Inter-Office Memorandum

To	Alto users	Date	September 11, 1980
From	Lyle Ramshaw	Location	Palo Alto
Subject	Draw 5.0	Organization	PARC/CSL

XEROX

Filed on: <AltoDocs>Draw-news.press

- - Version 5.0 (September 9, 1980) - -

Text positioning

Older versions of Draw positioned text by a rather arbitrary collection of rules. The result was that "what you saw" was not necessarily "what you got". Unfortunately, to really cure this problem, it would be necessary for Draw to read the file Fonts.Widths, so that Draw would know the sizes of the characters as they appear on the printed page. That would demand substantial modification to Draw; it hasn't been done so far, and is unlikely to ever be done. Draw 5.0 does attempt to make your life a little easier, though, by guaranteeing a couple of simple invariants:

(i) The left endpoint of the baseline of a text string that you see on your screen will be in the same location with repect to the graphical items on the page as the left endpoint of the baseline of that text string in your hardcopy. In general, since the characters in the Alto display font are wider than the corresponding Dover printing charaters, the right end of the text on your screen will be further right than the right end of the text on the hardcopy. Life is hard.

(ii) Arrowheads are an exception to the above rule. That is to say, if your string is a single character in the font Arrows, then the point of reference is the point of the arrowhead, rather than the left end of the baseline of the arrow (which happens to be at the lower left corner). Thus, the point of the arrowhead on your Alto screen will be in the same place as the point of the arrowhead on the hardcopy.

File format

Draw 5.0 writes its .draw files in a new format; if you read in a old .draw file, the coordinates of the text strings will automatically be adjusted so that the text will appear in the same place in your hardcopy. [Wizards: for technical reasons, arrowheads may move around by as much as one half of an Alto dot in each dimension.]

ReDraw compatibility

The program ReDraw now positions text by the same rules as the ^P command in Draw.

Storage space

Draw 5.0 has about 5% more free spae than its predecessor, Draw 4.5.

XEROX
PALO ALTO RESEARCH CENTER
Computer Science Laboratory
April 17, 1978

To: Alto users

From: Patrick Baudelaire

Subject: DRAW version 4.0

Filed on <AltoDocs>DRAW-news.press

The followings features have been added to DRAW since the publication of the manual in the *Alto User's Handbook*. Some of these features are purely experimental: use at your own risk... Comments and suggestions are welcome however.

-- Version 4.0 (April 17, 1978) --

Color

The main change introduced in this version is color. Curves, lines, and captions can be in black, or one of the six basic colors that PIMLICO can print: yellow, magenta, cyan, red, green, and violet (actually a dark blue). Eight new commands in the menu pertain to color. Seven of them are tags representing available colors, symbolised by a letter (B, Y, M, C, R, G, V) in a small circle. The color commands are used in two ways: selecting the current color in the same way the current brush or current font is selected (click the appropriate tag), or changing the color of an element (pick the tag from the menu, and point at the element). The colors in the picture are only shown when the menu command "COLOR ON/OFF" is turned on.

New DRAW file format

Addition of color information required a new format for DRAW files. Version 4.0 will read DRAW files in either the old and the new format. However files created with version 4.0 cannot be read by older versions of the program.

PRESS output

PRESS output (command CTRL-P) has been simplified. The option of printing the image as an Alto bitmap is not available anymore: only full PRESS output is available. Any picture is printable on a PIMLICO printer. However, what comes out of a DOVER/SPRUCE printer depends on the complexity of the picture (see comment below about version 2.3).

Width of printed lines & curves

The actual width of lines and curves on the printed page may be set to arbitrary values. This is specified by USER.CM entries of the form:

       LINEWIDTH:*n* *w*

where *n* is one of the four line widths available from the menu (0= thinnest, 3=thickest), and 2x*w* is the thickness of the printed line in *micas.* The default for *w* is $16x2^n$.

Some gains in performance

DRAW now uses floating-point and BitBlt microcode. Drawing and erasing curves goes a lot faster.

This version also has increased storage space obtained by a more efficient use of fonts.

-- Version 2.3 (August 11, 1977) --

PRESS output

PRESS output (command CTRL-P, in full PRESS output option) of curves and lines now produces a mixture of "objects" and "rectangles". Vertical and horizontal lines drawn with any of the non-round brushes are represented as "rectangles": they can be printed on a SPRUCE printer. All other lines and curves are represented as "objects": they must be printed on a PRESS printer.

This means that pictures containing only horizontal and vertical lines (box diagrams, bar graphs, organization charts, etc) should be drawn with a flat or square brush: they can be printed on DOVER. More complex pictures must be printed on a 3100 or PIMLICO printer.

-- Version 2.2 (June 15, 1977) --

Command line switches

A number of run-time parameters can be set with switches in the command line. Values are specified by a decimal number, followed by "/", followed by a letter (upper or lower case). Default values are used when the switches are omitted or if the specified values seem unreasonable.

Switch:	specifies:
n/S	The maximum number of *splines* (that is curves and lines) that will be allowed. The default is 200.
n/K	The maximum number of *knots* a curve may have. The default is 100.
n/T	The maximum number of *text* captions that will be allowed. The default is 100.
n/G	The *grid* spacing, in Alto screen units. The default is 16.
n/D	The length, in screen units, of line segments in *dashed* curves and lines. The default is 16.
n/O	The length, in screen units, of *omitted* line segments in dashed curves and lines. The default is 8.

Example:
        DRAW 250/S 50/k 8/G

Fonts, user profile

Fonts may be specified in the user profile USER.CM. There are two cases:
        - If the DRAW entry in USER.CM mentions at least one font, then only the exact

number of specified fonts (between 1 and 4) will be loaded.
- Otherwise, four default fonts are loaded: HELVETICA12, HELVETICA12B, HELVETICA8, and ARROWS10.

A template for the DRAW entry is provided in DRAW-USERCM.SLICE, to be found in <Alto>DRAW.DM. A valid entry looks like:

[DRAW]
FONT:0 HELVETICA12.AL
FONT:2 HELVETICA18.AL

Video background

If your Alto is equipped with a *Cybernex* TV-camera interface, you can display a video image as a background to your picture (the same feature exists in the font editor FRED). The video background is turned on and off with the toggle command CTRL-V.

Freehand drawing

Lines and curves can be drawn freehand, as an alternative to specifying line end-points or spline knots. To go into that mode, simply pick up with the cursor the brush symbol shown in the menu inside a small square. Then draw on the screen in the usual way: press a mouse button, move the mouse around, and release the mouse button. The trajectory of the brush-cursor is painted on the screen as you move along. But, when you have finished, the trajectory is erased and *replaced* by a spline curve fitted through knots that have been automatically selected along the trajectory: the curve now behaves like any other curve. Some smoothing of the trajectory is done in order to eliminate irregularities due mainly to the mouse.

DRAW tries to help you in two ways:
- If the trajectory that you drew seems to have little curvature, it will be replaced by a *straight line*, rather than a curve.
- If you use the grid button (BLUE, i.e. the rightmost or bottom one), DRAW will force the trajectory (and thus the resulting line or curve fit) to *start* and *end* on a grid point.

These two features should help drawing horizontal and vertical lines on the grid mesh: boxes, rectangles, diagrams, etc.

The freehand drawing features are experimental: they are prototypes of functions that we would like to offer in other illustration systems. There are problems and imperfections. Comments and suggestions will be appreciated.

Choice of spline fit method

The standard version of DRAW (the one on the <Alto> directory), uses a cubic spline method called *natural cubic spline*, with uniform parametrization.

Two other versions are available, that use different spline fitting methods: the programs are identical in all other respects, but the pictures may sometimes look very different. If you want to try these out, help yourself with:

<Baudelaire>DRAW2.RUN
This version uses a natural cubic spline, but with *cord length* parametrization. This method simulates better a real draftsman spline tool: more rounded curves, no sharp overshoots. It is more complicated to compute.

<Baudelaire>DRAW3.RUN
This version computes local cubic splines. It is currently set to use *cubic B-splines*. These splines have two important properties:

- the curve usually does not go through the knots;
- a knot k affects the shape of the curve only on a span extending from knot $k-2$ to knot $k+2$.

B-spline curves are smoother than natural spline curves, and seem to be better for freehand drawing. They also are simpler to compute.