PROGRAM PL3800 FOR PLOTTING RATES OR FLUXES VERSUS TIME

August 5 1988

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Program Name: PL3800

Function: Program PL3800 plots Rates or Fluxes versus time on a laser printer PR3800.

Introduction

This manual is provided to serve as a guide for the user to execute program "PL3800" for plotting Rates or Fluxes versus time. It also can be used by the programmer who intends to make software modifications to the program. The program is written in FORTRAN-77 and it resides in the IBM 3081 computer with MVS/TSO system.

Program Execution

The program "PL3800" is a batch program. It is executed via the file called PL3800.CNTL(RUN) under ID XRAJL. The input data parameters determining plot are given in the input data file PL3800.IN(member) assigned to logical unit number LUN=5. The values of the quantity to be plotted (Flux or Rates) are given in the input data files with assigned logical numbers which start with LUN = 20.

The user needs to modify the input data file PL3800.IN(member) or create a new input data file.

It is assumed that the user has prepared the input data file PL3800.IN(member) as described in Sect. 2.1 and that the output plot is to be produced on a PR3800 laser printer.

The sequence of steps leading to program execution is

a) copy XRAJL.PL3800.CNTL(RUN) into the user's file e.g.

COPY 'XRAJL.PL3800.CNTL(RUN)' PL3800.CNTL(RUN) UNIT(DISK)
In the next step edit the file replacing YOUR_ID, YOUR_ACCOUNT_NUMBER
and YOUR_BOX_NUMBER by the user's ID, account number and box number.

b) type command

SUBMIT PL3800.CNTL(RUN)

List of the PL3800.CNTL(RUN) file is shown below

```
//YOUR_ID JOB (YOUR_ACCOUNT_NO,YOUR_BOX_NUMBER,09),'GRAPHICS ON 3800'
//       TIME=(0,30),CLASS=O,MSGCLASS=X,NOTIFY=YOUR_ID
// EXEC PGM=PL38,REGION=6120K
//STEPLIB  DD DSN=XRAJL.PLOT.LOAD,DISP=SHR
//FT05F001 DD DSN=XRAJL.PL3800.IN(EXAMPLE4),DISP=SHR
//FT20F001 DD DSN=SB#IC.MCDGCR01.DATA(AIP450AL),DISP=SHR
```

```
//FT21F001 DD DSN=SB#IM.MCDGCR01.DATA(AL68381A),DISP=SHR
//SYSPRINT DD SYSOUT=*
//FT06F001 DD SYSOUT=*
//FT07F001 DD DUMMY
//FT08F001 DD SYSOUT=*
//FT09F001 DD DSN=&&LIBRARY,DISP=(,,DELETE),UNIT=SYSDA,
//   DCB=(RECFM=F,BLKSIZE=1280,DSORG=DA),SPACE=(1280,500)
//FT11F001 DD DSN=SYS2.TEMPLAT5.FONT,DISP=SHR,LABEL=(,,,IN)
//FT15F001 DD DSN=SYS2.CONFIG5.CNTL(G38),DISP=SHR,LABEL=(,,,IN)
//FT19F001 DD DSN=SYS2.WRLDATA1,DISP=SHR,LABEL=(,,,IN)
//ADMIMAGE DD SYSOUT=A,DCB=(BLKSIZE=19069,LRECL=137,RECFM=VBM)
//ADMSYMBL DD DSN=SYS1.GDDMSYM,DISP=SHR,LABEL=(,,,IN)
//ENDPDB    EXEC NOTIFYTS
```

Input and Output Data

The program "PL3800" reads in the input data parameters from the data set PL3800.IN(member) using the logical unit number LUN=5 and the values of the quantity to be plotted from the data files assigned to LUN=20, 21, ...The main output from the program is a plot on a laser printer PR3800.

Input Description

The input data file PL3800.IN(member) consists of several records. The numbers and text have to be given in an unformatted way. The numbers have to be separated with blanks and character strings have to be proceeded by a symbol ' and appended with two character string $' (see several input data examples given below).

Every record starts with a short text, which can be helpful when creating a new or modifying the old input data file. This string of characters is read by program on a dummy variable and does not affect execution. The information text, if needed, can be modified by the user.

First Record

The first record in the input data has values for three parameters INFORM, AUTOSC and SUPRES.

INFORM - a character string with short information about (CHARACTER) other parameters in this record.

AUTOSC - this parameter is a logical variable introduced (LOGICAL) to let the program to calculate minimum and maximum values on a vertical axis. For the false value of AUTOSC (value F) program uses minimum (YMIN) and maximum (YMAX) values given by a user.

SUPRES - is a logical variable used to make optional printing (LOGICAL) of a warning message on a plot. The warning can be printed if data values of a plotted quantity exceede a given range. For the true value of SUPRES parameter (value T in the first record) the warning message is not printed.

Second Record

The second record in the input data parameter file has two parameters, INFORM and NSAT. The parameter NSAT is an integer number which determines number of data files with values of the quantity

to be plotted. The assigned logical unit numbers of these data files start with LUN = 20. We used the name NSAT for this parameter because very often different data sets correspond to different satellites.

INFORM - a character string with short information about
(CHARACTER) other parameters in this record.

NSAT - is a number of data sets (data files) with values of
(INTEGER) the quantity to be plotted. Program is able to handle of up to 10 different data sets. Maximum of up to 10 curves can be plotted.

3 to (NSAT + 2) Records

The next NSAT records have the same structure. Every record has four values. The second parameter is a sequential number ISEQ of a data set and is used to select the data set. The other two parameters in the record are for the same data set. The third and the four values correspond to two array elements, SYM(ISEQ) and CONNEC(ISEQ) , where ISEQ (ISEQ=1,..., NSAT) is a sequential number of data sets. The third number in this record, SYM(ISEQ), can be any integer number selected from a set (0, 1, ..., 9). All these numbers correspond to different plotting symbols. Symbols and corresponding numbers are given in Table 1. The symbols can be connected or disconnected and this option is selected with the fourth value, CONNEC(ISEQ), which can be a logical value T or F.

INFORM - a character string with short information about
(CHARACTER) other parameters in this record.

ISEQ - sequential number selecting a data set with values to
(INTEGER) be plotted. We prescribe ISEQ = 1 to a data set with assigned logical unit number LUN = 20, ISEQ = 2 to LUN = 21, and so on. In the example of the PL3800.CNTL(RUN) given above we use data sets SB#IC.MCDGCR01.DATA(AIP450AL) and SB#IM.MCDGCR01.DATA(AL68381A) with assigned logical unit numbers, LUN = 20 and LUN = 21 (see lines in CNTL file with FT20F001 and FT21F001), respectively.

SYM - an array with symbols to mark values from different
(INTEGER) data sets. Every data set has one symbol. The number of different data symbols is 10. The numbers and the corresponding symbols are given in Table 1.

CONNEC - an array with logical values. It is used to select an
(LOGICAL) option with connected or disconnected points for plotting input data.

(NSAT + 3) Record

The next record (NSAT + 3) in the input data has values for five parameters INFORM, XMIN, XMAX, YMIN0, and YMAX0.

INFORM - a character string with short information about
(CHARACTER) other parameters in this record.

XMIN - minimum value on a horizontal axis. Data points with

(REAL) values smaller than XMIN are not plotted.

XMAX - maximum value on a horizontal axis. Data points with
(REAL) values larger than XMAX are not plotted.

YMIN0 - minimum value on a vertical axis. Data points with
(REAL) values smaller than YMIN0 are not plotted.
When AUTOSC is selected as true (value T) then
any real number can be given for YMIN0.

YMAX0 - maximum value on a vertical axis. Data points with
(REAL) values larger than YMAX0 are not plotted.
When AUTOSC is selected as true (value T) then
any real number can be given for YMAX0.

(NSAT + 4) Record

The record (NSAT + 4) in the input data has values for five parameters INFORM, YLOG, LTIME, RAT, AVG

INFORM - a character string with short information about
(CHARACTER) other parameters in this record.

YLOG - logical variable used to select logarithmic or linear
(LOGICAL) scale on a vertical axis. We use true (value T) to select
logarithmic scale and false (value F) to select linear
scale.

LTIME - logical variable to select time history plot in years
(LOGICAL) or in days. We use true (value T) to select time history
plot in years and false (value F) to select time
history plot in days.

RAT - logical variable to select flux or rates.
(LOGICAL) We use value true (value T) to select rates and false
(value F) to select flux. If false value for RAT is
selected then data values are multiplied by the
constant factor 1.0E+04.

AVG - the number of days during which data statistics is
(REAL) colected. If the time history plot is in days and the
time interval is in hours, then hours have to be
converted to day units.

(NSAT + 5) Record

The next record (NSAT + 5) in the input data has values for three parameters INFORM, SYMSIZ, and NLINES

INFORM - a character string with short information about
(CHARACTER) other parameters in this record.

SYMSIZ - size of a symbol, value of 1.0 corresponds to 1 mm symbol.
(REAL) The same size of the symbol is used for all data sets.

NLINES - number of text lines in a label box. The maximum number
(INTEGER) of lines can not exceede 10 lines. The minimum number

of lines has to be equal to the number of data sets. The number of lines in the label box can be larger than the number of data sets and additional lines can be used for extra information.

(NSAT + 6) Record

The record (NSAT + 6) in the input data contains two strings of characters INFORM and LABX

INFORM (CHARACTER) - a character string with short information about other parameters in this record.

LABX (CHARACTER) - description of a horizontal axis. Up to 30 characters can be used to describe meaning of the horizontal axis.

(NSAT + 7) Record

The record (NSAT + 7) in the input data contains two strings of characters INFORM and LABY

INFORM (CHARACTER) - a character string with short information about other parameters in this record.

LABY (CHARACTER) - description of a vertical axis. Up to 30 characters can be used to describe meaning of the vertical axis.

(NSAT + 7 + 1) to (NSAT + 7 + NLINES) Records

The next NLINES records ((NSAT+7+1) ... (NSAT+7+NLINES)) have the same structure, two character strings, INFORM and LAB, in every record.

INFORM (CHARACTER) - a character string with short information about other parameters in this record.

LAB1, LAB2, ..., LAB10 (CHARACTER) - text in sequential lines in a label box. The largest number of characters can not exceede 30 characters in any line. The first few lines, additionally to text contain selected symbols for all used data sets. In the first line, the symbol for the first data set (LUN=20) is plotted and the corresponding text in this line should refer to this data set. In the second line the symbol corresponding to the data file with LUN=21 is plotted, and so on. If the number of lines in the label box exceeds the number of data sets then the rest of the lines (NLINES-NSAT) are without symbols and can be used for extra text.

(NSAT + NLINES + 8) Record

The next record (NSAT+NLINES+8) in the input data has two string of characters, INFORM and SIZE. The parameter SIZE selects long or or short size of a plot. For a long size, the plot is longer in horizontal direction than in the vertical direction. For a short size, the plot is longer in vertical than in the horizontal direction.

INFORM - a character string with short information about other
(CHARACTER) parameters in this record.

SIZE - To select one of two options one has to type in 'LONG$'
(CHARACTER) or 'SHORT$' character string with appended special
character symbols ' and $.

(NSAT + NLINES + 9) Record

The last record (NSAT + NLINES+9) in the input data has two strings of characters, INFORM and LOCATE. The parameter LOCATE determines position of a label box with description text.

INFORM - a character string with short information about
(CHARACTER) other parameters in this record.

LOCATE - There are two options, top and bottom, which locate label
(CHARACTER) box within axis frame. To locate label box in the upper
part of the axis-frame, type in 'TOP$', to locate
in lower part of the axis-frame, type in 'BOTTOM$'.

Examples of Input data

In this section we present four examples of input data parameter sets. In all examples we use the same two data sets with values of Flux quantity. The names of both data sets are SB#IC.MCDGCR01.DATA(AIP450AL) and SB#IM.MCDGCR01.DATA(AL68381A). The plots corresponding to the presented here input data examples are shown in Figs. 2, 3, 4, and 5. All records in input data start with character string which carries short information about input parameters in the record. The character string is used by program as dummy string of characters, however, it can be helpful for a user who writes input data values.

Example 1

```
'AUTOSC , SUPRESS $'                    F    T
'NSAT     $'                              2
'ISEQ     SYMBOL   CONNEC $'              1    1     F
'ISEQ     SYMBOL   CONNEC $'              2    2     F
'XMIN     XMAX     YMIN   YMAX $'       78.  85.   .01   1.
'YLOG     LTIME    RAT    AVG  $'       T    T     F    26.
'SYMSIZE  NLINES   $'                  1.0   2
'LABX-descr. of x-axis $'              'YEARS$'
'LABY-descr. of y-axis $'              'HELIUM/ M2-S-SR-MEV$'
'LABEL 1-line $'                       'ISEE 180-450 MEV ALPHA/IP$'
'LABEL 2-line $'                       'IMP  168-381 MEV ALPHA$'
'LONG or SHORT $'                      'LONG $'
'POS. of label box, TOP or BOTTOM $'   'TOP $'
```

Example 2

```
'AUTOSC , SUPRESS $'                F    T
'NSAT     $'                        2
```

```
'ISEQ      SYMBOL   CONNEC  $'          1     1      T
'ISEQ      SYMBOL   CONNEC  $'          2     2      F
'XMIN      XMAX     YMIN    YMAX  $'    78.   85.    .01    1.
'YLOG      LTIME    RAT     AVG   $'    T     T      F      26.
'SYMSIZE   NLINES   $'               1.0    2
'LABX-descr. of x-axis $'            'YEARS$'
'LABY-descr. of y-axis $'            'HELIUM/ M2-S-SR-MEV$'
'LABEL-1 line $'                     'ISEE 180-450 MEV ALPHA/IP$'
'LABEL-2 line $'                     'IMP  168-381 MEV ALPHA$'
'LONG OR SHORT $'                        'LONG $'
'POS. OF LABEL BOX, TOP OR BOTTOM $'  'TOP $'
```

Example 3

```
'AUTOSC ,  SUPRESS  $'                F      T
'NSAT      $'                         2
'ISEQ      SYMBOL   CONNEC  $'          1     1      F
'ISEQ      SYMBOL   CONNEC  $'          2     2      F
'XMIN      XMAX     YMIN    YMAX  $'    78.   85.    .01    1.
'YLOG      LTIME    RAT     AVG   $'    T     T      F      26.
'SYMSIZE   NLINES   $'               1.0    2
'LABX-descr. of x-axis $'            'YEARS$'
'LABY-descr. of y-axis $'            'HELIUM/ M2-S-SR-MEV$'
'LABEL-1 line $'                     'ISEE 180-450 MEV ALPHA/IP$'
'LABEL-2 line $'                     'IMP  168-381 MEV ALPHA$'
'LONG OR SHORT $'                        'SHORT $'
'POS. OF LABEL BOX, TOP OR BOTTOM $'  'TOP $'
```

Example 4

```
'AUTOSC ,  SUPRESS  $'                F      T
'NSAT      $'                         2
'ISEQ      SYMBOL   CONNEC  $'          1     1      F
'ISEQ      SYMBOL   CONNEC  $'          2     2      F
'XMIN      XMAX     YMIN    YMAX  $'    78.   85.    .01    1.
'YLOG      LTIME    RAT     AVG   $'    T     T      F      26.
'SYMSIZE   NLINES   $'               1.0    2
'LABX-descr. of x-axis $'            'YEARS$'
'LABY-descr. of y-axis $'            'HELIUM/ M2-S-SR-MEV$'
'LABEL-1 line $'                     'ISEE 180-450 MEV ALPHA/IP$'
'LABEL-2 line $'                     'IMP  168-381 MEV ALPHA$'
'LONG OR SHORT $'                        'LONG $'
'POS. OF LABEL BOX, TOP OR BOTTOM $'  'BOTTOM $'
```

Output Description

The output plots are redirected to laser printer and to the device (printer or terminal screen) which is assigned to logical unit number (LUN=6). In the case of failure, e.g. when job is terminated by the main subroutine PL3800, the message with information is send to LUN=6. The examples of the output plots are shown in Figs. 2, 3, 4 and 5.

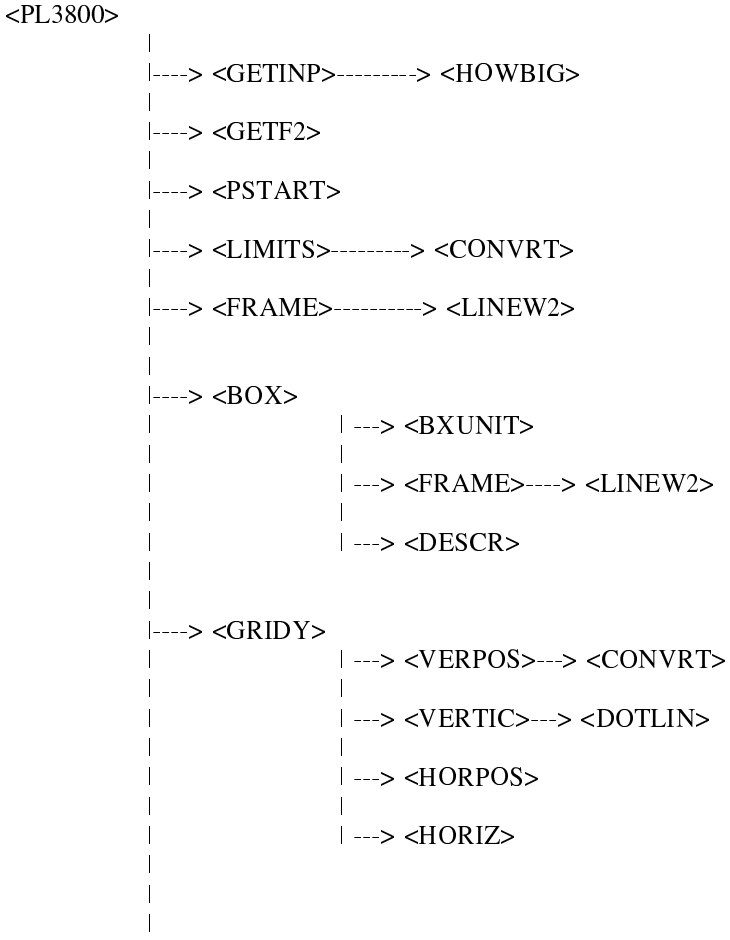
Description of program "PL3800"

The software 'PL3800' produces plots of Rates or Fluxes versus time. The plotted quantity can be presented in logarithmic or in linear scale (vertical axis). The time is plotted only in linear scale (horizontal axis). The time units can be selected as years or days. The plot consists of an axis frame, description of axes, a label box within the axis frame and data points plotted with selected symbols.

The size of the label box is adjusted to the given text and number of lines. Around the label box there are plotted horizontal and vertical grid lines

The program "PL3800" uses 26 routines (BOX, BXUNIT, CHARSZ, CONVRT, DESCR, DOTLIN, FRAME, GETF2, GETINP, GRIDY, HORIZ, HORPOS, HOWBIG, LIMITS, LINEW1, LINEW2, PLTEND, PLYDAT, PL3800, PSTART, VERPOS, VERTIC, XDESCR, XTICKS, YDESCR, YTICKS).

In Fig. 1 the block diagram shows organization of the program "PL3800". The entry subroutine is PL3800.



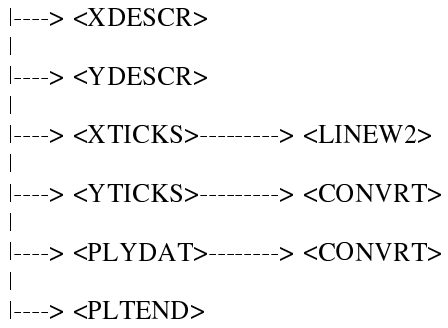


Fig.1 The block diagram of the software "PL3800"

1. Subroutine BOX

The subroutine BOX produces a label box with a description text. The input parametes (X0BOX, XNBOX, Y0BOX, YNBOX) determine position of a box within a frame with vertical and horizontal axes. The values are given in percent units, e.g. the coordinate (0, 0) corresponds to left lower corner and (100, 100) corresponds to upper right corner of the axis frame. For example the label box will be positioned in the upper part and on the left side of the axis frame for X0BOX = 5 and YNBOX = 95.

The subroutine BOX uses routine BXUNIT to convert position of a label box within the axis frame to position within display area of the whole plot.

In the next step, the routine FRAME is called to draw contour line of a label box. Finally, the routine DESCR fills label box with a description text.

2. Subroutine BXUNIT

The subroutine BXUNIT calculates position of a label box within whole display area in percent units. The input to the subroutine BXUNIT are parameters (X0BOX, XNBOX, Y0BOX, YNBOX) determining position of a label box within the axis frame. These position parameters are converted to position values within whole display area and are used as output parameters.

3. Subroutine CHARSZ

The subroutine CHARSZ sets up the size of the text characters

4. Subroutine CONVRT

The subroutine CONVRT uses linear transformation to convert x-variable to u-variable. The subroutine is used e.g. to convert positions given in physical units to positions on a display in percent units.

5. Subroutine DESCR

The subroutine DESCR writes text to a label box. The maximum number of text lines within label box is 10. The first lines have symbols used to mark values from different data sets (corresponding e.g. to different satellites) and description of a data set or a satellite. The number of these lines is equal to the number of data sets. In the case when the number of data sets is less than 10 the extra lines can be used for additional text.

With increasing number of lines the size of characters is decreased.

6. Subroutine DOTLIN

The subroutine DOTLIN is used to plot dotted, narrow line.

7. Subroutine FRAME

The subroutine FRAME plots a frame with horizontal and vertical axes. It uses the subroutine LINEW2 to draw solid lines with width 2.

8. Subroutine GETF2

The subroutine GETF2 is used as a driver to read and process data to plot Flux or Rates versus time. The subroutine reads time in the form (month, day, year, hour, minute, sec) and Flux (or Rates) values and corresponding experimental errors. For the case when the Flux quantity is selected, the Flux and the corresponding error are multiplied by the constant factor 1.0E+04.

In the next step, error bars for Flux (or Rates) are calculated from Flux (or Rates) values and corresponding errors.

The plotted quantity (Flux or Rates) is presented versus time. A logical variable LTIME is used to select time units. For LTIME = .TRUE. the time is calculated in years as given below

```
year =  calendar year  +
        ( days(up to the present month) +
        day of the present month +
        (1/2) of data collection period (in days) +
        hours / 24 ) / (number of days in a year)
```

For a leap year we use 366 days and for others 365 days. The days summed up over all sequential months are collected in two tables, IDAYS and IDAYL. The table IDAYS is used for a leap year, and the table IDAYL for others.

For LTIME = .FALSE. the time is calculated in days as given below

```
day  =  days(up to the present month) +
        day of the present month +
        (1/2) of data collection period (in days) +
        hours / 24
```

The next part of the program is developed for AUTOSC = .TRUE. option. For this option program itself finds minimum and maximum values of Flux (or Rates) within specified time interval. The last part of this subroutine writes information and warning messages to LUN = 6 (printer or terminal screen). For the option AUTOSC = .FALSE. the program uses given in the input data minimum and maximum values of Flux (or Rates). For this option a message is sent with information about how many data points are lost due to selected minimum and maximum values of Flux (or Rates) to the device with assigned logical unit number LUN=6 (printer or terminal screen). If there are more than 5 points above maximum or 5 point below minimum values in Flux (or Rates) then the execution of the program is terminated.

9. Subroutine GETINP

The subroutine GETINP reads several input data parameters from PL3800.IN(member) input data file. The length of a description text and number of text lines in a label box are used to calculate the size of the label box. The subroutine GETINP uses the routine HOWBIG to calculate the length of a string.

10. Subroutine GRIDY

The subroutine GRIDY draws vertical and horizontal grid lines outside of the label box. To draw vertical lines, first the positions of the vertical lines within display area are calculated by the subroutine VERPOS. In the next step, these positions are used by the subroutine VERTIC to draw vertical lines. To draw horizontal lines we use the HORPOS and the HORIZ subroutines.

11. Subroutine HORIZ

The subroutine HORIZ draws horizontal grid lines within a specified region. We use thin dotted line to draw grid lines. The positions of horizontal lines are calculated by the subroutine HORIZ .

12. Subroutine HORPOS

The subroutine HORPOS finds positions of horizontal grid lines. Two scales , the logarithmic and linear, are considered. In the case when the logarithmic scale is selected and when the plotted quantity is changing less than two decades the number of grid lines is 10 per decade. For the case when the plotted quantity is changing more than two decades the number of grid lines is changed to two per decade. This part of program logic uses "IF (DYLOG .GT. 2.) THEN" block with "LSTEP = 4" and "LMAX = 5" assignments for a reduced number of grid lines.

In the case when the linear scale is selected the routine produces more than 4 grid lines and less than 15 grid lines. The positions are converted to positions within whole display area (in percents).

13. Subroutine HOWBIG

The subroutine HOWBIG finds a length of a character string. The subroutine starts with last element of a string array and searches for a first element different from blank in ascending direction. The position of a found element gives length of a string. The applied technique has assumption that the given string starts with character different from blank.

14. Subroutine LIMITS

The subroutine LIMITS converts positions (XMIN, XMAX, YMIN, YMAX) determining frame with horizontal and vertical axes to percent units of the whole display area. It uses the subroutine CONVRT to convert quantity in physical units to percent units of the whole display area.

15. Subroutine LINEW1

The subroutine LINEW1 is used to plot a solid line with width=1 .

16. Subroutine LINEW2

The subroutine LINEW2 is used to plot a solid line with width=2 .

17. Subroutine PLTEND

The subroutine PLTEND is used to close the use of the Template graphic package.

18. Subroutine PLYDAT

The subroutine PLYDAT plots experimental data and error bars. The number of different data sets is NSAT. Points from different data sets are marked with different symbols. Points can be connected or disconnected.

In the first step, the subroutine PLYDAT eliminates some of the data points. Here is a list of conditions used to eliminate some of the data points

--- points which are to close to vertical axes are not plotted
--- cases with negative experimental data values are not considered
--- cases with negative bottom or upper values of error bars
are not considered.

In the next step, the data values are converted to positions on a display area. The values of error bars are truncated to limits on vertical axis for all cases when upper or bottom values of error bars exceeded minimum or maximum values on vertical axis. For the cases when some of the data points have values outside of the specified region <YMIN, YMAX> for plotted quantity the subroutine writes warning message to the plot. This message is produced only if the logical variable SUPRES = .FALSE. .

19. Subroutine PL3800

The subroutine PL3800 is an entry subroutine which calls several routines which read input data, perform data processing and plot Rates (or Flux) versus time. The subroutine terminates execution when the output parameter IFLAG from GETF2 , is equal to 1.

20. Subroutine PSTART

The subroutine PSTART is used to initialize Template graphic package. It uses percent units for display. There are 100 units in vertical direction and 100 units in horizontal direction. The size of characters can be changed in a contineoues way by the use of the software option in the USET subroutine of the Template graphic package.

21. Subroutine VERPOS

The subroutine VERPOS finds positions of vertical grid lines. The subroutine produces more than 4 and less than 15 grid lines. The positions are converted to positions within whole display area (in percents).

22. Subroutine VERTIC

The subroutine VERTIC draws horizontal grid lines within a specified region. We use thin dotted line to draw grid lines. The positions of vertical lines are calculated by the subroutine VERTIC.

23. Subroutine XDESCR

The subroutine XDESCR produces numbers and text on a horizontal axis of a plot. The text with a description of a horizontal axis is redistributed symmetrically around the middle point of the axis.

24. Subroutine XTICKS

The subroutine XTICKS draws ticks on horizontal bottom and top axes of a plotting frame.

25. Subroutine YDESCR

The subroutine YDESCR produces numbers and text on a vertical axis of a plot. The text with a description of a vertical axis is redistributed symmetrically around the middle point of the axis. The scale on a vertical axis can be linear or logarithmic. For YLOG = .TRUE. the logarithmic description is selected and for YLOG = .FALSE. the linear description is used.

26. Subroutine YTICKS

The subroutine YTICKS draws ticks on vertical left and right axes of a plotting frame.

Description of Input/Output Parameters for Routines from "PL3800"

1. BOX

PURPOSE The subroutine BOX produces a label box with a description text.

The input (X0BOX, XNBOX, Y0BOX, YNBOX) determines position of a box within a frame with vertical and horizontal axes. The values are given in percent units, e.g. the coordinate (0, 0) corresponds to left lower corner and (100, 100) corresponds to upper right corner of a frame.

INPUT
PARAMETERS

X0BOX - horizontal value of a left side of a label box
within an axis-frame (in percents)
XNBOX - horizontal value of a right side of a label box
within an axis-frame (in percents)
Y0BOX - vertical value of a bottom side of a label box
within an axis-frame (in percents)
YNBOX - vertical value of a top side of a label box
within an axis-frame (in percents)

COMMENTS
The input parameters (X0BOX, XNBOX, Y0BOX, and YNBOX) may have values ranging from 0 to 100. These values determine position of a label box within an axis-frame (units are percents).

OUTPUT
PARAMETERS

X0NEW - horizontal value of a left side of a label box
within display area (in percents)
XNNEW - horizontal value of a right side of a label box
within display area (in percents)
Y0NEW - vertical value of a bottom side of a label box
within display area (in percents)
YNNEW - vertical value of a top side of a label box
within display area (in percents)

2. BXUNIT

PURPOSE
The subroutine BXUNIT calculates position of a label box within whole display area in percent units.

INPUT
PARAMETERS

X0BOX - value of the position of a left side of a label box within axis-frame in percent units
XNBOX - value of the position of a right side of a label box within axis-frame in percent units
Y0BOX - value of the position of a lower side of a label box within axis-frame in percent units
YNBOX - value of the position of an upper side of a label box within axis-frame in percent units

OUTPUT
PARAMETERS

X0NEW - value of the position of a left side of a label box in percent units of the whole display area
XNNEW - value of the position of a right side of a label box in percent units of the whole display area
Y0NEW - value of the position of a lower side of a label box in percent units of the whole display area
YNNEW - value of the position of an upper side of a label box in percent units of the whole display area

3. CHARSZ

PURPOSE The subroutine CHARSZ sets up the size of the text characters

INPUT
PARAMETERS
H - hight of the character symbol
W - normalization width factor. For W = 7.0 the width of the character is equal to a hight of the character. Value W = 5.0 corresponds to a standard shape of the character.
TEMPLATE
ROUTINES
UPSET - The subroutine UPSET is used with the input parameters VERT and HORI.

4. CONVRT

PURPOSE
The subroutine CONVRT converts x-variable to u-variable using a linear equation.

INPUT
PARAMETRS

XMIN - minimum value of x-variable
XMAX - maximum value of x-variable
X - given x value
UMIN - value of u-variable corresponding to xmin
UMAX - value of u-variable corresponding to xmax

OUTPUT
PARAMETER

U - calculated value, corresponds to given x-value.

5. DESCR

PURPOSE

The subroutine DESCR writes text to a label box.
Maximum number of lines in a label box is 10. The first N
lines of description text correspond to N data sets. These
lines start with symbols which are used to mark data points
on a plot and are followed by the information text
concerning satellite, selected bin or other details
of the used data set. The rest of the lines (10-N)
can be used for any additional information.

INPUT
PARAMETERS

XMIN - left side of a label box
(percents of a display area)
XMAX - right side of a label box (percents)
YMIN - bottom side of a label box (percents)
YMAX - upper side of a label box (percents)
TEXT1 ... TEXT10 - text with a descrption of utilized data sets
NLINES - number of lines in a label box
NSAT - number of experimental data sets

6. DOTLIN

PURPOSE The subroutine DOTLIN is used to plot dotted, narrow line.

INPUT/OUTPUT PARAMETERS None

TEMPLATE ROUTINES UPSET, USET

The subroutine UPSET is used with the input parameters
WFLAG, WIDTH, SETDASH.
The subroutine USET is used with the input parameter
DNULL.

7. FRAME

PURPOSE - draws a box

INPUT
PARAMETERS

XMIN - left side of a box (percents of a display area)
XMAX - right side of a box (percents)
YMIN - bottom side of a box (percents)
YMAX - upper side of a box (percents)

8. GETF2

PURPOSE

The subroutine GETF2 is used as a driver to read and process data to plot Flux or Rates versus time.

INPUT
PARAMETERS

IUNIT - logical unit number for the first data file with Rates or Fluxes. This number is hardcoded in program (IUNIT = 20).
NSAT - is a number of data sets (data files) which have to be plotted.
IFLAG - flag parameter which is used to stop execution if 5 data values are above or below given maximum or minimum value for a plotted quantity (five points are lost). For the case when 5 points are lost IFLAG = 1 and the execution is stop.

9. GETINP

PURPOSE

The subroutine GETINP reads several input data parameters from PL3800.IN input data file.

10. GRIDY

PURPOSE

The subroutine GRIDY draws vertical and horizontal grid lines outside of the label box.

INPUT
PARAMETERS

XMIN - minimum value on a horizontal axis (in given units e.g. years, days, etc.)
XMAX - maximum value on a horizontal axis (in given units)
YMIN - minimum value on a vertical axis (in given units)
YMAX - maximum value on a vertical axis (in given units)
XDOWN - position of a left side of an axis-frame within a display area (in percents)
XUP - position of a right side of an axis-frame within a display area (in percents)

YDOWN - position of a bottom side of an axis-frame
within a display area (in percents)
YUP - position of an upper side of an axis-frame
within a display area (in percents)
X0NEW - value of the position of a left side
of a label box in percent units of the
whole display area
XNNEW - value of the position of a right side
of a label box in percent units of the
whole display area
Y0NEW - value of the position of a lower side
of a label box in percent units of the
whole display area
YNNEW - value of the position of an upper side
of a label box in percent units of the
whole display area
XX - values on a horizontal axis of an axis-frame
at which vertical grid lines are plotted
YY - values on a vertical axis of an axis-frame
at which horizontal grid lines are plotted
UU - positions for vertical grid lines on a horizontal
axis within a display area (in percents).
VV - positions for horizontal grid lines on a vertical
axis within a display area (in percents).
NGRIDX - number of vertical grid lines
NGRIDY - number of horizontal grid lines

11. HORIZ

PURPOSE draws horizontal lines within a specified region

INPUT
PARAMETERS
XMIN - position of a minimum value of a horizontal
axis within display area (in percents).
XMAX - position of a maximum value of a horizontal
axis within display area (in percents).
YMIN - position of a minimum value of a vertical
axis within display area (in percents).
YMAX - position of a maximum value of a vertical
axis within display area (in percents).
VV - values at grid points in percent units
of a display area
NGRIDY - number of grid points on y-axis

12. HORPOS

PURPOSE finds positions of horizontal grid lines

INPUT
PARAMETERS
XMIN - minimum x value
(in given units e.g. years, days, etc.)
XMAX - maximum x value (in given units)
YMIN - minimum y value (in given units)
YMAX - maximum y value (in given units)

OUTPUT
PARAMETERS
Y - values at grid points (in a given units)
VV - values at grid points in percent units
of a display area
NGRIDY - number of grid points on y-axis

13. HOWBIG

PURPOSE The subroutine HOWBIG finds a length of a character string.

INPUT
PARAMETERS
TEXT - a given character string
NCHAR - maximum possible number of characters
NCHAR is hardcoded in GETINP, as NCHAR=31.

OUTPUT
PARAMETER
LENGTH - length of the given character string

14. LIMITS

PURPOSE
converts positions (XMIN, XMAX, YMIN, YMAX)
determining frame with horizontal and vertical axes
to values in percent units of a display area.

INPUT
PARAMETERS
XMIN - is converted to XDOWN
(in percents of display area)
XMAX - is converted to XUP (in percents)
YMIN - is converted to YDOWN(in percents)
YMAX - is converted to YUP (in percents)

OUTPUT
PARAMETERS
XDOWN - position of a left side of an axis-frame
in percent units of a display area
XUP - position of a right side of an axis-frame
in percent units of a display area
YDOWN - position of a bottom side of an axis-frame
in percent units of a display area
YUP - position of an upper side of an axis-frame
in percent units of a display area

15. LINEW1

PURPOSE The subroutine LINEW1 is used to plot a solid line with width 1.

INPUT/OUTPUT PARAMETERS: None

TEMPLATE ROUTINES: UPSET, USET

The subroutine UPSET is used with the input parameters WFLAG, WIDTH.
The subroutine USET is used with the input parameter LNULL.

16. LINEW2

PURPOSE The subroutine LINEW2 is used to plot a solid line with width 2.

INPUT/OUTPUT PARAMETERS: None

TEMPLATE ROUTINES: UPSET, USET

The subroutine UPSET is used with the input parameters WFLAG, WIDTH.
The subroutine USET is used with the input parameter LNULL.

17. PLTEND

PURPOSE The subroutine PLTEND is used to close the use of the Template graphic package

INPUT/OUTPUT PARAMETERS: None

TEMPLATE ROUTINES: UHDCPY, UFLUSH, UERASE, UALPHA, UEND

18. PLYDAT

PURPOSE

The subroutine PLYDAT plots experimental data and error bars. The number of different data sets is given by NSAT parameter. Points from different data sets are marked with different symbols. Points can be connected or disconnected.

INPUT PARAMETERS

NSAT - is a number of data sets (data files) which have to be plotted. Program is able to handle up to 10 different data sets with experimental results. Maximum of up to 10 curves can be plotted.

CONNEC - an array with logical values. It is used to connect or not connect plotted values from the same data set.

XMIN - minimum value on a horizontal axis
(in given units e.g. years, days, etc.)
XMAX - maximum value on a horizontal axis
(in given units)
YMIN - minimum value on a vertical axis
(in given units)
YMAX - maximum value on a vertical axis
(in given units)

19. PL3800

PURPOSE
The subroutine PL3800 is an entry subroutine which calls several routines performing read of input data, some data processing and plotting of Rates (or Flux) versus time.

INPUT/OUTPUT PARAMETERS: None

20. PSTART

PURPOSE The subroutine PSTART is used to initialize Template graphic package

INPUT/OUTPUT PARAMETERS: None

TEMPLATE ROUTINES:
USTART, UVPRT, USET, UPSET
The subroutine USET is used with the following input parameters ASIZING, SOFTWARE, and LNULL.
The subroutine UPSET is used with parameters WFLAG and WIDTH.

21. VERPOS

PURPOSE finds positions of vertical grid lines

INPUT PARAMETERS:
XMIN - minimum x value
(in given units e.g. years, days, etc.)
XMAX - maximum x value (in given units)
YMIN - minimum y value (in given units)
YMAX - maximum y value (in given units)

OUTPUT PARAMETERS:
XX - values at grid points (in a given units)
UU - values at grid points in percent units of a display area
NGRIDX - number of grid points on a horizontal axis

COMMENTS only linear scale is considered at present for horizontal axis

22. VERTIC

PURPOSE draws vertical grid lines in a given region

INPUT
PARAMETERS

XMIN - left side of a region
(percents of a display area)
XMAX - right side of a region (percents)
YMIN - bottom side of a region (percents)
YMAX - upper side of a region (percents)
UU - positions of vertical axes on a horizontal axis
NGRIDX - number of vertical lines

23. XDESCR

PURPOSE produces numbers and text on a horizontal axis of a plot

INPUT
PARAMETERS

XMIN - position of a left side of an axis-frame
within a display area (in percents).
XMAX - position of a right side of an axis-frame
within a display area (in percents).
XX - values on a horizontal axis of an axis-frame
at which vertical grid lines are plotted
UU - positions for vertical grid lines on a horizontal
axis within a display area (in percents).
NGRID - number of vertical grid lines.

24. XTICKS

PURPOSE

The subroutine XTICKS is used to draw ticks on horizontal bottom and top axes of a plotting frame.

INPUT
PARAMETERS

QQ - positions for vertical ticks on a horizontal
axis of an axis-frame
NQGRID - number of ticks on a horizontal axis

25. YDESCR

PURPOSE

The subroutine YDESCR produces numbers and text on a vertical axis of a plot. The scale on a vertical axis can be linear or logarithmic.

INPUT
PARAMETERS

YMIN - position of a bottom side of an axis-frame

within a display area (in percents).
YMAX - position of a top side of an axis-frame
within a display area (in percents).
YY - values on a vertical axis of an axis-frame
at which horizontal grid lines are plotted
VV - positions for horizontal grid lines on a vertical
axis within a display area (in percents).
NGRID - number of horizontal grid lines.

26. YTICKS

PURPOSE

The subroutine YTICKS is used to draw ticks on vertical left and right axes of a plotting frame.

INPUT/OUTPUT PARAMETERS: None

TEMPLATE ROUTINES: USET, MOVE, UPEN

The subroutine USET is used with LNULL input parameter.

Compile and Link-Edit of the Program "PL3800"

The program "PL3800" can be compiled with the CNTL file called PL3800.CNTL(COMPILE) under ID XRAJL. The job controle file uses PROCLIB located in XRAJL.PL3800.CNTL(G38PLOT).

The sequence of steps leading to program compilation is

a) copy XRAJL.PL3800.CNTL(COMPILE) into the user's file e.g.

COPY 'XRAJL.PL3800.CNTL(COMPILE)' PL3800.CNTL(COMPILE) UNIT(DISK)
In the next step edit the file replacing YOURID, YOUR_ACCOUNT_NUMBER, YOUR_BOX_NUMBER by user's ID, account number and box number.

b) type command

SUBMIT PL3800.CNTL(COMPILE)

List of the PL3800.CNTL(COMPILE) file is shown below

```
//YOUR_ID JOB (YOUR_ACC_NUMBER,YOUR_BOX_NO,09),'GRAPHICS ON 3800',
//        TIME=(0,30),CLASS=O,NOTIFY=YOUR_ID,MSGCLASS=X
/*PROCLIB=XRAJL.PL3800.CNTL
//CALLPR    EXEC G38PLOT
//FORT.SYSIN  DD DSN=XRAJL.PL3800.CNTL(SOURCE),DISP=SHR
//ENDPDB    EXEC NOTIFYTS
```