

DTIC FILE COPY

4

ARL-SYS-TM-115

AR-005-569



**DEPARTMENT OF DEFENCE**

**DEFENCE SCIENCE AND TECHNOLOGY ORGANISATION**

**AERONAUTICAL RESEARCH LABORATORY**

MELBOURNE, VICTORIA

Aircraft Systems Technical Memorandum 115

AD-A211 770

**GENPLOT - General Plotting Program**  
**User Guide and Reference Manual**  
**Version 4.06**

DTIC  
ELECTE  
AUG 28 1989  
S  
D  
D

by  
A.G. PAGE

**DISTRIBUTION STATEMENT A**  
Approved for public release  
Distribution Unlimited

Approved for Public Release

(C) COMMONWEALTH OF AUSTRALIA 1989

APRIL 1989

89 8 29 005

This work is copyright. Apart from any fair dealing for the purpose of study, research, criticism or review, as permitted under the Copyright Act, no part may be reproduced by any process without written permission. Copyright is the responsibility of the Director Publishing and Marketing, AGPS. Inquiries should be directed to the Manager, AGPS Press, Australian Government Publishing Service, GPO Box 84, Canberra, ACT 2601.

THE UNITED STATES NATIONAL  
TECHNICAL INFORMATION SERVICE  
IS AUTHORISED TO  
REPRODUCE AND SELL THIS REPORT

AR-005-569

DEPARTMENT OF DEFENCE  
DEFENCE SCIENCE AND TECHNOLOGY ORGANISATION  
AERONAUTICAL RESEARCH LABORATORY

Aircraft Systems Technical Memorandum 115

**GENPLOT - General Plotting Program**  
**User Guide and Reference Manual**  
**Version 4.06**

by

A.G. Page

**SUMMARY**

Program GENPLOT was designed to plot columns of numerical data in the form of strings of ASCII coded characters onto a graphics terminal screen and/or to a metafile for use by any device supported by a DI-3000 meta-translator.

The source code was written in Fortran-77 (on an ELXSI System 6400) and uses the DI-3000 graphics language library routines.

Four methods of plot data input are available: column versus column from the same file, column versus column from two files, file versus file, and column versus time. The user enters the data for all lines to be plotted and selects the drawing options to be used for the plot.

GENPLOT is menu-driven and features zooming, legends, single lines of text on plot, and hardcopy options, as well as utilising DI-3000 character functions (such as underline and multi-font text lines) for plot labelling, legend and single text line construction.



(C) COMMONWEALTH OF AUSTRALIA 1989

POSTAL ADDRESS: Director, Aeronautical Research Laboratory,  
P.O. Box 4331, Melbourne, Victoria, 3001, Australia

---

**CONTENTS****Page No.**

---

<b>INTRODUCTION</b> . . . . .	<b>1</b>
<b>PART I : GENPLOT Users Guide</b> . . . . .	<b>2</b>
<b>I.1 Introduction</b> . . . . .	<b>2</b>
<b>I.2 Running GENPLOT</b> . . . . .	<b>3</b>
<b>I.2.1 Start-Up</b> . . . . .	<b>3</b>
<b>I.2.2 Plotting Options</b> . . . . .	<b>4</b>
<b>I.2.2.1 Plotting Option 1 : Column vs. Column from one file</b> . . . . .	<b>4</b>
<b>I.2.2.2 Plotting Option 2 : Column vs. Column from two files</b> . . . . .	<b>6</b>
<b>I.2.2.3 Plotting Option 3 : File vs. File</b> . . . . .	<b>7</b>
<b>I.2.2.4 Plotting Option 4 : Column vs. Time</b> . . . . .	<b>8</b>
<b>I.2.3 File Directory Specification</b> . . . . .	<b>8</b>
<b>I.2.4 Line Characteristics</b> . . . . .	<b>9</b>
<b>I.2.5 Plotting Option Check</b> . . . . .	<b>10</b>
<b>I.2.6 Drawing Options</b> . . . . .	<b>10</b>
<b>I.2.6.1 Plot Labelling</b> . . . . .	<b>11</b>
<b>I.2.7 Continuation Options - GENPLOT Plotting Features</b> . . . . .	<b>13</b>
<b>I.3 Example Run</b> . . . . .	<b>15</b>
<b>PART II : GENPLOT Reference Manual</b> . . . . .	<b>17</b>
<b>II.1 Introduction</b> . . . . .	<b>17</b>
<b>II.2 Directory Structure</b> . . . . .	<b>17</b>
<b>II.3 Start-Up Program</b> . . . . .	<b>17</b>
<b>II.4 Plot Construction</b> . . . . .	<b>18</b>
<b>II.5 Meta-Files</b> . . . . .	<b>18</b>
<b>II.6 Meta-Translators</b> . . . . .	<b>19</b>
<b>II.7 Subroutine Summary</b> . . . . .	<b>20</b>
<b>REFERENCES</b>	
<b>APPENDIX</b>	
<b>FIGURES</b>	
<b>DISTRIBUTION</b>	
<b>DOCUMENT CONTROL DATA</b>	

## INTRODUCTION

GENPLOT (General Plotting Program) is a menu-driven, interactively run program for plotting columns of numerical data in the form of strings of ASCII (American Standard Code for Information Interchange) characters.

The program can be run from any terminal. Graphics terminals which are supported by a DI-3000 device driver give the user the option of displaying the plots on the screen. Non-graphics terminals can only send plots to devices supported by a DI-3000 driver.

GENPLOT was written on an ELXSI System 6400 in Fortran-77 and implements the DI-3000 graphics language library routines. The program consists of more than 15500 lines of commented fortran source code.

This document is divided into two parts; a user guide, and a reference manual. The user guide is aimed at new users of GENPLOT. It explains what GENPLOT is capable of and how to use it. The reference manual is designed for people who want to know more about how GENPLOT works short of reading the source code.

GENPLOT evolved from a combination of two reasons: firstly, a need for a flexible data plotting program for analysing data from a flight profile generator program and a strapdown inertial navigation simulator; and secondly, the central plotting subroutines needed for GENPLOT already existed in a graphics package written, by the author, specifically for a navigation system simulator (NAVSIM). As GENPLOT developed, improvements in the program structure and plotting efficiency were incorporated back into the NAVSIM graphics package.

Accession For	
NTIS CRA&I	<input checked="" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By .....	
Distribution /	
Availability Codes	
Dist	Avail and/or Special
A-1	



---

## PART I : GENPLOT Users Guide

---

### I.1 Introduction

Many application programs produce files containing huge amounts of numeric output. It can be very difficult to understand the essential content of the data by inspecting pages of numbers, hence a graphical representation is often required and almost always desired. However, it is time-consuming and tedious to manually plot data - even if there are only 20 data points, multiple runs of a program quickly amount to excessive time and effort required for manual plotting.

GENPLOT was written to provide a quick, not overly complex, and yet flexible means of plotting data. It is essentially menu-driven, with validity checks and error recovery on entered selections. The menu format allows the user to backtrack at certain stages in the run to alter previously set options and values.

The user may enter data for each line on the plot by one of four methods: column versus column from the same data file, column versus column from two different data files, file versus file (i.e unformatted or single column data file), or column versus time. Up to 20 lines can be drawn to a plot.

The characteristics of each line on the plot are set by the user via a line characteristics menu displayed after the plotting options for each line have been set. The line characteristic options include line style and colour, also the frequency, type, and colour for markers at the data points. Either the line or the data markers may be omitted as required.

Once the user has defined all the line data, the drawing options for the plot must be specified. The drawing options include such things as: drawing a grid pattern, major and minor tick marks, plot aspect ratio, plot frame, plot limits, and axes and title labels. These options are available to provide the user with flexibility in displaying the plot. Default settings for these options are set on program initialisation which give reasonable un-labelled plots.

After the plot has been displayed (on the screen for graphics terminals and/or written to a device independent meta-file for later use with any available meta-translator, for example a Zeta-8 plotter), the user has the option of using any or all of GENPLOT's features. These include: zooming in on a user-specified area of the plot, creating a plot legend at a user-specified position within the plot box, creating single lines of text at user-specified positions within the plot box, redrawing the original non-zoomed plot with or without the legend and/or single text lines (if available), and obtaining a meta-file of the current picture for subsequent hard-copy output.

## 1.2 Running GENPLOT

To run GENPLOT on the ELXSI System 6400 the user must have access to the user donated program area. This area on the ELXSI is specifically for programs supplied by user's for public use. Access to these programs and their associated help files is gained by running the command 'useDonated'. The user should insert this command into the 'loginCommand' file to gain access to the program upon each login.

Once access is gained, simply type 'GENPLOT' to run the GENPLOT start-up program.

### 1.2.1 Start-Up

The first menu displayed upon starting a GENPLOT run is a set-up menu :

```
Genplot Set-Up
-----
0. EXIT program.
1. (Brief explanatory notes)
2. Terminal Type           (VT240)
3. Display plots on screen (YES)
ENTER SELECTION ((cr) to continue) :
```

Selection '1' will display several screens of information briefly describing GENPLOT and its features.

Selection '2' should be set to correspond to the user's terminal type. If the terminal is not the default terminal type (DEC VT-240) then the user must enter selection '2'. A list of available terminal types (i.e terminals currently supported by DI-3000 device drivers) will be displayed.

Selection '3' allows the user to run GENPLOT on a non-graphics terminal or to reduce the run time on a graphics terminal. Plots can be sent to driver-supported plotters for hardcopy output.

When the user is satisfied with the set-up parameters, a carriage return will run the appropriate terminal-type version of GENPLOT.

GENPLOT immediately requests the user to enter the number of lines to be drawn on the plot.

### I.2.2 Plotting Options

For each line to be drawn on the plot, the plotting options menu will be displayed:

```
Plotting Options for Line (nn)
-----
0. EXIT program.
1. Column vs. Column from one file.
2. Column vs. Column from different files.
3. File vs. File.
4. Column or File vs. Time.
5. Change number of lines on graph.
ENTER SELECTION :
```

Selection '0' is an escape from the program. Confirmation will be requested before aborting the run.

Selection '5' allows the user to alter the requested number of lines to be drawn on the plot.

Selections '1' to '4' display their set-up menus as shown in the following sub-sections.

#### I.2.2.1 Plotting Option 1 : Column vs. Column from one file

The user should select this option to have two columns of data from the same data file plotted against each other.

The following menu will be displayed;

```
Column vs. Column from one file.
-----
0. ABORT this plotting option
1. Re-display menu values used previously
2. Input Default value file
3. Save default value file
4. Name of data file :
5. Number of Columns in file :
6. Line number to start reading :
7. Line number to end reading :
8. Number of lines to skip :
9. Column number to plot on X-axis :
10. Column number to plot on Y-axis :
ENTER SELECTION ((cr) to continue) :
```

Selection '0' is a chance to return to the main plotting options menu.

Selection '1' allows menu values set the last time this plotting option was selected to be re-displayed. Hence this option is only available if the plotting option has been used previously.

Selection '2' reads the default-menu-values-file (saved on a previous run) for a specific data file. This file contains the data file name, the number of columns in the data file, the line number to start reading data file, and

the line number to stop reading the data file. This file can be in the user's current directory or in a sub-directory of the current directory. After the file name is entered, the directory name will be requested.

Selection '3' is used to save the default-menu-value-file described above for selection '2', so that it can be used on later runs to save time respecifying the same data file. The file name will have '.DEF1' appended to the user-specified name. This file can be saved in the users current directory or in a sub-directory of the current directory. After the file name is entered, the directory name will be requested.

Selection '4' requires the user to enter the data file name. This file contains the current line data to be plotted. The file name can have a maximum of 25 characters. This file can be in the user current directory or in a sub-directory of the current directory. After the menu values have been selected and a carriage return entered the data file directory name will be requested.

Selection '5' requires the user to enter the number of columns in the data file. This is the number of data columns (data separated by a comma or at least one blank space) per line of the data file. If this parameter is not properly specified the program might not pick up the problem and ,as a consequence, plot the wrong column of data.

Selections '6' and '7' require the user to enter the line numbers to commence and stop reading the data file respectively. Selection '6' must be used to skip any file header. These parameters can be used to plot selected regions of the data file. If selection '7' is specified such that it is larger than the file length, the file will be read to the end-of-file only.

Selection '8' requires the user to enter the number of lines of data that are to be skipped (i.e not plotted) following each line containing data that is plotted. This can be used to increase the speed of plotting. Naturally some accuracy will be lost since not all the available data is being plotted. Setting this to zero (the default) means that all available data will be used.

Selections '9' and '10' require the user to set the data file column numbers to be plotted on the X and Y axes respectively.

### I.2.2.2 Plotting Option 2 : Column vs. Column from two files

The user should select this option to have two columns of data from two different data files plotted against each other.

The following menu will be displayed;

#### Column vs. Column from two files.

- 0. ABORT this plotting option
  - 1. Re-display menu values used previously
  - 2. Input Default value file
  - 3. Save default value file
  - 4. Name of first data file :
  - 5. Name of second data file :
  - 6. Number of Columns in first file :
  - 7. Number of Columns in second file :
  - 8. Line number to start reading in 1st file :
  - 9. Line number to start reading in 2nd file :
  - 10. Line number to end reading in 1st file :
  - 11. Line number to end reading in 2nd file :
  - 12. Number of lines to skip in 1st file :
  - 13. Number of lines to skip in 2nd file :
  - 14. Column number to plot on X-axis :
  - 15. from First (1) or second (2) file :
  - 16. Column number to plot on Y-axis :
  - 17. from First (1) or second (2) file :
- ENTER SELECTION ((cr) to continue) :

The menu items for this plotting option are basically the same as for Plotting-Option-1 with additional items for the second file.

### 1.2.2.3 Plotting Option 3 : File vs. File

The user should select this option to have two files of single column (or unformatted) data plotted against each other.

The following menu will be displayed;

```
File vs. File (single column files)
-----
0. ABORT this plotting option
1. Re-display menu values used previously
2. Input Default value file
3. Save default value file
4. Name of first data file      :
5. Name of second data file    :
6. Line number to start reading in 1st file :
7. Line number to start reading in 2nd file :
8. Line number to end reading in 1st file  :
9. Line number to end reading in 2nd file  :
10. Number of data to skip in 1st file     :
11. Number of data to skip in 2nd file     :
12. Plot file (1 or 2) on X-axis          :
13. Plot file (1 or 2) on Y-axis          :
ENTER SELECTION ((cr) to continue) :
```

The menu items for this plotting option are basically the same as for Plotting-Option-2 with the following exception : the data files are assumed to have only one column of data. This means that all data in both files will be plotted, unless the data skip option is implemented. Hence the files can be formatted in a single column or be unformatted lines of data separated by a comma or any number of blanks.

#### 1.2.2.4 Plotting Option 4 : Column vs. Time

The user should select this option to have one column of data from a data file plotted against time on the X-axis.

The following menu will be displayed;

```
Column vs. Time.
-----
0. ABORT this plotting option
1. Re-display menu values used previously
2. Input Default value file
3. Save default value file
4. Name of data file           :
5. Number of Columns in file  :
6. Line number to start reading :
7. Line number to end reading  :
8. Number of lines to skip     :
9. Column number to plot on Y-axis :
10. Time step for X-axis (sec.) :
11. Time at start of plot (sec.) :
ENTER SELECTION ((cr) to continue) :
```

The menu items for this plotting option are basically the same as for Plotting-Option-1, except that X-axis data is not input from a data file, but instead is generated by the program using the user-entered time step and starting time. The X-axis time step is the time between successive Y-axis data in the data file.

#### 1.2.3 File Directory Specification

Once the plotting-option parameters are set to obtain the desired data for the current line, pressing the carriage return key will cause the program to input the current line plot data. The directory for the data file will be requested. Pressing the return key will indicate the data file is in the user's current directory. If the data file is in a subdirectory of the current one then the directory name must be entered. A directory above the current one or in another branch cannot be accessed. If more than one directory is to be accessed for files, GENPLOT should be run from a directory above the highest directory to be accessed and common to the accessed directory branches.

This can be probably better understood by referring to Figure 1.1 for the following examples.

If data files to be used exist in directories 8 and 9, then GENPLOT should be run from directory 7.

If data files to be used exist in directories 7 and 13, then GENPLOT should be run from directory 1. Even though 7 and 13 are on the same level, they exist in separate branches. GENPLOT must be run from a directory common to all directory branches containing files to be accessed.

If data files to be used exist in directories 6, 7 and 9, then GENPLOT should be run from directory 2.

Whenever a directory name is requested (for data files, default value files, output files, etc.) the above directory access rules apply. If GENPLOT

is run from more than one directory above the file being specified then the directory name will be a multi-directory name (pathname). For example, to specify directory 8 (refer to Figure 1.1) from a run in directory 1, the directory name is '2/4/7/8'.

If any error occurs locating a file or directory the user will be notified and allowed to correct the problem.

After locating and opening the file(s) containing data for the current line to be plotted, the required data is read. If any error occurs while reading the data the user will be notified and the file line in question will be displayed. The user will be required to rectify the problem.

#### 1.2.4 Line Characteristics

After the user has specified where to obtain the line data and the program has read that data from the specified data file, the user will be required to set the characteristics for that line. If more than one line has been entered the line characteristics for previous lines are displayed as a summary to the user.

To set the line characteristics the following menu is displayed.

```
Line Characteristics
-----
1. Draw line connecting data      :
2. Line style                     :
3. Line colour                   :
4. Draw markers at data points   :
5. Marker type                   :
6. Marker colour                 :
7. Marker frequency              :
8. Change previously set line    (MENU)
ENTER SELECTION ((cr) to continue) :
```

Selection '1' gives the user the option of either drawing a line connecting the data points or not. The default is to draw the line.

If the line connecting data points is to be drawn then the line style and line colour can be selected. Note that the line colour will only apply to colour terminals and colour plotters. If a requested colour is not supported by the plot device, the device will use whatever is available. If the line connecting data is not to be drawn the line style and colour do not apply.

Selection '4' allows the user to have markers drawn at the data points. The marker type and colour are set via selections '5' and '6' respectively. The frequency (data points per marker) is set via selection '7'. The default is not to draw markers, unless the line connecting data points is not to be drawn. Either the line or markers must be drawn.

Selection '8' allows the user to change the line characteristics of a line entered prior to the current line.

### 1.2.5 Plotting Options Check

After all the lines have been entered (data and characteristics), the user is given the opportunity to re-do any of the lines to be plotted (by re-specifying the plotting options and re-setting the line characteristics for that line) or alter the number of lines to be drawn on the plot.

The following menu will be displayed;

```
Plotting Options Check
-----
Number of lines entered :
0. EXIT program.
1. Change number of lines on graph.
2. Re-do previously entered line.
ENTER SELECTION ((cr) to continue) :
```

Selection '0' will seek double confirmation before aborting the run.

Selection '1' allows the user to enter more lines or delete the latest entered lines, while selection '2' allows the user to replace any entered line data by re-specifying that line via the Plotting-Options.

### 1.2.6 Drawing Options

The drawing option defaults are set at what is hoped to be the most commonly used values for a plot. The exceptions to this are the plot limits and plot labels.

The default plot limits (i.e the plot minima and maxima for the X and Y axes) are set to encompass all lines on the plot. However the user may wish to extend these to allow a margin between the lines and the plot edge or simply to round the limits to a more acceptable value.

The plot labels (X-axis, Y-axis, and title) defaults are all blanks, except when Plotting-Option-4 (Column vs. Time) has been selected - the X-axis label default is then 'Time (sec)'.

The drawing options menu is as shown below.

```
Drawing Options
-----
0. Plot Aspect Ratio (0.0 to use default)      :
1. Draw axes.                                  (MENU)
2. Draw box edges around plot.                 (MENU)
3. Draw grid lines.                            (MENU)
4. Draw tick marks.                            (MENU)
5. Draw numeric labels.                        (MENU)
6. Plotting ranges.                            (MENU)
7. Plot labels.                                (MENU)
ENTER SELECTION ((cr) to continue) :
```

Selection '0' allows the user to specify the plot aspect ratio (height/base). If this is set as zero the maximum available display area will be used. If the plots are only being displayed via meta-files the aspect ratio will be unity.

Selection '1' allows the user to control whether or not the X-axis and/or Y-axis is displayed on the plot. The default is to draw them if they are within the plot ranges.

Selection '2' allows the user to control whether or not a box is drawn around the plot. The default is to draw the box.

Selection '3' allows the user to draw a vertical and/or horizontal grid pattern on the plot. The grid lines will be drawn at the major tick mark positions. The default is not to draw a grid pattern.

Selection '4' allows the user to draw major and minor ticks marks along the plot box edges. The tick spacing can be explicitly set by the user or left for the program to determine. The ticks can also be drawn inside or outside the plot box. The default is to draw both the major and minor ticks (inside the plot box).

Selection '5' allows the user to draw numeric labels on the plot box edges at the major tick mark positions. The numeric labels can be drawn inside or outside the plot box. The default is to draw numeric labels (outside the plot box).

Selection '6' allows the user to set the plot limits, that is, the plot X and Y axes minima and maxima.

Selection '7' displays the sub-menu for setting the plot labels, which include the X and Y axes labels and the plot title.

#### 1.2.6.1 Plot Labelling

The set-labels-menu is as follows;

```
Plot Labels
-----
0. (Notes on Labelling)
1. Title label :
2. X-axis label :
3. Y-axis label :
4. Fonts : Title (Complex)
5.          X-axis (Complex)
6.          Y-axis (Complex)
7. Colours : Title (Normal)
8.          X-axis (Normal)
9.          Y-axis (Normal)
10. Display labels
ENTER SELECTION ((cr) to continue) :
```

Selection '0' displays several screens of notes on the available plot labelling functions.

Selections '1' to '3' are used to enter the plot label strings. The plot labelling functions listed below may be effected by inserting the corresponding substring within the label string.

Function	Substring
Change to font (FontID)	[FONT=(FontID)]
Begin and End superscript	[BSUP],[ESUP]
Begin and End subscript	[BSUB],[ESUB]
Begin and End uppercase	[BUC],[EUC]
Begin and End lowercase	[BLC],[ELC]
Begin and End underline	[BUND],[EUND]
Put the current position (X,Y) in the string onto the position stack	[PUSH]
Set the current position (X,Y) in the string to the value on the position stack	[POP]

The label is written in the font specified in the Set-Labels-Menu until the [FONT=(FontID)] function is specified, upon which the font type will change to the font identified (see list below for valid (FontID)). To change back to the set (default) font insert the substring [FONT=DEF].

- Font Identifiers -

SIM	Simplex	iSIM	Italic Simplex
DUP	Duplex	iDUP	Italic Duplex
COM	Complex	iCOM	Italic Complex
TRI	Triplex	iTRI	Italic Triplex
GRE	Greek	iGRE	Italic Greek
SCR	Script	iSCR	Italic Script
CYR	Complex Cyrillic	iCYR	Italic Complex Cyrillic
ENG	Gothic English	iENG	Italic Gothic English
GER	Gothic German	iGER	Italic Gothic German
ITA	Gothic Italian	iITA	Italic Gothic Italian
SWE	Swedish	iSWE	Italic Swedish
SYM1	Symbolic I	SYM2	Symbolic II
DEF	Default font (as set in menu)		

EXAMPLES :

1. Example [BUND] Label [EUND]  
Label has underlined section.
2. [FONT=GRE]s[BSUB]1[ESUB][FONT=DEF] (Mpa)  
This produces a label of a Greek s (sigma) with a sub-scripted '1', followed by '(MPa)' in the default font.
3. h[PUSH][FONT=SWE][BSUP]y[ESUP][POP][BSUB]x[ESUB]  
This produces a label of 'h' (in the default font) with a superscript 'y' (in the swedish font) and a subscript 'x' (still in the swedish font).  
The [PUSH] function saves the drawing position after the 'h' is drawn. The 'y' superscript is then drawn in the character position following the 'h'. So that the 'x' subscript is drawn on the 'h' (i.e under the 'y' superscript) the drawing position is returned to the saved position using the [POP] function which restores the position stored by the last call to the [PUSH] function.

Selections '4' to '6' enable the user to set the default fonts for the labels. Whenever a default font is set, the font menu will be displayed. This menu contains a 'Font Demonstration' option, which allows the user to display any number of fonts to the screen and/or output to a plotter. Figure 1.2 shows the font-demonstration for all available fonts.

Selections '7' to '9' enable the user to set the default colours for the labels. They are only applicable to colour terminals and colour plotters.

Selection '10' is available to graphics terminals only. It enables the user to display the labels on the screen before drawing the plot.

After the desired drawing options have been selected, a carriage return will start the plotting. When the plot has been finished on the screen the program will pause until the user enters a carriage return. The next menu displays what options are available to the user.

### 1.2.7 Continuation Options - GENPLOT Plotting Features

The following menu is displayed when the user responds to the continuation prompt following the completion of any plot :

```
Your Options are :
-----
0. EXIT
1. Re-start program for new plot
2. HardCopy (write Metafile)
3. Make Legend (MENU)
4. Make Single Lines of text (MENU)
5. Zoom (MENU)
6. Re-draw non-zoom plot (MENU)
7. Change Drawing Options
8. Change Plotting Options
ENTER SELECTION :
```

If option '0' or '1' is selected and a hardcopy was selected at any stage in the run the following series of events will occur :

- a) The type of plotter (or any supported DI-3000 device) for which the user wants a Meta-Command-File (MCF) created for must be selected.  
A MCF is an ELXSI shellfile (see p7-1, ref. 2) from which the selected device meta-translator will read commands to draw all the requested plots.  
More than one MCF can be requested if the user requires output to more than one output device. However, most of the meta-translators will use the identical MCF hence multiple copies are not always required. The user will be informed if this situation arises.
- b) If a Zeta-8 or Zeta-53 plotter is selected the plot frame height will be required. The plot base length will be determined using the plot aspect ratio.
- c) Several screens of notes are displayed, describing the new files the user will have in the current directory. These new files include the device-independent picture files and the selected output device command file(s).
- d) If a Zeta plotter is selected the user is asked if the plots are to be spooled.

e) A brief reminder on how to use the selected meta-translator is displayed if a non-Zeta device was selected for output.

If the 'EXIT' option is selected the program will then terminate. If the Re-Start option is selected the program will partially initialise itself and start again at the 'Enter number of lines of plot : ' request. The partial initialisation means that all plotting-option menu values, drawing options (including plot labels), and default fonts and colours will be maintained from the previous run.

The 'Hard-Copy' option allows the user to save the latest plot on a user-named Meta-Picture-File (MPF) for later output to selected devices, via the MCF. When this selection is chosen for the first time in a run, the user is required to enter a MCF name. This file is used by the selected device meta-translator as its source of commands to draw all the requested plots. Every time this option is selected the user is requested to enter a MPF name. These files will contain the device-independent plot information.

The 'Legend' option allows the user to create one of two types of legend on the latest picture. The first type of legend is one where a line sample for each line type on the plot is drawn next to a user-entered line identifier. The second type of legend consists only of user-entered text lines. Both types of legend text may utilise the plot-labelling functions (such as subscripts and font-changes), and both must be positioned within the plot box by the user specifying the top left corner of the legend box (in plot co-ordinates).

The 'Single-Text-Line' option allows the user to draw any number of single lines of text on the latest picture at user-specified positions within the plot box (in plot co-ordinates). The text lines may utilise the plot-labelling functions. Each text line must be positioned by specifying the starting position of the line on the plot.

The 'Zoom' option allows the user to display any section of the plot in more detail by specifying an area (in the plot co-ordinates) to draw.

If a legend has previously been created in a non-zoom plot the user will be given the following options :

1. Don't redraw the legend onto this zoom plot.
2. Redraw the available legend at the same position on the screen as when it was created.
3. Redraw the available legend on the plot at the same plot co-ordinate position as when it was created. If this co-ordinate is outside the zoom area then this option will be disallowed.
4. Redraw the available legend at a new co-ordinate position. The user will be requested to enter the new legend position (in plot co-ordinates).

If single text lines have been previously created the user will be informed and given the option of having them drawn on the zoom plot. If the text lines are to be redrawn on the zoom plot, they are drawn at the same plot co-ordinate positions as when they were created. If a co-ordinate is outside the zoom area or the text line extends outside the area, then that text line will not be reproduced on the zoom plot.

The 'Re-Draw' option allows the user to re-display the non-zoom plot. If a legend has been created previously in either a non-zoom or zoom plot then the user has the option of redrawing it. If single text lines have been created previously in either a non-zoom or zoom plot then the user has the option of redrawing them. The user also has the option of masking (not-drawing) any line(s) on the plot.

The 'Change-Drawing-Options' selection allows the user to return to the Drawing-Options menu to alter any of these for ensuing plots. The menu will no longer contain the plot aspect ratio set option, and will contain a change-line-characteristics option.

The 'Change-Plotting-Options' selection returns the user to the Plotting-Options menu to allow the user to change the number of lines on the plot and/or change the plot data for any of the lines to be plotted. After any changes are made the run continues by going through the set-drawing-options menu and then creates the new plot. Any previously created legends and/or single text lines will no longer be available for the new plot.

### 1.3 Example Run

Three pairs of data columns from results files obtained from an aircraft simulation program were entered into GENPLOT via the Plotting-Option-Menus, on a DEC VT-240 terminal.

Figure 1.3a shows the plot obtained (on a Zeta-8 plotter) by leaving all the drawing options as set by the program.

Figure 1.3b shows the plot obtained by changing the plot limits and setting plot labels. The plot data ranged from 0.075 to 9.925 along the X-axis and -66.886 to 310.976 along the Y-axis. Extending the plot ranges to 0.0 to 10.0 and -70.0 to 320.0 allows a small margin around the data so that the box doesn't mask any data, and the tick marks and numeric labels reach the plot limits at a 'round' value.

The plot labels were set as follows :

```
Title : [BUND]Example Plot Title[EUND]
X-axis : Time ([FONT=SCR]sec[FONT=DEF])
Y-axis : [FONT=SWE] VELOCITY [FONT=DEF]
([FONT=SCR]v[FONT=DEF]=[FONT=GRE]![FONT=DEF][PUSH]
[BSUB] t [BSUB] 0 [ESUB] [ESUB] [POP]
[BSUP] t [BSUB] 1 [ESUB] [ESUP]
[FONT=SCR] a [FONT=SWE] dt [FONT=DEF] ) ft/sec
```

Spaces before and after a character function are significant. A space in the label specifications will be drawn as a space on the plot label wherever it appears in the label string. If the underline function is on, then any spaces will also be underlined.

The plot labels are entered 60 characters at a time up to a maximum of 300 characters. At the end of each line a carriage return must be entered to continue entering the label. The label will be displayed on the plot as a single line. Labels will be drawn in a program-defined size. If a very long label exceeds the length of the plot the program will reduce the character sizing until the label is small enough to fit inside the plot window.

Figure 1.3c shows the plot of Fig 1.3b with a line-sample-type legend. To get this the user entered :

Legend Position : X = 6  
Y = 240

Line Identifiers : 1 = u  
2 = w  
3 = v

Figure 1.3d is a zoom plot with the legend created in Fig 1.3c redrawn at a new co-ordinate position. The user entered :

Zoom Area : Xmin = 0.0  
Xmax = 4.0  
Ymin = -70.0  
Ymax = 70.0

Redraw legend at X = 2.2  
Y = -20.0

Figure 1.3e shows the non-zoom plot with an all-text legend and 3 single text lines. The Change-Drawing-Option was also used to alter the line characteristics for all three lines.

The single text lines were made by specifying :

Positions : 1 = (5.0,275.0)  
2 = (3.0,55.0)  
3 = (2.2,-20.0)

Text Lines : 1 = [font=scr]u[font=def] (X-direction Velocity)  
2 = [font=scr]w[font=def] (Z-direction Velocity)  
3 = [font=scr]v[font=def] (Y-direction Velocity)

Figure 1.3f is a zoom plot of Fig 1.3e with the single text lines redrawn and without the legend. Note that only one single text line was redrawn. This is because it was the only one which stayed within the zoom plot box.

---

## PART II : GENPLOT Reference Manual

---

### II.1 Introduction

GENPLOT can be divided into six major areas. The main controlling routines, Plotting-Options routines, Drawing-Options routines, Plotting routines, Continuation-Options routines, and the general library routines.

Every routine in GENPLOT is a separate file. These files are compiled separately and the object files grouped into object libraries.

This section of the document details GENPLOT's directory and file structure, and gives some discussion of program topics. A brief explanation of all routines is also given.

### II.2 Directory Structure

GENPLOT is structured such that the executable programs and command files (compilation, object library construction, binding, etc.) are in the GENPLOT root directory. All source code and object libraries, etc., are in GENPLOT sub-directories.

Figure II.1 shows the directory structure. The source code sub-directories also contain command files for compiling and making the object library for the files in that directory.

Because the Start-Up program is an independent program, its source code is in a separate directory, but the executable file is in the GENPLOT root directory. The Start-Up program is run by a shellfile in the commands directory.

Figure II.2 shows the directory links (via object libraries) and file structure for the program. The Start-Up program makes use of some general library routines and therefore is bound with the object library. Some include files are also referenced from the include file directory.

### II.3 Start-Up Program

The independent fortran program GENPLOT.StartUp has two purposes. Firstly, it creates a Start-Up-File, named GENPLOT.SUF, in the users current directory. This file contains the user selected Terminal-Type and Draw-Plots-to-Screen flag. Secondly, it runs the appropriate terminal type executable version of GENPLOT. Terminal-Type is used to determine which version to run, and is used in GENPLOT for the terminal-specific functions of routine TERM in the general library.

When GENPLOT starts, the first thing it looks for is the existence of a correctly formatted GENPLOT.SUF file. The Terminal-Type and Screen-Flag are read from the file, after which the file is deleted. The user will generally be unaware of this file's existence unless the program run is interrupted while the file exists. If the user has a file called GENPLOT.SUF before starting GENPLOT via GENPLOT-Start-Up, then the user will be notified and given the option of overwriting the file or renaming the pre-existing file.

GENPLOT implements the DI-3000 graphics language library routines. Calls to DI-3000 commands (library routines) are device independent in the application source code. When the application object code is bound (linked) into an executable file, the DI-3000 routines must also be bound in to this file. A DI-3000 device driver must also be bound in, so that the device

independent object code is transformed into machine code for the specified output device.

The terminal type selection in the Start-Up program reflects the available DI-3000 device drivers. A bound version of GENPLOT must be made for each device type which GENPLOT is to be used. Shellfiles exist in the main GENPLOT directory for binding various device versions of GENPLOT. If the user selects a terminal type in the start-up program for which a bound version does not exist the user will be notified. The user is then given the option of requesting a permanent GENPLOT version be made for the device or making a temporary GENPLOT version constructed for the current run only. If a permanent version is requested mail is sent to the GENPLOT resident area. The user will then have to wait until the mail is read and acted upon. A version for that terminal type will then have to be created and made available to the users. If a temporary version is requested, an executable version for the specified device type is constructed in the user's area and subsequently deleted upon exiting the run.

#### II.4 Plot Construction

GENPLOT uses DI-3000 retained segments to create each plot as individual sections, to be fitted together as required to construct the requested plot. This saves computation work when the original plot is added to and/or modified by the user using the Continuation-Options.

Every plot will consist of some of the following segments :

BOX	(Plot frame, axes, tick marks, numeric labels)
LABEL	(Plot title and axes labels)
LINES + n	(n plot data lines)
LEGEND	(Plot legend)
L1	{Plot single-text-lines}
ZOOMBOX	(Plot box for zoom plot)
ZOOMLINE + n	(n plot data lines for zoom plot)
NEWLEGD	(Plot legend other than original)
NEWL1	(Plot single-text-lines other than original)

When a retained segment is created it is invisible (i.e not displayed). This attribute is selected when DI-3000 is initialised. After all required segments have been constructed for a particular plot they are made visible on the initialised display devices (screen and/or meta-file) using the DI-3000 Batch-of-Updates. This allows DI-3000 to draw the picture in what it determines the most efficient manner. The segments required for a plot and those available for plotting are kept track of by two sets of flags : FLAGxxx and CurPlotxxx, where xxx indicates a segment name.

#### II.5 Meta-Files

GENPLOT draws all plots to the DI-3000 created meta-file (META-DAT). The plots are also drawn on the terminal screen if the user has requested them via the screen flag, set in the Start-Up program.

Whenever a retained segment is made visible, it is drawn to all selected display devices. Display device 0 corresponds to the metafile and display device 1 to the screen.

If the user selects the 'Hard-Copy' option for the current picture, the metafile containing the output-device-independent picture information will

be renamed to the user-selected MPF name. To rename the METADAT file, the metafile must first be de-selected and terminated. After renaming the file, the metafile is re-initialised, re-selected, and all retained segments re-associated with the metafile display device. This is done because when the metafile was terminated all retained segments associated with the device are dis-associated. When the metafile is re-initialised access to the existing retained segments is still required for the new metafile.

If the current picture metafile isn't renamed via 'Hard-Copy', then the METADAT file is terminated and deleted before the next picture is started. This is done by the 'initMETAFILE' routine, called when the ZOOM, LEG-END, SINGLE, or REDRAW routines are setting-up prior to constructing the next picture.

## II.6 Meta-Translators

When the user decides to finish a run, by selecting either the 'EXIT' option or 'Restart Program' option, all 'Hard-Copy' requests are processed for output to any user-selected output device(s).

The available, so-called 'output devices' are actually the available device meta-translators. The meta-translator converts the device independent picture information files (MPF's, which are renamed METADAT files) into plot information for the particular output device. Meta-translators are available for hard-copy devices (plotters) as well as graphics terminals, which makes the term 'Hard-Copy' option somewhat misleading since the MPF's created by the 'Hard-Copy' option can be used by plotters and graphics terminals. However, it is assumed that hard-copy devices would be selected in most cases.

When the user selects an output device, the routine 'OUTHARD' constructs the Meta-Command-File (MCF). The MCF is a file containing the meta-translator commands for outputting all the requested pictures (MPFs) to the particular device. The MCF is constructed so that the user does not need to know how to use the meta-translator, except how to start it and enter the command source file name. Just before the final exit message from GENPLOT the user is given a small explanation on how to run the selected meta-translator.

Users with knowledge of DI-3000 meta-translators can manipulate the MPFs to create multiple picture plots, boxed plots, zoom effects, and so on. See the DI-3000 users guide (Ref. 1) for more information.

On the ELXSI System 6400, a command exists for spooling plots to the Zeta-8 and Zeta-53 plotters. This command (plot.zt8/plot.z53) uses the 'zt8' and 'z53' meta-translators implicitly and creates a plot header. If the user selects one or both of the Zeta plotters, then a MCF is made which uses the plot.zt8/z53 command. The user is requested to enter the required plot frame height. The plot base dimension is determined in GENPLOT using the picture aspect ratio (set in the Drawing-Options menu). This is done because the output plot aspect ratio (height/base) must equal the metafile picture aspect ratio. The user is also asked if he wants the plots spooled to the plotter.

If any output device, other than the Zeta-plotters, is selected the MCF will contain identical commands. The only difference is the MCF name extension and the explanatory comments to the user on meta-translator use.

### **II.7 Subroutine Summary**

A brief explanation of all GENPLOT routines, grouped into their respective directories, is presented in Appendix II.1. Also refer to Figure's II.1 and II.2. Note that the directory named INC contains only include files. These files consist only of common blocks and/or data declarations.

---

## REFERENCES

1. Precision Visuals *DI-3000 User's Guide*. 1982.
2. ELXSI *EMBOS User's Guide, Volume 1*. 1983.

## APPENDIX 1 : GENPLOT Subroutine Summary

### Controlling Routines : MAIN

GENPLOT	Controlling routine for the program.
getSTARTUP	Reads Start-Up-File created by GENPLOT.StartUp .
showHEADER	Displays program header.
getNUMLINE	Gets number of lines to be plotted.
INIT	Initialises all variables and sets default values.
(Entry-Point : PartialINIT - Initialises flags and counters)	
PLOT_OPTS	Displays Plotting-Options menu and acts on users selection (see PLOT_OPTS section II.7.2).
chgPLOT_OPTS	Displays Plotting-Options-Check menu and allows users to alter number of lines on plot or change any line data.
chgNUMLINE	Change number of lines on plot.
MINMAX	Determine data minimum and maximum for all lines.
LINECHAR	Set line characteristics.
showLINECHARsumm	Display line characteristics summary.
chgLINECHAR	Change selected line characteristics.
DRAW_OPTS	Displays Drawing-Options menu and acts on users selection (see DRAW_OPTS section II.7.3).
CONTOPTS	Displays Continuation-Options menu and acts on users selection (see CONTOPTS section II.7.5).

### Plotting-Options Routines : PLOT\_OPTS

PLOT_OPT1	Enter line data via Plotting-Option-1.
PLOT_OPT2	Enter line data via Plotting-Option-2.
PLOT_OPT3	Enter line data via Plotting-Option-3.
PLOT_OPT4	Enter line data via Plotting-Option-4.
getDATFIL	Get data file name.
getNUMCOL	Get number of columns in data file.
getLSTART	Get line number to start reading data file.
getLINEND	Get line number to end reading data file.
getNOSKIP	Get number of lines to skip between reading data from file.
getCOLNUM	Get column number to plot.



### Plotting Routines : PLOTTING

setWINDOW	Set the plot window limits.
BOX	Controls the construction of the plot box (frame, axes, grid, ticks marks, numeric labels)
drawFRAME	Draws the plot box frame edges if required.
drawAXES	Draws the plot box axes if required.
setupTICKS	Sets up the tick mark parameters.
setupMajorTicks	Sets up the major tick attributes.
setupMinorTick	Sets up the minor tick attributes.
getTickStart	Determines the position to start making tick marks.
drawMajorXticks	Draws the major tick marks along the X-axis.
drawMinorXticks	Draws the minor tick marks along the X-axis.
drawMajorYticks	Draws the major tick marks along the Y-axis.
drawMinorYticks	Draws the minor tick marks along the Y-axis.
setupXnumericLabels	Sets up the X-axis numeric label attributes.
drawXnumericLabels	Draws the X-axis numeric labels.
setupYnumericLabels	Sets up the Y-axis numeric label attributes.
drawYnumericLabels	Draws the Y-axis numeric labels.
drawMinorXticks	Draws the minor tick marks along the X-axis.
REALNUMtoCHAR	Converts the numeric label real number to its character equivalent.
chkRNDERR	Checks for and corrects rounding errors of numeric labels.
assembleNUMLABS	Constructs the numeric label character strings.
refineNUMLABS	Refines the numeric label character strings for final output to the plot.
LABEL	Draws the plot labels.
LABELchkSize	Checks and adjusts the label size to avoid extending beyond plot window.
LINES	Draws the data lines on the plot.
CLIP	Clips the data (used for zoom plots) to ensure only data within the plot box is displayed.
drawRECT	Draws a rectangular-shaped marker at the specified position on the plot.
drawTRI	Draws a triangular-shaped marker at the specified position on the plot.
drawBOW	Draws a bow-tie-shaped marker at the specified position on the plot.
drawINVTRI	Draws an inverted triangular-shaped marker at the specified position on the plot.
drawHRGLASS	Draws an hour-glass-shaped marker at the specified position on the plot.
drawDIAMOND	Draws a diamond-shaped marker at the specified position on the plot.

### Continuation-Options Routines : CONTOPTS

SHUTDOWN	Tidies up at the end of each run. Outputs requested hard-copies to selected devices.
ZOOM	Makes a zoom plot of a selected area of the plot.
LEGEND	Makes a legend for the plot.
LEGENDnotes	Displays notes to the user on legend construction.
getLEGENDposition	The Top-Left-Corner of the legend box is positioned by the user.
getLEGENDextent	Determines the extent of the legend within the plot.
setLEGENDbox	Sets the legend box limits.
makeLEGEND	Creates the legend.
SINGLE	Makes single lines of text for the plot.
SINGLEnotes	Displays notes to the user on Single-Text-Line construction.
makeSINGLE	Creates the single text line.
REDRAW	Redraws the non-zoom plot.
HARDCOPY	Makes the current picture Meta-Picture-File for later use to output hard-copies to devices.
getMCFname	Gets the Meta-Command-File name from the user.
showMFsumm	Displays the Meta-(Command/Picture)-File names.
getMPFname	Gets the Meta-Picture-File name from the user.
OUTHARD	Gets the selected output device(s) for hard-copies and makes the relevant Meta-Command-File(s).
PlotAdvance	Advances program to the next plot.
initMETAFILE	Initialises the DI-3000 metafile METADAT if the latest picture wasn't sent for hard-copy.

### General Library Routines : GENERAL

CLRSCR	Clears the terminal screen.
UPCASE	Coverts a string to all upper-case characters.
DELETE	Delete a file from the users current directory.
RENAME	Renames a file in the users current directory.
chkEXIST	Checks for existance of file in users current directory.
PATH	Constructs the file path name (Directory/FileName) and performs existence checks.
StringLength	Determines the length of the entered string.
CONTPROMPT	Displays a continuation prompt and awaits reply.
WAIT	Displays a wait message to user while program finishes computations.
BELL	Emits audio warning bell specified number of times.
READREAL1	Enters one real number from user. The number is read as a character string, checked, and converted to a real number.
READINT1	Enters one integer number from user. The number is read as a character string, checked, and converted to an integer number.
CHARNUMtoINT	Converts a character string number to its integer equivalent.
INTtoCHAR	Converts an integer to its character equivalent.
swapYN	Swaps over (YES) and (NO) strings.
CONFIRM	Seeks a Y/N confirmation before continuing.
chkINTrange	Checks that the entered integer is inside a given range.
chkREALrange	Checks that the entered real number is inside a given range.
TERM	Terminal specific functions (e.g reset, intensity).
deviceINIT	Initialises the D1-3000 display device (screen and/or metafile).
ERRMSG	Displays errors messages.
EXITMSG	Displays program exit message.

FIGURE I.1 : Directory Specification Sample Structure

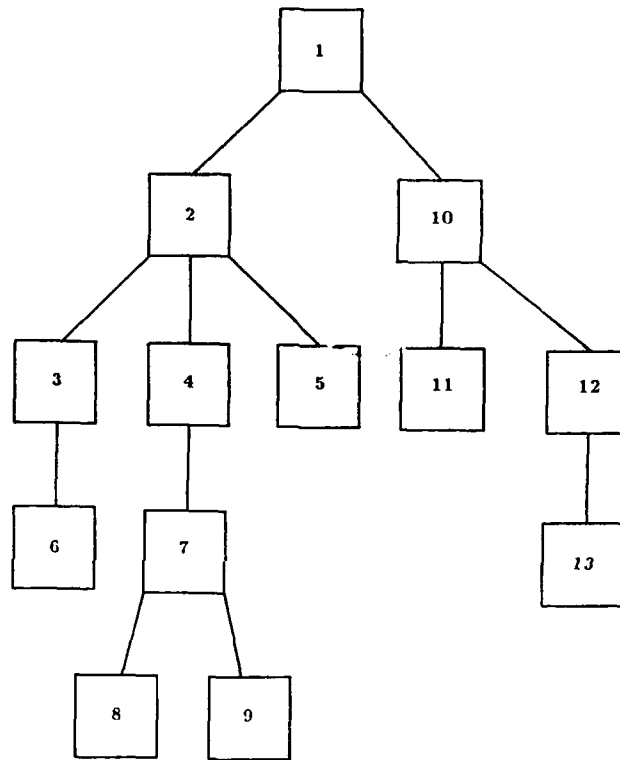


FIGURE I.2 : Font Demonstration

```
<Simplex>
  abcdefghijklmnopqrstuvwxyz
  ABCDEFGHIJKLMNOPQRSTUVWXYZ
  0123456789
  ~!@#$$%~&*() --+=
  [ ] { } < > ; : " \ / ? ,

<Italic Simplex>
  abcdefghijklmnopqrstuvwxyz
  ABCDEFGHIJKLMNOPQRSTUVWXYZ
  0123456789
  ~!@#$$%~&*() --+=
  [ ] { } < > ; : " \ / ? ,

<Duplex>
  abcdefghijklmnopqrstuvwxyz
  ABCDEFGHIJKLMNOPQRSTUVWXYZ
  0123456789
  ~!@#$$%~&*() --+=
  [ ] { } < > ; : " \ / ? ,

<Italic Duplex>
  abcdefghijklmnopqrstuvwxyz
  ABCDEFGHIJKLMNOPQRSTUVWXYZ
  0123456789
  ~!@#$$%~&*() --+=
  [ ] { } < > ; : " \ / ? ,

<Complex>
  abcdefghijklmnopqrstuvwxyz
  ABCDEFGHIJKLMNOPQRSTUVWXYZ
  0123456789
  ~!@#$$%~&*() --+=
  [ ] { } < > ; : " \ / ? ,

<Italic Complex>
  abcdefghijklmnopqrstuvwxyz
  ABCDEFGHIJKLMNOPQRSTUVWXYZ
  0123456789
  ~!@#$$%~&*() --+=
  [ ] { } < > ; : " \ / ? ,

<Triplex>
  abcdefghijklmnopqrstuvwxyz
  ABCDEFGHIJKLMNOPQRSTUVWXYZ
  0123456789
  ~!@#$$%~&*() --+=
  [ ] { } < > ; : " \ / ? ,

<Italic Triplex>
  abcdefghijklmnopqrstuvwxyz
  ABCDEFGHIJKLMNOPQRSTUVWXYZ
  0123456789
  ~!@#$$%~&*() --+=
  [ ] { } < > ; : " \ / ? ,
```

FIGURE I.2 : Font Demonstration (cont.)

<Greek>  
αβγδεζηυι κλμνξοπρστυφ χψω  
ΑΒΓΔΕΖΗΘΙ ΚΑΜΝΞΟΠΡΣΤΥΦ ΧΨΩ  
0123456789  
~!@#%&\*() - +=  
[]{}<>:;"'\`/?.

<Italic Greek>  
*αβγδεζηυι κλμνξοπρστυφ χψω*  
*ΑΒΓΔΕΖΗΘΙ ΚΑΜΝΞΟΠΡΣΤΥΦ ΧΨΩ*  
*0123456789*  
*~!@#%&\*() - +=*  
*[]{}<>:;"'\`/?.*

<Script>  
*αβγδεζηυι κλμνξοπρστυφ χψω*  
*ΑΒΓΔΕΖΗΘΙ ΚΑΜΝΞΟΠΡΣΤΥΦ ΧΨΩ*  
*0123456789*  
*~!@#%&\*() - +=*  
*[]{}<>:;"'\`/?.*

<Italic Script>  
*αβγδεζηυι κλμνξοπρστυφ χψω*  
*ΑΒΓΔΕΖΗΘΙ ΚΑΜΝΞΟΠΡΣΤΥΦ ΧΨΩ*  
*0123456789*  
*~!@#%&\*() - +=*  
*[]{}<>:;"'\`/?.*

<Complex Cyrillic>  
абэдійфгжичклмнопшрстювщхуз  
ΑΒЭДЙФГЖИЧКЛМНОПШРСТЮВЩХУΖ  
0123456789  
ь'!@#ЫЦЯы\*() - +=  
ЕЪея<>:;"'\`ь/?.

<Italic Complex Cyrillic>  
*абэдійфгжичклмнопшрстювщхуз*  
*ΑΒЭДЙФГЖИЧКЛМНОПШРСТЮВЩХУΖ*  
*0123456789*  
*ь'!@#ЫЦЯы\*() - +=*  
*ЕЪея<>:;"'\`ь/?.*

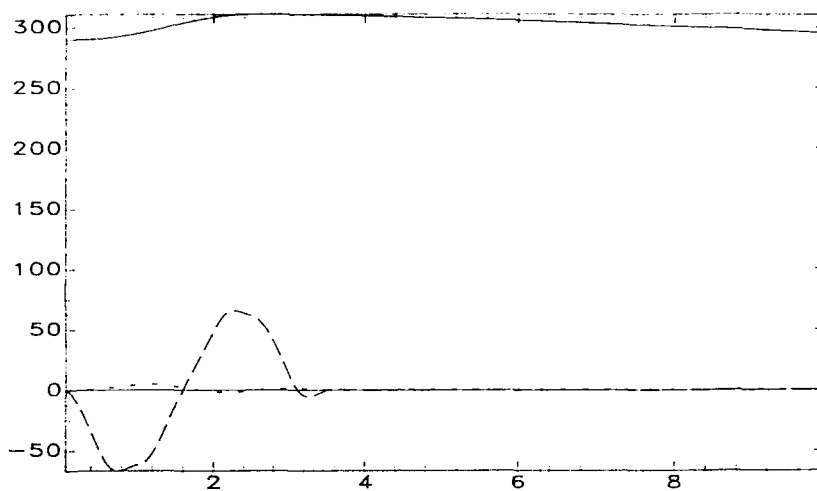
<Gothic English>  
**αβγδεζηυι κλμνξοπρστυφ χψω**  
**ΑΒΓΔΕΖΗΘΙ ΚΑΜΝΞΟΠΡΣΤΥΦ ΧΨΩ**  
**0123456789**  
**~!@#%&\*() - +=**  
**[]{}<>:;"'\`/?.**

<Italic Gothic English>  
***αβγδεζηυι κλμνξοπρστυφ χψω***  
***ΑΒΓΔΕΖΗΘΙ ΚΑΜΝΞΟΠΡΣΤΥΦ ΧΨΩ***  
***0123456789***  
***~!@#%&\*() - +=***  
***[]{}<>:;"'\`/?.***

.../cont.

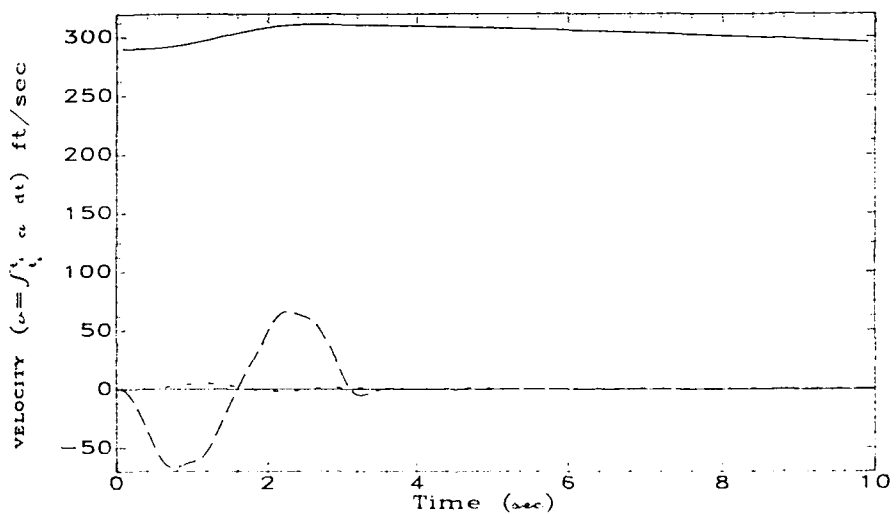


FIGURE I.3 : Example Run Plots



(a) With Default Drawing Options

Example Plot Title

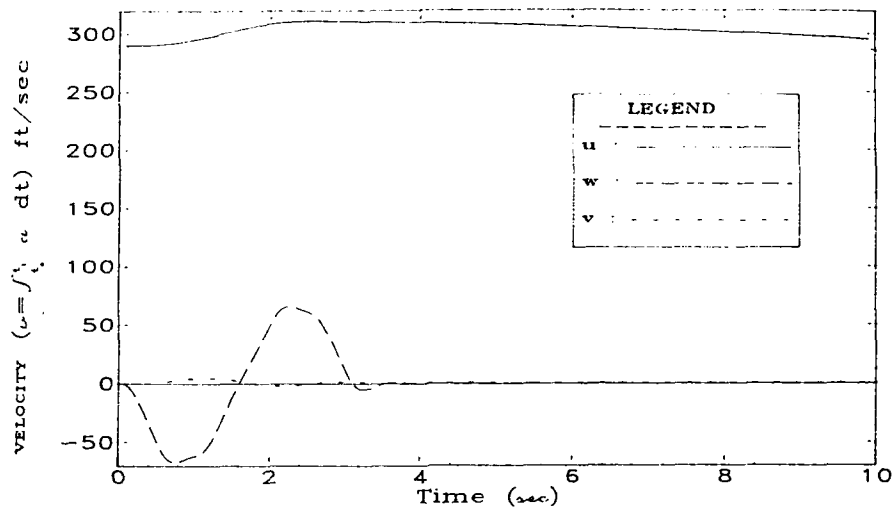


(b) Set Plot Limits and Plot Labels

.../cont.

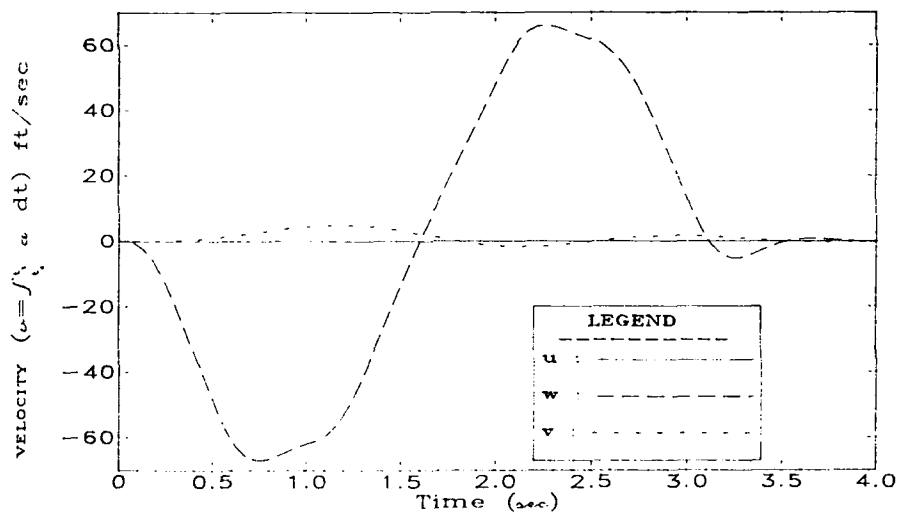
FIGURE I.3 : Example Run Plots (cont.)

Example Plot Title



(c) With Line-Sample-Type Legend

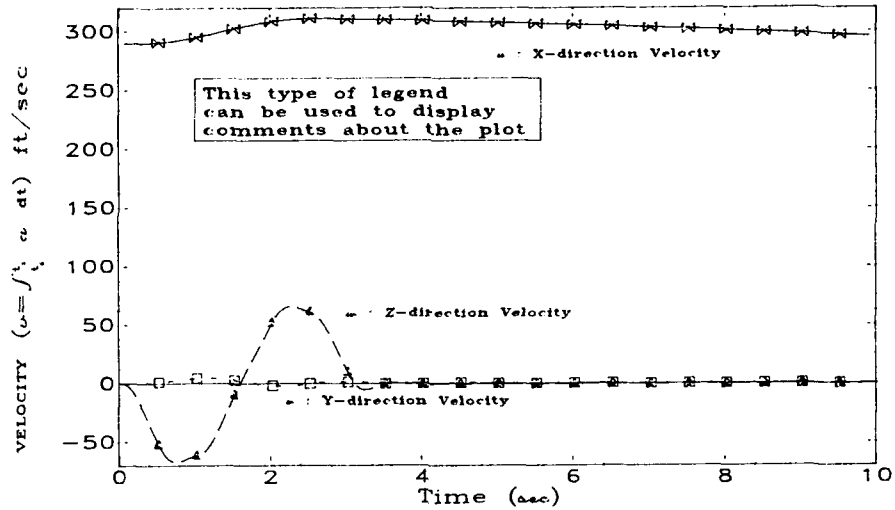
Example Plot Title



(d) Zoom Plot with Legend

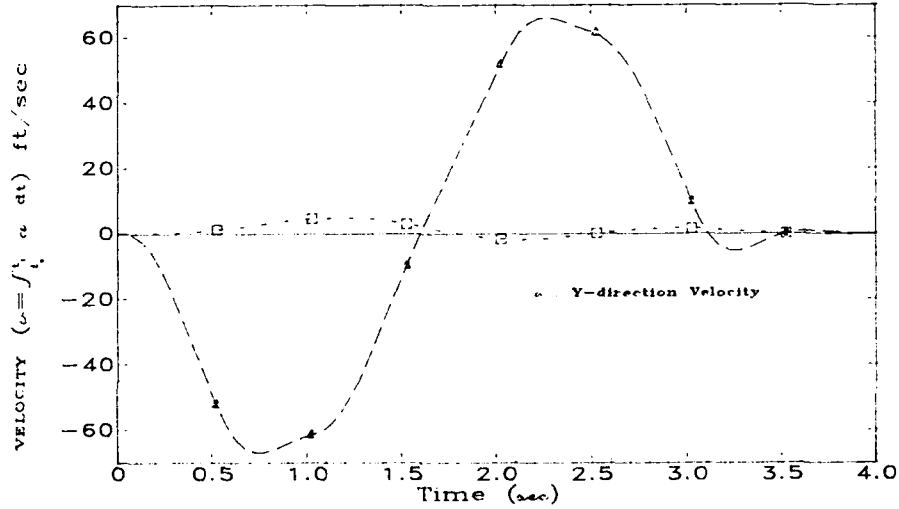
FIGURE I.3 : Example Run Plots (cont.)

Example Plot Title



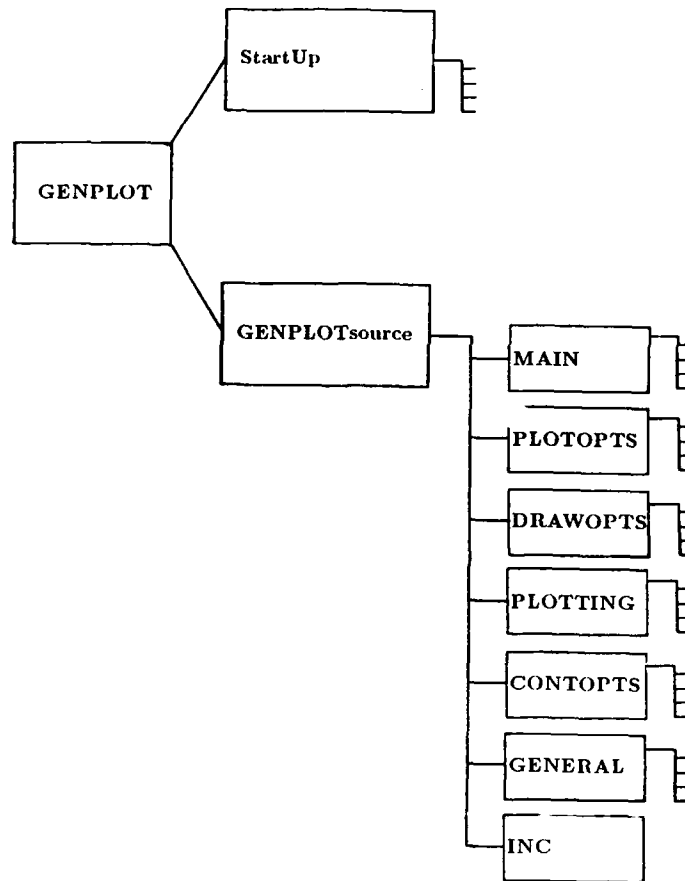
(e) With All-Text Legend and Single Text Lines

Example Plot Title



(f) Zoom Plot with Single Text Lines

FIGURE II.1 : GENPLOT System Directory Structure




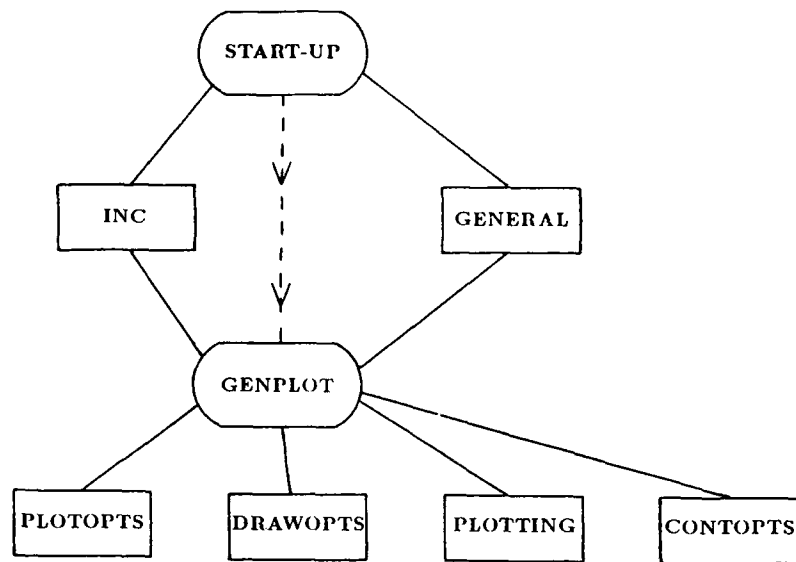
 indicates the four directories .o, .l, .e, and .s ,  
where .o' contains the object files.  
.l' contains the listing files.  
.e' contains the compilation error files.  
.s' contains the compilation summary files.  
INC contains only include files.

FIGURE II.2 : GENPLOT Program Structure



**DISTRIBUTION**

**AUSTRALIA**

Department of Defence

Defence Central

Chief Defence Scientist  
FAS Science Corporate Management (shared copy)  
FAS Science Policy (shared copy)  
Director, Departmental Publications  
Counsellor, Defence Science, London (Doc Data Sheet Only)  
Counsellor, Defence Science, Washington (Doc Data Sheet Only)  
S.A. to Thailand MRD (Doc Data Sheet Only)  
S.A. to the DRC (Kuala Lumpur) (Doc Data Sheet Only)  
OIC TRS, Defence Central Library  
Document Exchange Centre, DISB (18 copies)  
Joint Intelligence Organisation  
Librarian H Block, Victoria Barracks, Melbourne  
Director General - Army Development (NSO) (4 copies)  
Defence Industry and Materiel Policy, FAS

Aeronautical Research Laboratory

Director  
Library  
Chief - Aircraft Systems  
Author: A.G. Page  
PO FMG (10 copies)  
PO CS (10 copies)

Materials Research Laboratory

Director/Library

Defence Science & Technology Organisation - Salisbury  
Library

Navy Office

Navy Scientific Adviser (3 copies Doc Data sheet only)

Army Office

Scientific Adviser - Army (Doc Data sheet only)

Air Force Office

Air Force Scientific Adviser (Doc Data sheet only)

Statutory and State Authorities and Industry

Aero-Space Technologies Australia, Manager/Librarian (2 copies)

Universities and Colleges

NSW

Library, Australian Defence Force Academy

SPARES (20 copies)

TOTAL (77 copies)

AL 149

DEPARTMENT OF DEFENCE

## DOCUMENT CONTROL DATA

PAGE CLASSIFICATION  
UNCLASSIFIED

PRIVACY MARKING

|   |  |  |   |
|---|--|--|---|
| 1a. AR NUMBER<br>AR-005-569   | 1b. ESTABLISHMENT NUMBER<br>ARL-SYS-TM-115 | 2. DOCUMENT DATE<br>APRIL 1989   | 3. TASK NUMBER<br>DST 87/030                |
| 4. TITLE<br>GENPLOT - General<br>Plotting Program<br>User Guide and Reference<br>Manual. Version 4.06   |  | 5. SECURITY CLASSIFICATION<br>(PLACE APPROPRIATE CLASSIFICATION<br>IN BOX(S) I.E. SECRET (S), CONF.(C)<br>RESTRICTED (R), UNCLASSIFIED (U) ).<br><br><input type="checkbox"/> U <input type="checkbox"/> U <input type="checkbox"/> U<br>DOCUMENT    TITLE    ABSTRACT | 6. NO. PAGES<br>36<br><br>7. NO. REFS.<br>2 |
| 8. AUTHOR(S)<br>A.G. PAGE   |  | 9. DOWNGRADING/DELIMITING INSTRUCTIONS<br>Not applicable.  |   |
| 10. CORPORATE AUTHOR AND ADDRESS<br><br>AERONAUTICAL RESEARCH LABORATORY<br>P.O. BOX 4331, MELBOURNE VIC 3001   |  | 11. OFFICE/POSITION RESPONSIBLE FOR:<br><br>SPONSOR _____ DSTO<br>SECURITY _____<br>DOWNGRADING _____<br>APPROVAL _____ CSYD   |   |
| 12. SECONDARY DISTRIBUTION (OF THIS DOCUMENT)<br><br>Approved for Public Release<br><br>OVERSEAS ENQUIRIES OUTSIDE STATED LIMITATIONS SHOULD BE REFERRED THROUGH ASDIS, DEFENCE INFORMATION SERVICES BRANCH, DEPARTMENT OF DEFENCE, CAMPBELL PARK, CANBERRA, ACT 2601   |  |  |   |
| 13a. THIS DOCUMENT MAY BE ANNOUNCED IN CATALOGUES AND AWARENESS SERVICES AVAILABLE TO....<br>No limitations.  |  |  |   |
| 13b. CITATION FOR OTHER PURPOSES (I.E. CASUAL ANNOUNCEMENT) MAY BE  |  | <input checked="" type="checkbox"/> UNRESTRICTED OR  | <input type="checkbox"/> AS FOR 13a.        |
| 14. DESCRIPTORS<br><br>Computer graphics<br>Plotting<br>DI-3000 (subroutines)<br>GENPLOT (computer program)   |  | 15. DRDA SUBJECT CATEGORIES<br><br>0062B   |   |
| 16. ABSTRACT<br>Program GENPLOT was designed to plot columns of numerical data in the form of strings of ASCII coded characters onto a graphics terminal screen and/or to a metafile for use by any device supported by a DI-3000 meta-translator.<br><br>The source code was written in Fortran-77 (on an ELXSI System 6400) and uses the DI-3000 graphics language library routines.<br><br>Four methods of plot data input are available: column versus column |  |  |   |

|                                     |
|-------------------------------------|
| PAGE CLASSIFICATION<br>UNCLASSIFIED |
| PRIVACY MARKING                     |

THIS PAGE IS TO BE USED TO RECORD INFORMATION WHICH IS REQUIRED BY THE ESTABLISHMENT FOR ITS OWN USE BUT WHICH WILL NOT BE ADDED TO THE DISTIS DATA UNLESS SPECIFICALLY REQUESTED.

|  |                             |                                       |
|--|-----------------------------|---------------------------------------|
| 16. ABSTRACT (CONT.)<br>from the same file, column versus column from two files, file versus file, and column versus time. The user enters the data for all lines to be plotted and selects the drawing options to be used for the plot.<br>GENPLOT is menu-driven and features zooming, legends, single lines of text on plot, and hardcopy options, as well as utilizing DI-3000 character functions (such as underline and multi-font text lines) for plot labelling, legend and single text line construction. |                             |                                       |
| 17. IMPRINT<br><br>AERONAUTICAL RESEARCH LABORATORY, MELBOURNE   |                             |                                       |
| 18. DOCUMENT SERIES AND NUMBER<br><br>Aircraft Systems<br>Technical Memorandum 115   | 19. COST CODE<br><br>721310 | 20. TYPE OF REPORT AND PERIOD COVERED |
| 21. COMPUTER PROGRAMS USED   |                             |                                       |
| 22. ESTABLISHMENT FILE REF.(S)   |                             |                                       |
| 23. ADDITIONAL INFORMATION (AS REQUIRED)   |                             |                                       |