EXAMPLE PROBLEMS. EVALPLOT
*CORRECTED FOR ENDF/B-VII DEFINITION OF 
  TEMPERATURE FROM MF=1/MT=451. EVALPLOT
*CORRECTED LOGIC SO THAT EACH REQUEST 
  IS TREATED SEPARATELY TO CREATE A 
  PLOT, UNLESS REQUESTS ARE CHAINED 
  TOGETHER. EVALPLOT
*ADDED VARIABLE CHARACTER SIZE INPUT. EVALPLOT

VERSION 93-1 (MARCH 1993)
*ADDED PAGE SIZE FROM 12000 EVALPLOT 
  TO 210000 EVALPLOT 
*INCREASED THE NUMBER OF ENERGIES EVALPLOT 
  VS. LEGENDRE COEFFICIENTS FROM EVALPLOT 
  167 TO 7000 EVALPLOT
*UPDATED FOR ON SCREEN GRAPHICS EVALPLOT 
  USING THE LAHEY FORTRAN COMPILER. EVALPLOT 
*ADDED VARIABLE CHARACTER SIZE INPUT. EVALPLOT 

VERSION 94-1 (JANUARY 1994)
*VARIABLE ENDF/B DATA FILENAMES EVALPLOT 
  TO ALLOW ACCESS TO FILE STRUCTURES EVALPLOT 
  (WARNING - INPUT PARAMETER FORMAT EVALPLOT 
  HAS BEEN CHANGED) EVALPLOT
*CLOSE ALL FILES BEFORE TERMINATING EVALPLOT 
  (SEE, SUBROUTINE ENDIT) EVALPLOT

VERSION 96-1 (JANUARY 1996)
*COMPLETE RE-WRITE EVALPLOT 
*IMPROVED COMPUTER INDEPENDENCE EVALPLOT 
*ALL DOUBLE PRECISION EVALPLOT 
*UNIFORM TREATMENT OF ENDF/B I/O EVALPLOT 
*IMPROVED OUTPUT PRECISION EVALPLOT 
*DEFINED SCRATCH FILE NAMES EVALPLOT 
*ADDED (N,REMAINDER) TO FIRST PLOT. EVALPLOT

VERSION 97-1 (APRIL 1997)
*ADDED PAGE SIZE FROM 210000 EVALPLOT 
  TO 480,000 EVALPLOT

VERSION 99-1 (MARCH 1999)
*CORRECTED CHARACTER TO FLOATING EVALPLOT 
  POINT READ FOR MORE DIGITS EVALPLOT 
*UPDATED TEST FOR ENDF/B FORMAT EVALPLOT 
  VERSION BASED ON RECENT FORMAT CHANGES EVALPLOT
*GENERAL IMPROVEMENTS BASED ON 
  USER FEEDBACK EVALPLOT
VERS. 2000-1 (FEBRUARY 2000)*ADDED MF=10, ACTIVATION CROSS 
  SECTION PLOTS. EVALPLOT 
*INCREASED DIMENSIONS TO HANDLE MORE EVALPLOT 
  SECTIONS - UP TO 1,000 EVALPLOT 
*GENERAL IMPROVEMENTS BASED ON 
  USER FEEDBACK EVALPLOT
VERS. 2002-1 (Nov. 2002)
*OPTIONAL INPUT PARAMETERTS EVALPLOT 
*OPTIONAL BLACK OR WHITE BACKGROUND EVALPLOT 
*COLOR POSTSCRIPT FILES EVALPLOT
VERS. 2004-1 (MARCH 2004)
*ADDED INCLUDE FOR COMMON EVALPLOT 
*INCREASED PAGE SIZE TO 600,000 EVALPLOT 
*INCREASED THE NUMBER OF ENERGIES EVALPLOT 
  VS. LEGENDRE COEFFICIENTS FROM EVALPLOT 
  7000 TO 20000 EVALPLOT
VERS. 2007-1 (JAN. 2007)
*CHECKED AGAINST ALL ENDF/B-VII. EVALPLOT 
*INCREASED PAGE SIZE TO 2,400,000 EVALPLOT 
  FROM 600,000. EVALPLOT 
  VS. LEGENDRE COEFFICIENTS TO EVALPLOT 
  80,000 FROM 20,000 (MUST BE 1/30 
  PAGE SIZE). EVALPLOT 
*ADDED (N,REMAINDER) TO FIRST PLOT. EVALPLOT
VERS. 2007-2 (DEC. 2007)
*72 CHARACTER FILE NAMES. EVALPLOT 
VERS. 2008-1 (JULY 2008)
*UPDATED FOR MF=4/LTT = 3 = LEGENDRE EVALPLOT 
  PLUS TABULATED EVALPLOT 
VERS. 2010-1 (Aug. 2010)
*Extended to plots up to 100 Legendre EVALPLOT 
  Coefficients versus incident energy. EVALPLOT
VERS. 2011-1 (July 2011)
*Increased MT.DAT from 200 to 1,000 EVALPLOT 
  entries, to accommodate new MTs. EVALPLOT 
*Updated MF=10 plots to identify ZAP EVALPLOT 
  and state for Neutron Activation. EVALPLOT 
*Updated for energy release parameters EVALPLOT 
  MF=3, MT=301 to 450. EVALPLOT 
VERS. 2012-1 (Aug. 2012)
*Updated incident particle list to EVALPLOT 
  include photon (ZA = 0). EVALPLOT 
*Added CODENAME EVALPLOT
32 and 64 bit Compatible

*Added ERROR stops

VERS. 2013-1 (Nov. 2013)
*OUT9 replaced NORMX

VERS. 2015-1 (Jan. 2015)
*Updated MF=10 Labels, which requires longer plot titles.

VERS. 2015-2 (Mar. 2015)
*Restricted character size multiplier to 0.5 to 1.5 to accommodate longer plot titles.

VERS. 2017-1 (May 2017)
*Updated MF=10 Labels, which requires longer plot titles.

VERS. 2018-1 (Jan. 2018)
*Initial Linear X scaling for MF=1 *(nu-bar) and MF=4 (Legendre).

VERS. 2019-1 (June 2019)
*Unless energy range is requested = 0, print WARNING messages.

VERS. 2020-1 (Mar. 2020)
*Expanded storage to handle new R-M (LRF=7) angular distributions.

VERS. 2021-1 (June 2021)
*Additional Interpolation Law Tests

VERS. 2021-2 (Sept 2021)
*Corrected Angular (MF=4) and Energy plotting - 2021-1 skipped ALL remaining MF rather than just current MF - 2021-2 corrects this.

Vers. 2022-1 (Feb. 2022)
*Corrected to plot MF3/MT=301-450.

Vers. 2023-1 (Feb. 2023)
*Reduced page sizes to 120,00.

2022-1 Acknowledgment
I thank Jean-Christophe Sublet (NDS, IAEA, Vienna) for notifying me that EVALPLOT 2021 was not plotting MF3/MT=301-450 - compared to EVALPLOT 2019 that was. EVALPLOT 2022-1 now correctly plots MF3/MT=301-450.

2015-2 Acknowledgment
I thank Chuck Whitmer (TerraPower, WA) for reporting the errors that led to the 2015-2 Improvements in this code.

I thank Jean-Christophe Sublet (UKAEA) for contributing MAC

VERS. 2015-2 (Mar. 2015)
*Minor changes based on user feedback

VERS. 2017-1 (May 2017)
*Expanded storage to handle new R-M (LRF=7) angular distributions.

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

VERS. 2020-1 (Mar. 2020)
*Major re-write to update MT tables to include ALL ENDF/B-6 format defined MT numbers for plotting.

VERS. 2021-1 (June 2021)
*Additional MOUSE Interaction to ZOOM plots of Neutron (MF=3) and Photon (MF=23) Cross Sections.

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I thank Jean-Christophe Sublet (UKAEA) for contributing MAC
executables and Bojan Zefran (IJS, Slovenia) for contributing LINUX (32 or 63 bit) executables. And most of all I must thank Andrej Trkov (NDS, IAEA) for overseeing the entire PREPRO project at IAEA, Vienna. This was a truly International team who worked together to produce PREPRO 2015-2.

OWNED, MAINTAINED AND DISTRIBUTED BY
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ORIGINALLY WRITTEN BY
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AUTHORS MESSAGE
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THE REPORT DESCRIBED ABOVE IS THE LATEST PUBLISHED DOCUMENTATION FOR THIS PROGRAM. HOWEVER, THE COMMENTS BELOW SHOULD BE CONSIDERED THE LATEST DOCUMENTATION INCLUDING ALL RECENT IMPROVEMENTS. PLEASE READ ALL OF THESE COMMENTS BEFORE IMPLEMENTATION, PARTICULARLY THE COMMENTS CONCERNING MACHINE DEPENDENT CODING.

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 APPRECIATED 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
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THIS PROGRAM IS DESIGNED TO READ EVALUATED DATA FROM THE ENDF/B FORMAT AND TO PLOT THE DATA. THE USER MAY SELECT CROSS SECTIONS, PARAMETERS (E.G. NU-BAR, MU-BAR, ETC.), ANGULAR DISTRIBUTIONS AND/OR ENERGY DISTRIBUTIONS TO BE PLOTTED.

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

ON WHAT COMPUTERS WILL THE PROGRAM RUN
------------------------------------------
THE PROGRAM HAS BEEN IMPLEMENTED ON A WIDE VARIETY OF COMPUTERS FROM THE ONE EXTREME OF LARGE MAINFRAME CRAY AND IBM COMPUTERS TO THE OTHER EXTREME OF SUN TERMINALS AND IBM PERSONAL COMPUTERS. THE PROGRAM IS DESIGNED TO RUN ON VIRTUALLY ANY COMPUTER. FOR SPECIAL CONSIDERATIONS SEE THE SECTIONS BELOW ON, (1) COMPUTER DEPENDENT CODING (2) PLOTTER/GRAPHICS TERMINAL INTERFACE

2015 PLOTTER DIMENSIONS
==================================================================
PLOTTER DIMENSIONS ARE IN INCHES - NOT CM, MM, OR CUBITS.
THIS IS DONE FOR HISTORICAL REASONS AND HOPEFULLY THIS WILL NOT INCONVENIENCE ANYONE - IN PRACTICE I HAVE USED EXACTLY THE
SAME DIMENSION = X = 0 to 12.5 and Y = 0 to 10 FOR DECADES TO PRODUCE BOTH ON-SCREEN AND HARDCOPY POSTSCRIPT PLOTS.

I STRONGLY SUGGEST THAT YOU NOT CHANGE THESE DIMENSIONS UNLESS YOU MUST = BASED ON THE PLOT SIZE YOU OBTAIN WHEN YOU FIRST RUN THIS CODE.

GRAPHICS INTERFACE

THIS PROGRAM USES A SIMPLE CALCOMP LIKE GRAPHICS INTERFACE WHICH REQUIRES ONLY 3 SUBROUTINES...PLOTS, PLOT AND PEN (DESCRIBED IN DETAIL BELOW). ALL CHARACTERS AND SYMBOLS ARE DRAWN USING TABLES OF PEN STROKES (SUPPLIED WITH THIS PROGRAM). USING THIS METHOD THE PROGRAM SHOULD BE SIMPLE TO INTERFACE TO VIRTUALLY ANY PLOTTER OR GRAPHICS TERMINAL AND THE APPEARANCE AND LAYOUT OF THE PLOTS SHOULD BE INDEPENDENT OF WHICH PLOTTER IS USED.

PROGRAM IDENTIFICATION

AS DISTRIBUTED THE FIRST FRAME OF PLOTTED OUTPUT WILL DOCUMENT THE PROGRAM NAME, VERSION AND INSTALLATION. THIS INFORMATION IS STORED AS DATA IN THE ARRAY VERSES NEAR THE BEGINNING OF SUBROUTINE FRAME0. IF YOU WISH TO CUSTOMIZE THE OUTPUT TO IDENTIFY YOUR INSTALLATION CHANGE THE LAST TWO LINES OF THE ARRAY VERSES.

SIZE OF PLOTS

THE PROGRAM HAS A BUILT-IN DEFAULT SIZE TO MAKE EACH PLOT 13.50 BY 10.24 INCHES. THIS SIZE WAS SELECTED ASSUMING THAT THE RESOLUTION OF THE PLOTTER IS 1024 RASTER POINTS PER INCH. THE USER MAY CHANGE THE SIZE OF THE PLOT BY SPECIFYING ANY REQUIRED SIZE ON THE FIRST INPUT LINE. IN PARTICULAR FOR USE ON ANY PLOTTER THAT USES CENTIMETERS INSTEAD OF INCHES THE USER MAY MERELY SPECIFY THE REQUIRED SIZE OF THE PLOT IN CENTIMETERS (E.G., TO OBTAIN A 13.50 BY 10.24 INCH PLOT, THE USER NEED ONLY SPECIFY 34.3 BY 26 ON THE FIRST INPUT LINE...ASSUMING 2.54 CENTIMETERS PER INCH, OR 343 BY 260 FOR MILLIMETERS..ASSUMING 25.4 MILLIMETERS PER INCH).

CHARACTER SIZE


PLOT PER FRAME

BY INPUT THE USER CAN SPECIFY NOT ONLY THE ACTUAL SIZE OF THE LOCAL PLOTTER, BUT ALSO HOW MANY PLOTS SHOULD APPEAR ON EACH FRAME. THIS IS DONE BY SPECIFYING THE LAYOUT OF A FRAME IN TERMS OF THE NUMBER OF PLOTS IN THE X AND Y DIRECTION. FOR EXAMPLE BY SPECIFYING THAT EACH FRAME BE DIVIDED INTO 3 PLOTS IN THE X DIRECTION AND 2 PLOTS IN THE Y DIRECTION, EACH FRAME WILL CONTAIN UP TO 6 PLOTS (3 X 2). INTERNALLY EACH PLOT WILL BE GENERATED TO STANDARD A4 SIZE, AS DESCRIBED ABOVE, AND THEN ON OUTPUT SCALING TO THE NUMBER OF PLOTS PER FRAME SPECIFIED BY THE USER INPUT.

ENDF/B FORMAT

IT IS ASSUMED THAT THE DATA IS CORRECTLY CODED IN THE ENDF/B 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. FORMAT OF SECTION MT=452,455, 456/ MF=1, AND ALL SECTIONS OF MF=3, 4 AND 5 MUST BE CORRECT. ALL OTHER SECTION OF DATA ARE SKIPPED AND AS SUCH THE OPERATION OF THIS PROGRAM IS INSENSITIVE TO THE CORRECTNESS OR INCORRECTNESS OF ALL OTHER SECTIONS.

INTERPOLATION LAW
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EACH TABLE OF DATA MAY USE EITHER COMPLETELY HISTOGRAM OR COMPLETELY LINEAR INTERPOLATION LAW (THE TWO INTERPOLATION LAWS CANNOT BE MIXED TOGETHER IN ONE TABLE). EITHER OF THESE TWO REPRESENTATIONS WILL BE STORED IN CORE IN LINEARLY INTERPOLABLE FORM. IF THIS PROGRAM FINDS ANY DATA THAT USES ANY OTHER INTERPOLATION LAW IT WILL PRINT AN ERROR MESSAGE AND PLOT THE TABLE AS IF IT WERE LINEARLY INTERPOLABLE. THE ONLY ERROR THAT WILL RESULT IN THE PLOT WILL BE IN THE CURVE FOLLOWED BETWEEN TABULATED POINTS. PROGRAM LINEAR (UCRL-50400, VOL. 17, PART A) MAY BE USED TO CONVERT CROSS SECTIONS TO LINEARLY INTERPOLABLE FORM. PROGRAM LEGEND CAN BE USED FOR ANGULAR DISTRIBUTIONS AND PROGRAM ENERGY CAN BE USED FOR SECONDARY ENERGY DISTRIBUTIONS.

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

PAGE SIZE
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ONLY ONE PAGE OF DATA = 600000 DATA POINTS - IS KEPT IN CORE AT ANY GIVEN TIME. IF THERE IS MORE THAN THIS MANY POINTS THEY WILL BE KEPT ON A SCRATCH FILE AND LOADED INTO CORE AS NEEDED.

TO CHANGE THE PAGE SIZE,

1) CHANGE 600000 TO THE NEW PAGE SIZE
2) CHANGE 1200000 TO TWO TIMES THE NEW PAGE SIZE

SECTION SIZE
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SINCE THIS PROGRAM USES A LOGICAL PAGING SYSTEM THERE IS NO LIMIT TO THE NUMBER OF POINTS IN ANY SECTION, E.G., THE TOTAL CROSS SECTION MAY BE REPRESENTED BY 200,000 DATA POINTS.

THE ONLY EXCEPTION TO THIS RULE IS THAT EACH TABLE OF DATA WHICH USES A HISTOGRAM INTERPOLATION LAW CANNOT EXCEED HALF THE SIZE OF THE IN CORE PAGE (PRESENTLY 600000/2=300000) WHICH IS ADEQUATE FOR ALMOST ALL HISTOGRAM (E.G. MULTIGROUP) REPRESENTATIONS OF A SINGLE TABLE (E.G. REACTION).

WHAT DATA CAN BE PLOTTED
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THIS CODE CAN PLOT VIRTUALLY ANY NEUTRON OR PHOTON CROSS SECTIONS (MF=3 OR 23) AND ANY TABULATED ANGULAR OR ENERGY DISTRIBUTIONS OR LEGENDRE COEFFICIENTS. WHAT IS ACTUALLY PLOTTED DEPENDS ON WHAT DATA IS SELECTED BY THE USER.

SELECTION OF DATA
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DATA TO BE PLOTTED IS SPECIFIED BY INPUTTING UP TO 100 MAT/MF/MT RANGES OR UP TO 100 ZA/MF/MT RANGES. IN ADDITION FOR EACH RANGE THE USER MAY SPECIFY AN X RANGE (USUALLY ENERGY) AND THE TYPE OF DATA TO BE PLOTTED (SEE: THE DESCRIPTION OF TYPES, BELOW).

THE X RANGE FOR MF = 1, 3, 23 AND 27 AND MF = 4 LEGENDRE COEFFICIENTS WILL BE USED AS THE X LIMITS OF THE Plots, E.G., PLOT ENERGY DEPENDENT CROSS SECTIONS BETWEEN 1 AND 20 MEV.

THE X RANGE FOR MF = 4 AND 5 WILL BE USED TO ONLY SELECT ANGULAR
AND ENERGY DISTRIBUTION FOR WHICH THE INCIDENT NEUTRON ENERGY IS IN THE X RANGE. E.G., ONLY PLOT ANGULAR DISTRIBUTIONS WHERE THE INCIDENT NEUTRON ENERGY IS 1 TO 20 MEV.

INTERACTIVE VS. BATCH MODE

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VERSION 92-1 AND LATER VERSIONS OF THIS CODE ONLY USE A BATCH MODE WHERE ALL REQUESTS ARE READ AND PROCESSED. EARLIER VERSIONS OF THIS CODE HAD BOTH AN INTERACTIVE MODE (WHERE REQUESTS WERE READ AND EXECUTED ONE AT A TIME) AND A BATCH MODE. INTERACTIVE MODE HAS BEEN DROPPED AND WILL NOT BE REINTRODUCED UNLESS THE AUTHOR IS INFORMED BY USERS THAT THEY WERE USING THE INTERACTIVE MODE.

PLOT LAYOUT

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VERSION 92-1 AND LATER VERSIONS OF THIS CODE WILL PLOT ALL CURVES ON A SINGLE PLOT. EARLIER VERSIONS OF THIS CODE ALLOWED THE OPTION TO HAVE, MULTIPLE PLOTS - INDIVIDUAL SCALING MULTIPLE PLOTS - COMMON SCALING SINGLE PLOT MULTIPLE PLOTS PER PLOT HAVE BEEN DROPPED AND WILL NOT BE REINTRODUCED UNLESS IT IS DEMONSTRATED TO THE AUTHOR THAT THEY ARE OF PRACTICAL USE IN SOME APPLICATION.

PROCESSING OF DATA

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IN THE CASE OF NEUTRON AND PHOTON CROSS SECTIONS (MF=3 OR 23) AND PARAMETERS (MF=1 OR 27) ALL DATA IN A FILE (MF) IS READ GROUPED TOGETHER BY TYPE (AS EXPLAINED BELOW) AND PLOTTED.

IN THE CASE OF ANGULAR AND ENERGY DISTRIBUTIONS (MF=4 OR 5) ONLY ONE SECTION OF DATA AT A TIME IS READ AND PLOTTED.

TYPES OF DATA (MF=1, 3, 23 AND 27 ONLY)

- These data are divided into up to 20 types and each type of data is grouped together and plotted (if the data is actually present).

- What type of data is actually plotted can be controlled by user input either based on selected MAT/MF/MT or ZA/MF/MT ranges or by explicitly selecting only one type of data is to be plotted (see the description of input below).

SIMPLE REQUESTS

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Generally each MAT/MF/MT or ZA/MF/MT requested is treated separately and the specified data is grouped by type and plotted. For example, the user may specify using one request that all types of data be plotted over the entire energy range and use a second request to specify that one particular type of data be plotted over a specific energy range.

CHAINED REQUESTS

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Requests may also be chained together (see the description of input below), where a number of requests may be used to select data, but only the last request in a chain will cause all selected data to be plotted. A series of requests for data type = -1, except for the last request of the chain, which must specify a type data = 0 (all) or a positive number. Unlike simple requests, where each will produce one or more plots, with chained requests the entire series of chained requests will be treated as a single request and will produce one or more plots.

For example, data type = 1 will normally include,

\[ MT = 1 \text{ - total} \]
\[ = 2 \text{ - elastic} \]
IF YOU WISH TO EXCLUDE TOTAL INELASTIC FROM A PLOT YOU NEED ONLY SPECIFY TWO CHAINED REQUESTS THE FIRST TO SELECT MT = 1 THROUGH 2 (TO INCLUDE TOTAL AND ELASTIC) AND A SECOND TO INCLUDE MT = 18 THROUGH 102. THE FIRST REQUEST SHOULD SPECIFY DATA TYPE = -1 AND THE SECOND MT = 4 THROUGH 102 AND MT = 18 THROUGH 102 ALL APPEAR ON THE SAME PLOT). SINCE MT = 4 (TOTAL INELASTIC) IS NOT REQUESTED IT WILL NOT BE PLOTTED.

DEFINITION OF 20 DATA TYPES

1. Neutrons (MF = 3)
   - Total, Elastic, Capture, Fission, Total Inelastic, Remainder
   - (1) Total, Elastic, Capture, Fission, Total Inelastic, Remainder
   - (2) (N,2N) and (N,3N) and (N,N' Charged Particle)
   - (3) (N,Charged Particle)
   - (4) Particle Production (Proton, Deuteron, etc.) and Damage
   - (5) Total, First, Second, Etc. Chance Fission
   - (6) Total Inelastic, Inelastic Discrete Levels and Continuum
   - (7) (N,P) Total and Levels (Only if Levels are Given)
   - (8) (N,D) Total and Levels (Only if Levels are Given)
   - (9) (N,T) Total and Levels (Only if Levels are Given)
   - (10) (N,He-3) Total and Levels (Only if Levels are Given)
   - (11) (N,Alpha) Total and Levels (Only if Levels are Given)
   - (12) Parameters Nu-Bar, Xi and Gamma
   - (13) Nu-Bar - Total, Prompt and Delayed
   - (19) Energy Release Parameters, MF=3, MT=301-450

2. Activation (MF=10)
   - All mt=1 to 999.

3. Photons (MF=23 and 27)
   - Total, Coherent, Incoherent, Total Photoelectric, Total Pair Production
   - Total and Subshell Photoelectric
   - Total Nuclear and Electron Pair Production
   - Coherent Form Factor and Incoherent Scattering Function
   - Real and Imaginary Scattering Factors

IDENTIFICATION OF DATA

All plots identify the target, e.g., U-238 and units of the x and y axis, e.g., x = Energy (MeV) or Cosine (lab), etc., y = Cross Section (Barns) or Probability/Cosine, etc.

For types of data (MF=1, 3, 23 and 27) different reactions (MT) are grouped together to appear on the same plot. The title at the top of the plot will identify the type of data being plotted and the legend box within the plot will identify each reaction.

For angular and energy distributions (MF=4 or 5) each plot will contain data for a single reaction (MT) and different incident neutron energies. The title at the top of the plot will identify the reaction and the legend box within the plot will identify the incident energy.

For Legendre coefficient the data in ENDF/B format will be inverted in order to present each Legendre coefficient versus incident energy. The title at the top of the plot will identify the reaction and the legend box within the plot will identify the Legendre order.

INPUT FILES
<table>
<thead>
<tr>
<th>UNIT DESCRIPTION</th>
<th>EVALPLOT</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 INPUT LINES (BCD - 80 CHARACTERS/RECORD)</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>9 MT DEFINITIONS (BCD - 80 CHARACTERS/RECORD)</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>10 ENDF/B DATA (BCD - 80 CHARACTERS/RECORD)</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>12 SOFTWARE CHARACTERS (BCD - 80 CHARACTERS/RECORD)</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>OUTPUT FILES</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>------------------</td>
<td>---------</td>
</tr>
<tr>
<td>3 OUTPUT REPORT (BCD - 120 CHARACTERS/RECORD)</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>16 PLOTTING UNIT</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>SCRATCH FILES</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>------------------</td>
<td>---------</td>
</tr>
<tr>
<td>11 SCRATCH FILE (BINARY - 960000 WORDS/RECORD = 2*PAGE SIZE)</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>OPTIONAL STANDARD FILE NAMES (SEE SUBROUTINE FILIO1 AND FILIO2)</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>UNIT FILE NAME</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>------------------</td>
<td>---------</td>
</tr>
<tr>
<td>2 EVALPLOT.INP</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>3 EVALPLOT.LST</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>9 MT.DAT</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>10 ENDFVB.IN (OR AS INPUT PARAMETER)</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>11 (SCRATCH)</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>12 PLOT.CHR</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>16 (PLOTTING UNIT...USUALLY A DUMMY)</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>INPUT PARAMETERS</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>------------------</td>
<td>---------</td>
</tr>
<tr>
<td>LINE COLUMNS FORMAT</td>
<td>DESCRIPTION</td>
</tr>
<tr>
<td>------------------</td>
<td>---------</td>
</tr>
<tr>
<td>1 1-11 E11.4 LOWER X LIMIT OF PLOTTER</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>12-22 E11.4 UPPER X LIMIT OF PLOTTER</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>23-33 E11.4 LOWER Y LIMIT OF PLOTTER</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>34-44 E11.4 UPPER Y LIMIT OF PLOTTER</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>45-55 I11 NUMBER OF PlOTS PER FRAME IN X DIRECTION</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>56-66 I11 NUMBER OF PlOTS PER FRAME IN Y DIRECTION</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>67-70 F4.1 CHARACTER SIZE MULTIPLIER</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>= 0 OR 1 - NORMAL CHARACTER SIZE</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>= OTHERWISE - CHARACTERS SCALED BY THIS FACTOR.</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>2 1-72 A72 ENDF/B DATA FILENAME</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>(LEAVE BLANK FOR STANDARD = ENDFB.IN)</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>3 1-11 I11 RETRIEVAL CRITERIA</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>= 0 - MAT</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>= 1 - ZA</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>12-22 I11 TYPE OF GRID</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>= 0 - TICK MARKS ON BORDER</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>= 1 - SOLID AT COARSE INTERVALS</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>= 2 - DASHED AT COARSE INTERVALS</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>= 3 - SOLID AT FINE INTERVALS</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>= 4 - DASHED AT FINE INTERVALS</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>= 5 - SOLID COARSE/DASHED FINE GRID</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>23-33 I11 SHOULD BORDER BE PLOTTED ON EACH PLOT</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>= 0 - NO</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>= 1 - YES</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>34-44 I11 LINE THICKNESS</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>= 0 - 5 = BORDER/CURVES/CHARACTERS</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>=-1 - -5 = BORDER/CURVES (NOT CHARACTERS)</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>NOTE, THE GRID IS NEVER THICK.</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>45-55 I11 SHOULD TEMPERATURE BE PLOTTED.</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>= 0 - YES</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>= 1 - NO</td>
<td>EVALPLOT</td>
</tr>
<tr>
<td>56-66 E11.4 ALLOWABLE RATIO OF PLOT Y RANGE MAXIMUM TO MINIMUM - IF THIS RATIO IS EXCEEDED THE Y RANGE MINIMUM WILL BE CHANGED TO THE Y RANGE</td>
<td>EVALPLOT</td>
</tr>
</tbody>
</table>
MAXIMUM TIMES THIS RATIO. IF THIS RATIO IS NOT POSITIVE, IT IS INTERPRETED TO MEAN NO LIMIT ON Y RANGE.

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>67-70 I4</td>
<td>BACKGROUND COLOR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>= 0</td>
<td>BLACK</td>
<td></td>
<td></td>
</tr>
<tr>
<td>= OTHERWISE</td>
<td>WHITE</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4-N 1- 6 I6 LOWER MAT OR ZA LIMIT
7- 8 I2 LOWER MF LIMIT
9-11 I3 LOWER MT LIMIT
11-22 E11.4 LOWER X LIMIT (USUALLY ENERGY) - EV
23-28 I6 UPPER MAT OR ZA LIMIT
29-30 I2 UPPER MF LIMIT
31-33 I3 UPPER MT LIMIT
34-44 E11.4 UPPER X LIMIT (USUALLY ENERGY) - EV
45-55 I11 TYPE OF DATA TO RETRIEVE AND PLOT
= -1 - CHAIN THIS REQUEST TO THE NEXT ONE
= 0 - ALL
= 1-21 - TYPE AS SPECIFIED ABOVE

2020/1/9 - Changed 20 to 21

THERE MAY BE UP 100 MAT/MF/MT OR ZA/MF/MT REQUEST RANGES. INPUT MUST BE TERMINATED BY A BLANK LINE.

IF X LIMITS ARE NOT SPECIFIED (I.E., LOWER AND UPPER X LIMIT = 0) THIS WILL BE INTERPRETED TO MEAN NO LIMIT AND ALL DATA WILL BE PLOTTED OVER THEIR ENTIRE ENERGY RANGE, I.E., YOU NEED NOT KNOW AND SPECIFY THE ACTUAL ENERGY LIMITS OF THE DATA.

EXAMPLE DEFINITION OF PLOTTER

-----------------------------

2015 - WARNING - THE FOLLOWING DESCRIPTION IS OUT-OF-DATE.

TODAY THE DIMENSIONS OF THE PLOTTER ARE IN INCHES.


IF THE LOCAL PLOTTER USES DIMENSIONS OF INCHES IN ORDER TO OBTAIN 10 X 10 INCH FRAMES WITH 3 X 2 PLOTS PER FRAME THE FIRST INPUT LINE SHOULD BE,

0.0 10.0 0.0 10.0 3 2

IF THE LOCAL PLOTTER USES DIMENSION OF MILLIMETERS THE SAME PHYSICAL SIZE PLOT MAY BE OBTAINED IF THE FIRST INPUT LINE IS,

0.0 254.0 0.0 254.0 3 2

FOR SIMPLICITY THE FOLLOWING EXAMPLE INPUTS WILL NOT DISCUSS THE PHYSICAL DIMENSIONS OF THE PLOTTER AND THE FIRST INPUT LINE WILL IN ALL CASES INDICATE 10 X 10 INCH PLOTS WITH ONLY 1 PLOT PER FRAME.

ALL OF THE FOLLOWING EXAMPLE WILL USE,

1) A DASHED GRID (SECOND LINE, COLS. 12-22 = 2)
2) NO BORDER (SECOND LINE, COLS. 23-33 = 0)
3) LINE THICKNESS -2 (SECOND LINE, COLS. 34-44 =-2)
4) TEMPERATURE ON PLOTS (SECOND LINE, COLS. 45-55 = 0)
5) NO Y RANGE LIMIT (SECOND LINE, COLS. 56-66 = 0.0)

EXAMPLE INPUT NO. 1

FOR ALL THORIUM AND URANIUM ISOTOPES PLOT NEUTRON CROSS SECTIONS ENTIRE ENERGY RANGE. IN ADDITION PLOT TYPE 1 DATA, MAJOR NEUTRON CROSS SECTIONS OVER THE ENERGY RANGE 1 EV TO 1 KEV. USE THE

EVALPLOT
STANDARD FILENAME (ENDFB.IN) FOR THE ENDF/B DATA. THE FOLLOWING 6 INPUT LINES ARE REQUIRED:

```
0.0       10.0       0.0       10.0               3          2
ENDFB.IN
1          2         0 0.0            EVALPLOT
26056 4  2 1.00000+0 626056 4  2 2.00000+7 0
```

EXAMPLE INPUT NO. 2
-------------------
```
PLOT FE-56 ELASTIC AND INELASTIC ANGULAR DISTRIBUTIONS BETWEEN 1 AND 20 MEV. THE FOLLOWING 6 INPUT LINES ARE REQUIRED:
```

```
0.0       10.0       0.0       10.0               3          2
ENDFB.IN
1          2         0 0.0            EVALPLOT
26056 4  2 1.00000+0 626056 4  2 2.00000+7 0
```

EXAMPLE INPUT NO. 3 (CHAINED INPUT)
-----------------------------------
```
FOR ALL THORIUM AND URANIUM ISOTOPES PLOT TOTAL, ELASTIC, CAPTURE AND FISSION, BUT NOT INELASTIC CROSS SECTIONS OVER THERE ENTIRE ENERGY RANGE AND FROM 1 KEV TO 1 MEV. THE FOLLOWING 8 INPUT LINES ARE REQUIRED:
```

```
0.0       10.0       0.0       10.0               3          2
ENDFB.IN
1          2         0 0.0            EVALPLOT
90000 3 0 90999 3999 0
90000 3 0 1.00000+0 90999 3999 1.00000+3 1
```

EXAMPLE INPUT NO. 4
-------------------
```
FOR THE SAME EXAMPLE AS ABOVE, EXCEPT USE A DIFFERENT FILENAME FOR THE ENDF/B DATA TO READ FROM A FILE TREE STRUCTURE. THE FOLLOWING 8 INPUT LINES ARE REQUIRED:
```

```
0.0       10.0       0.0       10.0               3          2
ENDFB.IN
1          2         0 0.0            EVALPLOT
90000 3 1 90999 3 2 -1
90000 3 18 90999 3102 1
90000 3 18 1.00000+0 390999 3 2 1.00000+6 -1
90000 3 18 1.00000+0 390999 3102 1.00000+6 1
```

NOTE, THIS EXAMPLE INCLUDES 2 CHAINED REQUESTED - INPUT LINES 3 AND 4 SELECTING DATA AND PRODUCING A PLOT OVER THE ENTIRE ENERGY RANGE AND INPUT LINES 5 AND 6 SELECTING THE SAME DATA AND PRODUCING A PLOT FROM 1 KEV TO 1 MEV.

ANY NUMBER OF REQUEST LINES MAY TO CHAINED TOGETHER TO SELECT DATA. THE CHAIN ENDS WHERE THE TYPE OF DATA (COLS. 45-55) IS NOT NEGATIVE AND THEN THE SELECTED DATA WILL BE PLOTTED.

EXAMPLE INPUT NO. 4
-------------------
```
FOR THE SAME EXAMPLE AS ABOVE, EXCEPT USE A DIFFERENT FILENAME FOR THE ENDF/B DATA TO READ FROM A FILE TREE STRUCTURE. THE FOLLOWING 8 INPUT LINES ARE REQUIRED:
```

```
0.0       10.0       0.0       10.0               3          2
ENDFB.IN
1          2         0 0.0            EVALPLOT
90000 3 1 90999 3 2 -1
90000 3 18 90999 3102 1
90000 3 18 1.00000+0 390999 3 2 1.00000+6 -1
90000 3 18 1.00000+0 390999 3102 1.00000+6 1
```

ENDPLOTS - TERMINATE PLOTTING

===== PLOTTER/GRAFICS TERMINAL INTERFACE ==============================
PLOT(X,Y,IPEN) - DRAW OR MOVE FROM LAST LOCATION TO (X,Y), END OF CURRENT PLOT OR END OF PLOTTING.

IPEN = 2 - DRAW
     = 3 - MOVE

PEN(IPEN) - SELECT COLOR.
IPEN - COLOR = 1 TO N (N = ANY POSITIVE INTEGER)

BOXCOLOR(X,Y,IFILL,IBORDER) - FILL A RECTANGULAR BOX DEFINED BY THE X AND Y CORNERS X(1), X(2), Y(1), Y(2)
IFILL - COLOR TO FILL BOX WITH
IBORDER - COLOR OF BOX BORDER

IN ORDER TO INTERFACE THIS PROGRAM FOR USE ON ANY PLOTTER WHICH DOES NOT USE THE ABOVE CONVENTIONS IT IS MERELY NECESSARY FOR THE USER TO WRITE 6 SUBROUTINES WITH THE NAMES PLOTS, PLOT AND PEN, WITH THE SUBROUTINE ARGUMENTS DESCRIBED ABOVE AND TO THEN CALL THE LOCAL EQUIVALENT ROUTINES.

COLOR PLOTS
-------------------------------
TO SELECT PLOTTING COLORS SUBROUTINE PEN (DESCRIBED ABOVE) IS USED TO SELECT ONE OF THE AVAILABLE COLORS. IF YOU HAVE COLOR ON YOUR PLOTTER YOU SHOULD PROVIDE A SUBROUTINE PEN TO SELECT COLORS.

BLACK AND WHITE PLOTS
----------------------
WHEN PRODUCING BLACK AND WHITE PLOTS SUBROUTINE PEN NEED MERELY BE A DUMMY SUBROUTINE TO IGNORE ANY ATTEMPT TO CHANGE COLORS, SUBROUTINE PEN(IPEN) RETURN END

SIMILAR BOXCOLOR CAN BE A DUMMY
SUBROUTINE BOXCOLOR(X,Y,IFILL,IBORDER) RETURN END

CHARACTER SET
-----------------
THIS PROGRAM USES COMPUTER AND PLOTTER DEVICE INDEPENDENT SOFTWARE CHARACTERS. THIS PROGRAM COMES WITH A FILE THAT DEFINES THE PEN STROKES REQUIRED TO DRAW ALL CHARACTERS ON AN IBM KEYBOARD (UPPER AND LOWER CASE CHARACTERS, NUMBERS, ETC.) PLUS AN ALTERNATE SET OF ALL UPPER AND LOWER CASE GREEK CHARACTERS AND ADDITIONAL SPECIAL SYMBOLS.

THE SOFTWARE CHARACTER TABLE CONTAINS X AND Y AND PEN POSITIONS TO DRAW EACH CHARACTER. IF YOU WISH TO DRAW ANY ADDITIONAL CHARACTERS OR TO MODIFY THE FONT OF THE EXISTING CHARACTERS YOU NEED ONLY MODIFY THIS TABLE.

ADDITIONAL FONTS
-----------------
THIS PROGRAM COMES WITH 3 COMPLETE SETS OF THE SAME CHARACTERS USING DIFFERENT FONTS. FOR SPEED IN PLOTTING IT IS RECOMMENDED THAT YOU USE THE SIMPLEX FONT. FOR FINISHED PLOTS SUITABLE FOR PUBLICATION, BUT REQUIRING MORE TIME TO GENERATE A PLOT, IT IS RECOMMENDED THAT YOU USE THE DUPLEX OR COMPLEX FONT - YOU CAN EXPERIMENT WITH ANY OF THE 3 FONTS TO DETERMINE WHICH BEST MEETS YOUR NEEDS.

TO USE ANY ONE OF THE FONTS MERELY BY SURE THAT IT IS DEFINED AS UNIT 12 FOR INPUT (IF USING STANDARD FILENAMES IT SHOULD BE NAMED PLOT.CHR). SO THAT SWITCHING FONTS CAN BE SIMPLY DONE MERELY BY COPYING THE FONT THAT YOU WANT TO THE UNIT 12 THAT YOU ARE USING FOR INPUT.
CONTROL CHARACTERS
-----------------------------------------------

IN THE SOFTWARE CHARACTER TABLE ALL CHARACTERS TO BE PLOTTED WILL HAVE PEN POSITION = 2 (DRAW) OR = 3 (MOVE). IN ADDITION THE TABLE CURRENTLY CONTAINS 4 CONTROL CHARACTERS,

PEN POSITION = 0
-----------------
SHIFT THE NEXT PRINTED CHARACTER BY X AND Y. 3 CONTROL CHARACTERS ARE PRESENTLY INCLUDED IN THE SOFTWARE CHARACTER TABLE TO ALLOW SHIFTING.

{   = SHIFT UP (FOR SUPERSCRIPTS..............X= 0.0, Y= 0.5)
}   = SHIFT DOWN (FOR SUBSCRIPTS..............X= 0.0, Y= -0.5)
\  = SHIFT LEFT 1 CHARACTER (FOR BACKSPACE...X=-1.0, Y= 0.0)

PEN POSITION =-1
---------------
SELECT THE NEXT PRINTED CHARACTER FROM THE ALTERNATE CHARACTER SET. AT PRESENT THIS CONTROL CHARACTER IS,

|   = SWITCH TO ALTERNATE CHARACTER SET

THESE 4 CONTROL CHARACTERS ARE ONLY DEFINED BY THE VALUE OF THE PEN POSITION IN THE SOFTWARE CHARACTER TABLE (I.E., THEY ARE NOT HARD WIRED INTO THIS PROGRAM). AS SUCH BY MODIFYING THE SOFTWARE CHARACTER TABLE THE USER HAS THE OPTION OF DEFINING ANY CONTROL CHARACTERS TO MEET SPECIFIC NEEDS.

THESE CHARACTERS MAY BE USED IN CHARACTER STRINGS TO PRODUCE SPECIAL EFFECTS. FOR EXAMPLE, TO PLOT SUBSCRIPT 5, B, SUPERSCRIPT 10 USE THE STRING,

}\5B{1{0

TO PLOT B, SUBSCRIPT 5 AND SUPERSCRIPT 10 WITH THE 5 DIRECTLY BELOW THE 1 OF THE 10 WE CAN USE THE BACKSPACE CHARACTER TO POSITION THE 1 DIRECTLY ABOVE THE 5 USING THE STRING,

B}5\{1{0

TO PLOT UPPER CASE GREEK GAMMA FOLLOWED BY THE WORD TOTAL (I.E., RESONANCE TOTAL WIDTH) USE THE STRING.

|G TOTAL

NOTE, WHEN THESE CONTROL CHARACTERS ARE USED THEY ONLY EFFECT THE NEXT 1 PRINTED CHARACTER (SEE, ABOVE EXAMPLE OF PLOTTING SUPER-SCRIPT 10 WHERE THE SHIFT UP CONTROL CHARACTER WAS USED BEFORE THE 10 AND THEN AGAIN BEFORE THE 0 AND THE BACKSPACE AND SHIFT UP CONTROL CHARACTERS WERE USED IN COMBINATION).

IF THESE 4 CONTROL CHARACTERS ARE NOT AVAILABLE ON YOUR COMPUTER YOU CAN MODIFY THE SOFTWARE CHARACTER TABLE TO USE ANY OTHER 4 CHARACTERS THAT YOU DO NOT NORMALLY USE IN CHARACTER STRINGS (FOR DETAILS SEE THE SOFTWARE CHARACTER TABLE).

STANDARD/ALTERNATE CHARACTER SETS
-------------------------------------

THE SOFTWARE CHARACTER TABLE CONTAINS 2 SETS OF CHARACTERS WHICH ARE A STANDARD SET (ALL CHARACTERS ON AN IBM KEYBOARD) AND AN ALTERNATE SET (UPPER AND LOWER CASE GREEK CHARACTERS AND SPECIAL CHARACTERS). TO DRAW A CHARACTER FROM THE ALTERNATE CHARACTER SET PUT A RIGHT BRACKET CHARACTER (|) BEFORE A CHARACTER (SEE THE ABOVE EXAMPLE AND THE SOFTWARE CHARACTER TABLE FOR DETAILS). THIS CONTROL CHARACTER WILL ONLY EFFECT THE NEXT 1 PRINTED CHARACTER.

SUB AND SUPER SCRIPTS
-----------------------

TO DRAW SUBSCRIPT PRECEED A CHARACTER BY ). TO DRAW SUPERSCRIPT PRECEED A CHARACTER BY { (SEE THE ABOVE EXAMPLE AND THE SOFTWARE
CHARACTER TABLE FOR DETAILS). THESE CONTROL CHARACTER WILL ONLY EFFECT THE NEXT 1 PLOTTED CHARACTER.

BACKSPACING

TO BACKSPACE ONE CHARACTER PRECEED A CHARACTER BY \ (SEE, THE ABOVE EXAMPLE AND THE SOFTWARE CHARACTER TABLE FOR DETAILS). THIS CONTROL CHARACTER WILL PERFORM A TRUE BACKSPACE AND WILL EFFECT ALL FOLLOWING CHARACTERS IN THE SAME CHARACTER STRING.

PLOT DIMENSIONS

ARE DEFINED BY USER INPUT. INTERNALLY THE PROGRAM WILL CREATE A PLOT IN APPROXIMATELY A4 OR 8-1/2 BY 11 INCH FORMAT. DURING OUTPUT THE PLOT IS TRANSFORMED TO THE UNITS (INCHES, CENTIMETERS, MILLIMETERS, WHATEVER) OF THE PLOTTER BEING USED AND OUTPUT.