POSTSCRIPT

PURPOSE

Direct graphical output to a Postscript device.

DESCRIPTION

Postscript is a popular device independent page description language supported by many vendors. Although Postscript is primarily used by laser printers (e.g., the Sun and Apple laser writers), it can be used by other types of devices (e.g., film recorders) as well.

Many word processing and page publishing programs import Postscript files thereby allowing graphics generated by other programs to be embedded with text. However, these programs normally require that the Postscript file be in an enhanced format called encapsulated Postscript. The DATAPLOT standard Postscript and encapsulated Postscript files are similar. The primary distinction is that encapsulated Postscript assumes each page is a separate entity since it will be embedded within another page. In addition, with encapsulated Postscript, the "showpage" command, which actually draws the page, is made a null command (for this reason, encapsulated Postscript files may not print anything when sent to a printer). Both the standard driver and the encapsulated driver use "conforming" structure (this may be required by some print spoolers).

By default, DATAPLOT writes all output to DEVICE 2 to the file DPPL1F.DAT. With encapsulated Postscript, you typically want each page to be in a separate file. To do this, enter something like the following:

    SET IPL1NA PLOT_1.DAT
    DEVICE 2 POSTSCRIPT ENCAPSULATED
    PLOT ...
    DEVICE 2 CLOSE
    SET IPL1NA PLOT_2.DAT
    DEVICE 2 POSTSCRIPT ENCAPSULATED
    PLOT ...
    DEVICE 2 CLOSE

The parameter IPL1NA is an internal parameter that defines the name of the plot file used by the DEVICE 2 command. It can be any valid name, up to 80 characters, on your computer system.

In any event, use standard Postscript when you want to send your plots directly to a printer. Use encapsulated Postscript when you want to embed the graphs in a document. If you want to do both, create separate files.

SYNTAX 1

POSTSCRIPT <ENCAPSULATED>

This form designates device 1 (the terminal) as a Postscript device. If the word ENCAPSULATED is omitted, standard Postscript is generated. If the word ENCAPSULATED is included, then an encapsulated Postscript file is generated.

SYNTAX 2

DEVICE <1/2/3> POSTSCRIPT <ENCAPSULATED>

This form designates one of DATAPLOT's 3 devices (it will typically be device 2) as a Postscript device. If the word ENCAPSULATED is omitted, standard Postscript is generated. If the word ENCAPSULATED is included, then an encapsulated Postscript file is generated.

EXAMPLES

DEVICE 2 POSTSCRIPT
DEVICE 2 POSTSCRIPT ENCAPSULATED

NOTE 1

The Postscript driver can support either color or monochrome Postscript devices. The default is monochrome. Enter a DEVICE <num> COLOR ON command after the POSTSCRIPT command to specify color Postscript. Postscript supports the full range of color and gray scale provided for in DATAPLOT. See the Color chapter for a list of available colors and gray scales. Colors can have a different appearance on different Postscript devices. Specifically, Postscript color printers can come with 1 bit, 4 bits, or 8 bits for each of 3 colors. The output quality will vary significantly depending on the number of bits used.

Monochrome Postscript devices do support gray scale. Be aware that they do it by "dithering" since each pixel is either on or off. Dithering means that gray scale is emulated by turning some proportion of neighboring pixels on or off to get the desired effect. Color

Postscript devices (particularly with 8 bits per color) can generate true gray scale (i.e., the pixel has an intensity in addition to being on or off).

NOTE 2

One of Postscript's strengths is the availability of scalable and rotatable typeset quality fonts. Postscript fonts (for hardware generated characters) can be specified with the following command:

    SET POSTSCRIPT FONT <font id>

The available fonts (34 are currently supported) can be shown with the following command:

    POSTSCRIPT SHOW FONTS

The default font is Helvetica Bold. See the documentation for the POSTSCRIPT SHOW FONTS command in this chapter for a sample of each font.

NOTE 3

Postscript fonts are only used when hardware characters are generated. This means that Greek characters and other special symbols are NOT available with the Postscript fonts.

Greek characters (and some other special symbols) can be generated by using the symbol font (SET POSTSCRIPT FONT SYMBOL). The second program example demonstrates the characters that are available using the symbol font. DATAPLOT does not currently provide any means for accessing the characters represented by numbers greater than 127 in the ASCII collating sequence. With the symbol font, a lower case Greek alpha is obtained by entering TEXT LC()A rather than TEXT LC()ALPH(). The limitation is that only one Postscript font can be active for a plot, so text strings that require a mixture of standard and Greek characters are not practical with this method. DATAPLOT does not support automatically switching to the symbol font when a Greek character (e.g., ALPH(), BETA()) is encountered in the text string.

At this time, if you have text strings which consist only of Greek characters you can use the symbol font. However, if your string is a mixture of standard and Greek characters, you need to use one of the software fonts. If you need to mix Greek and non-Greek characters, divide the text into portions containing only Greek or only non-Greek characters. Then each portion should be drawn separately using explicit MOVE and DRAW commands (and with the proper SET POSTSCRIPT FONT command before each portion). Normally, using the CR OFF and LF OFF commands (documented in the Diagrammatic Graphics chapter) would help by leaving the current position at the end of the current string. However, Postscript text is justified using Postscript commands, not by DATAPLOT calculating how much space is used. In addition, only the Courier fonts uses fixed (rather than proportional) spacing. This means that the position DATAPLOT calculates as the current position at the end of the TEXT command will not be correct. For non-Courier fonts, the only convenient method for determining the correct MOVE coordinates is to use the CROSS HAIR command (documented in the Diagrammatic Graphics chapter).

NOTE 4

Postscript printers on most systems require that the first line of the file start with a %! with no leading space. However, a few require that it include a leading space before the %!. The default in DATAPLOT is no leading space. If your system requires this (i.e, if the Postscript output is printed as text rather than a graph), enter the following command:

    SET POSTSCRIPT SPACE ON

NOTE 5

Landscape or portrait orientation can be set via the ORIENTATION command. It can be toggled as many times as desired in a DATAPLOT session. The default is landscape orientation.

NOTE 6

The following SET commands can be used to specify the margins and resolution of the particular Postscript printer (these normally do not need to be set).

SET POSTSCRIPT PPI	-	<number> sets the resolution (in points per inch). The default is 300.
SET POSTSCRIPT [LANDSCAPE/PORTRAIT] LEFT MARGIN	-	sets the left margin (in dots). The default is 50.
SET POSTSCRIPT [LANDSCAPE/PORTRAIT] RIGHT MARGIN	-	sets the right margin (in dots). The default is 50.
SET POSTSCRIPT [LANDSCAPE/PORTRAIT] BOTTOM MARGIN	-	sets the bottom margin (in dots). The default is 50.
SET POSTSCRIPT [LANDSCAPE/PORTRAIT] TOP MARGIN	-	sets the top margin (in dots). The default is 50.

You can also use the WINDOW CORNER COORDINATES command to set the physical area of the graphics device to use (an alternate way to set the margins), but this affects all the active devices.

NOTE 7

Postscript is actually a complete language rather than simply a device protocol. For this reason, many word processing and text publishing programs that support the importing of encapsulated Postscript files do not allow you to preview it on the screen. They typically draw a box around the reserved area, but leave it blank. Postscript allows a "bitmap" of the image to be included for previewing purposes only (it is ignored when the Postscript output is sent to a file). However, DATAPLOT does not generate such a preview bitmap.

Most programs that support importing encapsulated Postscript allow you to rotate and scale the image after you import it. In particular, DATAPLOT specifies a "bounding box" of 11 inches by 11 inches since it can support either landscape or portrait mode. For some programs, you may need to scale it down to avoid clipping the image. The importing programs generally do not let you edit the Postscript image (however, some may allow you to overlay additional text or graphics on top of it).

Since there are a large number of word processing and text publishing programs on the market, we are unable to report on how well DATAPLOT works with all of them. The following is a list of some that we do know about.

1. We have used this capability extensively with FrameMaker (versions 3.1 and 4.0 on a Sun running Open Look). In fact, these DATAPLOT Reference Manuals were prepared with Frame Maker and the graphs were imported into anchored frames. A few minor code changes were made to DATAPLOT (approximately March 1993) in order for Frame Maker to handle DATAPLOT Postscript files correctly. Plots typically have to be rotated and scaled to fit in the anchored frame correctly. Version 3.1 running under Sun Open Look version was able to preview the plots on the screen even without a preview bitmap. However, version 4.0 was not able to do this.We have been told that it will work after upgrading to Solaris. One user reported that the MacIntosh version was not able to preview the Postscript files. We have not verified the behaviour for Frame Maker running on other platforms.

2. We have been told by users that they have successfully imported DATAPLOT encapsulated Postscript files into WordPerfect (version 5.1). The plots are shown on the screen as a grey box, although they print correctly on Postscript printers. The Postscript plots will not print on non-Postscript printers. We have not verified it for ourselves.

3. There is an undocumented step required for importing into Microsoft Word on the MacIntosh. For Word version 5, follow the steps given on page 774 of the Word User's Guide (version 5) for importing encapsulated Postscript files. However, in the Word commands folder, if there is a file called EPS-TIFF-PICT, it automatically converts the Postscript files to text. You have to temporarily move that file to the screen area. When this file is not present, the importing works as documented. Word must NOT be running when you move the file. After the file is imported, you can move it back to Word folder.

   One of our users imported DATAPLOT encapsulated Postscript files into CricketDraw on the MacIntosh. The only reported problem was that the image was drawn "left-right mirrored.". The CricketDraw documentation describes how to easily take care of this.

Users who have problems with importing into other programs should contact the DATAPLOT authors.

NOTE 8

Display Postscript is a special version of Postscript for terminals and workstations. The standard Postscript driver does not work for these devices. A Display Postscript driver is on our list of device drivers to add.

NOTE 9

DATAPLOT does not support dot matrix printers and LaserJet II printers directly. However, there are several programs available for converting Postscript output to various types of printers. Specifically, we have used the Ghostscript program. This allows both previewing on the screen or printing on a non-Postscript printer. It supports most of the common IBM/PC compatible printers. Ghostscript is available on both Unix and IBM/PC platforms and is distributed by the Free Software Foundation . There are other commercial programs, e.g. Freedom of the Press, that provide a similar capability, although we do not have direct experience with them.

Postscript cartridges are also available for the popular LaserJet II printers. LaserJet III and IV printers have a built-in HP-GL emulation capability and many also have Postscript capability. See the documentation for the HP command in this chapter for details on using the DATAPLOT HP-GL driver for these printers.

DEFAULT

Off

SYNONYMS

DEVICE 2 PS is a synonym for DEVICE 2 POSTSCRIPT. DEVICE 2 EPS and DEVICE 2 ENCAPSULATED POSTSCRIPT are synonyms for DEVICE 2 POSTSCRIPT ENCAPSULATED.

DEVICE NOTES

   1. HARDWARE TEXT - Postscript hardware characters can be scaled to any size. Vertical strings are rotated 90 degrees. There are 34 typeset publication quality fonts that can be selected. Postscript fonts are proportionally spaced fonts with the exception of the Courier fonts. Use one of the Courier fonts if you need fixed space output.

   2. COLOR - Postscript devices are treated as black and white by default (although they do support gray scale). To activate color, enter DEVICE 2 COLOR ON after the DEVICE 2 POSTSCRIPT command. Postscript supports the full range of DATAPLOT colors. The appearance of a specific color can vary depending on the device.

   3. HARDWARE FILL - Area fills are generated in hardware. The SET POSTSCRIPT HARDWARE FILL OFF command can be used to specify that solid fills should be done in software.

   4. DASH PATTERNS - The Postscript driver supports unique dash patterns for DASH, DOT, DASH2, DASH3, and DASH4. DASH5 is the same as DASH4.

   5. LINE WIDTH - Thick lines are generated in hardware.

   6. GRAPHICS INPUT - The CROSS-HAIR command is ignored for this device.

RELATED COMMANDS

HPGL	=	Direct graphical output to an HPGL device.
X11	=	Direct graphical output to an X11 device.
SHOW POSTSCRIPT COLOR	=	Show the available colors on the Postscript device.
SET POSTSCRIPT FONT	=	Specify the font to use on the Postscript device.
POSTSCRIPT SHOW FONTS	=	Show the available fonts on the Postscript device.

APPLICATIONS

Graphics device specification

IMPLEMENTATION DATE

89/2

PROGRAM 1

DEVICE 2 POSTSCRIPT
PLOT SIN(X) FOR X = -6.28 0.01 6.28
QUIT

This generates a Postscript graph in the file DPPL1F.DAT, which can be printed on a Postscript printer with the standard operating system command on your local system.

PROGRAM 2
        SET POSTSCRIPT FONT HELVETICA BOLD
        CASE ASIS; JUSTIFICATION LEFT; HEIGHT 3
        MOVE 10 70; TEXT SYMBOL FONT -
        SET POSTSCRIPT FONT SYMBOL
        MOVE 30 70; TEXT ABCDabcd
        SET POSTSCRIPT FONT HELVETICA BOLD
        MOVE 45 70;TEXT - NOW BACK TO HELVETICA BOLD FONT
        .
        HEIGHT 2; SET POSTSCRIPT FONT HELVETICA BOLD
        MOVE 10 50; TEXT SYMBOL FONT (ASCII 33 TO 64):
        TERMINATOR CHARACTER |; SET POSTSCRIPT FONT SYMBOL
        MOVE 55 50; TEXT ! " # $ % & ' ( ) * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @
        TERMINATOR CHARACTER ;
        .
        SET POSTSCRIPT FONT HELVETICA BOLD
        MOVE 10 40; TEXT SYMBOL FONT (UPPER CASE CHARACTERS):
        SET POSTSCRIPT FONT SYMBOL
        TEXT A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
        SET POSTSCRIPT FONT HELVETICA BOLD
        MOVE 10 30; TEXT SYMBOL FONT (LOWER CASE CHARACTERS):
        SET POSTSCRIPT FONT SYMBOL
        MOVE 55 30; TEXT a b c d e f g h i j k l m n o p q r s t u v w x y z
        .
        SET POSTSCRIPT FONT HELVETICA BOLD
        MOVE 10 20; TEXT SYMBOL FONT (ASCII 91 TO 96, ASCII 123 TO 126):
        SUBSTITUTE CHARACTER !
        SET POSTSCRIPT FONT SYMBOL
        MOVE 55 20; TEXT [\ ] ^ _ ` { | } ~
        SUBSTITUTE CHARACTER ^