

X11**PURPOSE**

Direct graphical output to an X11 graphics device.

DESCRIPTION

The X Window System is a computer independent protocol developed at MIT for supporting windowing and graphics applications in a networked environment. X is emerging as an industry standard and is now supported by most workstation vendors. The X11 driver has been successfully implemented on Release 3, Release 4 and Release 5 of X11.

DATAPLOT must be linked with the proper X11 libraries in order for the X11 driver to work. If this is not the case, contact your local DATAPLOT installer.

X11 is provided in 3 layers: the xlib library, the xt library, and the toolkit library. The lowest layer is the xlib library. This layer implements the window and graphics primitives. That is, it provides the routines for opening windows and drawing lines and text in the window. The second layer is the xt library. This layer provides the primitives for writing a graphical user interface (i.e., menu and dialog boxes). However, this layer is intended to provide the primitives for implementing any type of graphical interface. It does not impose a “look and feel” on the interface. These first 2 layers are provided with the standard X11 installation. The third layer is called the toolkit layer. This is the layer that provides routines for writing a graphical user interface with a distinct “look and feel.” Most X11 workstations support either the Motif or the OpenLook toolkit. Some installations run a plain vanilla X11 system (i.e., the twm). In any event, the DATAPLOT X11 driver uses only the xlib layer and so can be used with any of the X11 toolkits.

X11 supports graphical user interfaces. However, at this point, DATAPLOT simply supports X11 as a graphics device driver. Providing an X11 based graphical user interface to DATAPLOT is under consideration as a future enhancement.

A powerful feature of X is the ability to work in a networked environment. DATAPLOT can use X11 in one of two ways:

1. DATAPLOT is installed on a local workstation (e.g., a SUN). In this case, simply enter the `DEVICE 1 X11` command to open a graphics window. This assumes that X11 is installed on your local workstation. Check with your system administrator if you are not sure.
2. DATAPLOT is installed on a remote host and the graphics will be generated on a local workstation or X11 terminal. Two typical configurations are:
 - 1) A workstation running DATAPLOT from a mainframe.
 - 2) A group of workstations linked in a common network with DATAPLOT installed on one of these workstations.

In either of these cases, X11 must be installed on both the remote host and the local host and the following 3 steps are required for Unix installations (similar steps are required for non-Unix hosts, but the details may differ):

- 1) Enter the following from your local workstation:
`xhost + (entered from your local workstation)`
- 2) `rlogin` or `telnet` to the remote host
- 3) Enter the following command before executing DATAPLOT:
`setenv DISPLAY <local_X_machine>:0`

The `xhost` command gives the remote host permission to write to your display. The `setenv` command identifies the specific workstation the remote host should generate the graphics on. Non-Unix hosts may have a different command than `setenv`.

On Unix systems, the X11 command is typically the most important of DATAPLOT's output device commands. X11 is increasingly being supported on many non-Unix operating systems as well.

SYNTAX 1

X11

This form designates device 1 as an X11 graphics device.

SYNTAX 2

`DEVICE <1/2/3> X11`

This form designates one of DATAPLOT's 3 devices (typically device 1) as an X11 device.

EXAMPLES

X11
`DEVICE 1 X11`

NOTE 1

The dataplot command can be executed from any currently open X11 window. DATAPLOT's alphanumeric input and output, such as entering commands and the printing of FIT results, occurs in this window. DATAPLOT makes no effort to determine or manipulate the attributes of the alphanumeric window. When the DEVICE 1 X11 command is entered, a separate graphics window is opened. Both the alphanumeric and graphics windows can be controlled (i.e., moved, resized, exposed) with standard window manager menu options. In addition, the DATAPLOT commands PICTURE POINTS and ORIENTATION can control the size and shape of the graphics window. If the window is resized, the new dimensions do not take effect until the next screen erase is performed (automatically with the next plot or forced via a DATAPLOT ERASE command). Until the screen erase is done, graphics may either be clipped or only use a part of the available window.

NOTE 2

In X11, the window manager is simply another application program. This means that different implementations of X11 can use different window managers. There may be minor differences in how the DATAPLOT graphics window interacts with different window managers. However, DATAPLOT is written using the lowest layer of the X11 libraries (xlib), so it should be compatible with any of the window managers. The popular OpenLook (from Sun and AT&T) and Motif (most other vendors) window systems are X11 based and the X11 driver work well with them.

NOTE 3

Several SET commands were added to support X11 specific features.

1. SET X11 NAME <display name>

Normally, X11 sends the graphics to the default display (for Unix systems, this is the "setenv DISPLAY" variable). This SET command is used to override the default display name. On Unix systems, this command is the equivalent to entering the Unix command "setenv DISPLAY <name>". The name is given in one of the following 2 formats:

```
SET X11 NAME dogwood.cam.nist.gov:0
SET X11 NAME 129.6.80.44:0
```

The numeric address should always be recognized. The name (and any abbreviations of the name) depend on the host tables on the specific machine.

2. SET X11 PIXMAP <ON/OFF>

If all or part of the DATAPLOT graphics window is covered and then re-exposed, the current graph is not automatically redrawn. If the PIXMAP variable is turned on, graphs are written to a pixmap in the background as well as to the screen. If part of the current graph is lost, the pixmap is copied to the screen to restore the current graph (the updating does not occur until the next command is entered). This option is recommended.

**3. SET X11 FONT **

The X11 font name can be up to 80 characters long. The following are terminal emulator fonts that should be available on most X11 systems.

```
6x10
6x12
6x13
8x13
8x13bold
9x15
fixed
variable
```

For example, to set the 9x15 font, enter the following command

```
SET X11 FONT 9x15
```

In addition, most X11 implementations provide a large number of additional fonts. The complete list available on a given implementation can be retrieved with the operating system (not DATAPLOT) "xlsfont" command. Since the list of fonts varies with the implementation, DATAPLOT provides no abbreviations of the font names (which tend to be long).

X11 fonts are a fixed size and orientation. This means that the various SIZE commands do NOT change the size of hardware generated characters on the X11 screen since X11 fonts are used when hardware characters are drawn (see the documentation for the FONT command in the Diagrammatic Graphics chapter for further discussion of hardware and software characters). Only one X11 font can be in effect at a time.

4. SET X11 CAP <BUTT/ROUND/PROJECT/NOTLAST>

```
SET X11 JOIN <MITER/ROUND/BEVEL>
```

The cap style determines how the end of lines are drawn (referred to as end-caps). For BUTT, the end-caps are squared off at end-points perpendicular to the slope of the line. The NOTLAST option is equivalent to BUTT for wide lines. For one pixel wide lines, the last point is not drawn. The ROUND option draws the end-cap as a circle with diameter equal to the line width. The PROJECT option draws a squared off end-cap, but it projects half the line-width beyond the endpoints. The join style controls how intermediate points of a polyline are connected (only if the line is more than one pixel wide). The MITER option extends the outer edges so that they meet at the same angle as would narrow lines. The ROUND option rounds off corners using a circle with diameter equal to the line width centered at the join point. The BEVEL option joins the lines as if they both had BUTT end-caps. In most cases, the cap and join style can simply be defaulted (BUTT and MITER respectively). The other choices are aesthetic preferences. Occasionally, curves that meet at sharp angles can produce spikes, in which case specifying a join style of ROUND or BEVEL should solve the problem.

NOTE 4

DATAPLOT automatically determines if the X11 device is color. The X11 driver supports the full range of colors available with DATAPLOT (about 88 colors and 100 levels of gray scale). On some implementations of X11, some colors may not be available. This is particularly true on smaller memory systems such as IBM-PC's or if other applications are running and reserving large numbers of colors. Unavailable colors are set to black (or white if the background is black). See the Color chapter for a list of available colors.

DEFAULT

Off

SYNONYMS

None

DEVICE NOTES

1. **HARDWARE TEXT** - A large number of hardware fonts are available (use the SET X11 FONT command). The 6x12 font is the default. A given font has a fixed size and rotation, so the only way to change the character size is to change the font.
2. **COLOR** - X11 devices vary in their support of color (from monochrome to full 24-bit color). For color workstations, DATAPLOT will try to assign all 88 colors. Colors that are not available on the device are set to black (or white for black backgrounds). Gray scale is supported if the device itself supports it.
3. **HARDWARE FILL** - Solid area fills are done in hardware. The command SET X11 HARDWARE FILL OFF can be entered to specify that solid fills of non-rectangular regions should be done in software.
4. **DASH PATTERNS** - The following dash patterns are available:
 - DASH - 6 pixels on, 3 pixels off;
 - DOT - 1 pixel on, 2 pixels off;
 - DASH2 - 9 pixels on, 3 pixels off, 3 pixels on, 3 pixels off;
 - DASH3 - 3 pixels on, 3 pixels off;
 - DASH4 - 2 pixels on, 4 pixels off.
5. **LINE WIDTH** - Thick lines are generated in hardware.
6. **GRAPHICS INPUT** - The CROSS-HAIR command is supported for this device.

RELATED COMMANDS

POSTSCRIPT	=	Direct graphical output to a Postscript device.
HPGL	=	Direct graphical output to an HPGL device.
TEKTRONIX	=	Direct graphical output to a Tektronix device.
DEVICE	=	Specify certain actions for the graphics output.
SET X11 NAME	=	Specify the name of the X11 device.
SET X11 PIXMAP	=	Specify whether or not the graphics window will be updated when it is corrupted.
SET X11 FONT	=	Specify the X11 font to use.
SET X11 CAP	=	Specify the X11 cap style to use.
SET X11 JOIN	=	Specify the X11 join style to use.

APPLICATIONS

Graphics device specification

IMPLEMENTATION DATE

90/4

PROGRAM

```
DEVICE 1 X11
SET X11 PIXMAP ON
SET X11 FONT 9X15
PLOT SIN(X) FOR X = -6.28 0.01 6.28
QUIT
```

This opens a graphics window and then generates a plot in that graphics window.