Bitmap Editor

Vista Laboratory
Xerox Special Information Systems

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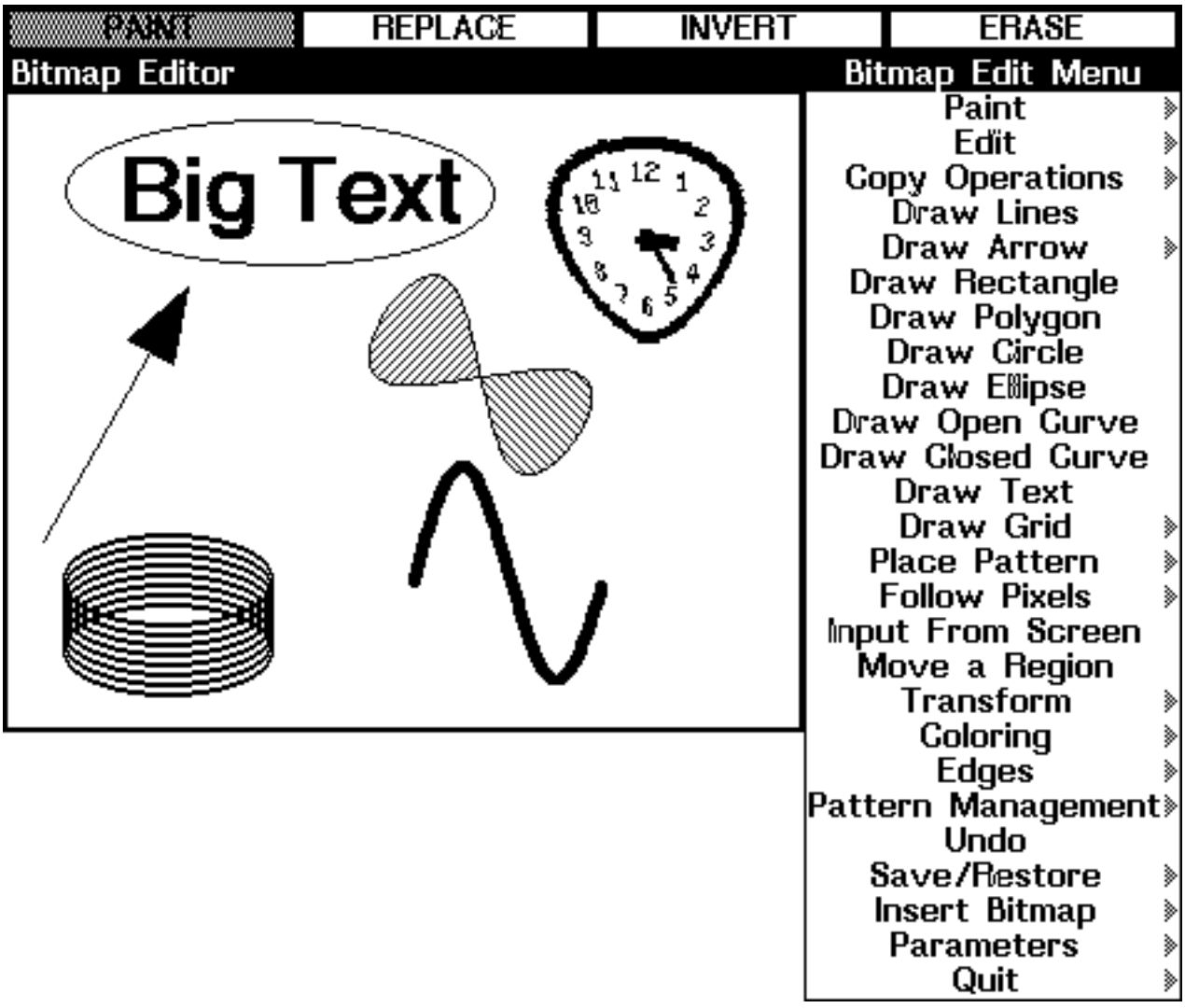
The bitmap editor is invoked as follows.

(EditBitmap BitmapOrFile Window ...)

If BitmapOrFile is an existing bitmap, the user will be prompted to place a window displaying the existing bitmap. If BitmapOrFile represents a file containing a bitmap in binary form, it will be read from the file and subsequently edited via the window. If BitmapOrFile is non-NIL and Window is given, the bitmap will be edited within the existing window although it may be clipped if the bitmap is larger than the window. Finally, if both BitmapOrFile and Window are NIL, the user will be prompted to sweep out a region on the screen that will define the bitmap. The editing window is then placed as desired.



The four menu items at the top of the editor window set the primary drawing operation. Paint logically ORs the drawing bits with the bitmap bits to give the result. In Replace mode, all drawing bits replace the bitmap bits whether they are on or off. Invert does a logical exclusive OR between the drawing bits and the bitmap bits. Erase preforms a logical AND between the inverse of the drawing bits and the destination bits. The

drawing operation may also be changed via Parameter menu subitems.

A brief description of all the menu items follows.

Abort - Error out of the bitmap editor. Equivalent to a control-E.

Add Border - The bitmap is expanded by adding a border with a user specified width and texture.

Add Texture - Adds a user selectable texture to the entire bitmap.

Add Pattern - Allows the user to define a pattern (an independent bitmap) that may be placed in the primary bitmap, used for painting, etc.

Air Brush Size - Sets the size of the air brush.

Air Brush Speed - Sets the speed of the air brush. The affects the density of "spray."

Apply Operation to Copy and Original - Applies the primary bitmap operation (Paint, Replace, Invert, or Erase) to the original bitmap and an independent copy that is created and maintained by the primary editor. The copy may be separately edited.

Arrowhead - Sets the width and height of the arrowhead created by the Draw Arrow command.

Auto-Save File Name - Sets the name of the file to be used for auto-saving of the bitmap.

Auto-Save Interval - Sets the interval between automatic saving of the bitmap.

Auto-Save Status - Displays the current auto-save status, file name, and interval.

Averaging - Applies an averaging matrix to the entire bitmap. The weighted sum of each pixel and its eight neighbors is compared with a threshold. If the sum is greater than the threshold, the pixel is turned on (or left on), else it is turned off. The user may use a default averaging scheme or define her own in a Lisp executive.

Bitmap Editor Paint with Airbrush - Allows painting of the bitmap with an "air brush." The size, shape, and speed of the air brush may be changed via subitems of the Parameters menu item. The operation (Paint, Replace, Invert, or Erase) and the speed may be changed while in this mode by clicking the right mouse button and selecting the appropriate menu item.

Bitmap Editor Paint with Brush - Similar to the standard Interlsp-D paint facility. The size and shape of the brush are modified via subitems of the Parameters menu item. The operation (Paint, Replace, Invert, or Erase) may be changed while in this mode by clicking the right mouse button and selecting the appropriate menu item.

Bitmap Editor Paint with Pattern - Similar to Bitmap Editor Paint with Brush, but paints with a pattern (arbitrary bitmap) instead of a standard brush.

Brush Shape - Sets the brush and air brush shape. The available choices are round, square, horizontal, vertical, and diagonal.

Checkpoint Restore - Resets the bitmap to the state it was in just prior to the last Checkpoint Save.

Checkpoint Save - Saves the current bitmap locally. The saved bitmap is not written to a file, but merely saved as a window property. Each Checkpoint Save destroys the previous saved bitmap.

Clear - Clears the entire bitmap.

Clear All But Region - Clears the entire bitmap except for a reqion swept out by the user.

Clear Region - Clears a region swept out by the user.

Coloring - Menu subitems change coloring of the bitmap and regions.

Copy Operations - Menu subitems create and edit a copy of the bitmap.

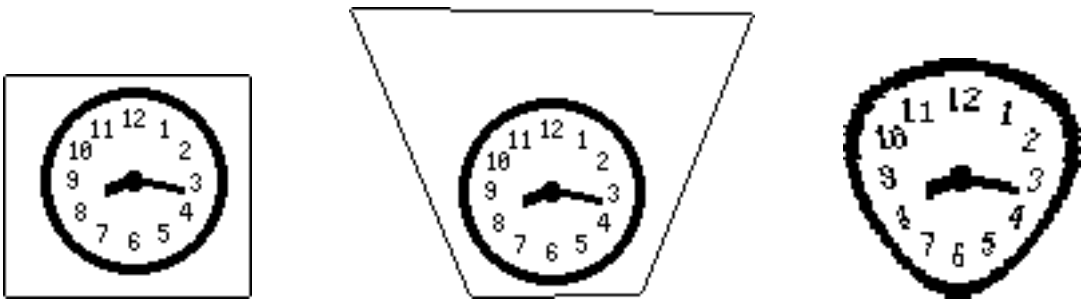
Copy/Edit Pattern - Creates a copy of an existing pattern and opens an edit window on the pattern.

Create New Copy of Bitmap - Creates a copy of the existing bitmap and maintains it separately. The copy may be edited separately.

Dashing - Turns dashing on or off and sets the style. When dashing is on, all line drawing operations will be done with the existing dashing pattern.

Delete Pattern - Allows the deletion of one of the patterns currently defined for the bitmap editor.

Distort Region - Distorts a rectangular region of the bitmap. This operation is time consuming on an 1186 which does not have hardware floating point. The operation operates as follows. A rectangular region is first swept out by the user as in the figure to the left. The vertices are then moved with the left button resulting in a display as in the middle figure. The result is shown in the rightmost figure. Note that if the user wishes to replace the region with the distorted result, the editor must be in the REPLACE mode. Otherwise, the distorted region will be PAINTed over the original region.



Draw Arrow - Draws one or more line segments with an open arrow at the end point. The size of the arrow may be changed by setting the appropriate parameters.

Draw Circle - Draws a circle in the same manner as SKETCH. The circle will be drawn with the current drawing brush size and dashing.

Draw Closed Curve - Draws a closed curve in the same manner as SKETCH. The curve will be drawn with the current drawing brush size and dashing.

Draw Ellipse - Draws an ellipse in the same manner as SKETCH. The ellipse will be drawn with the current drawing brush and dashing.

Draw Filled Arrow - Draws one or more line segments with a filled arrow at the end point. The size of the arrow may be changed by setting the appropriate parameters.

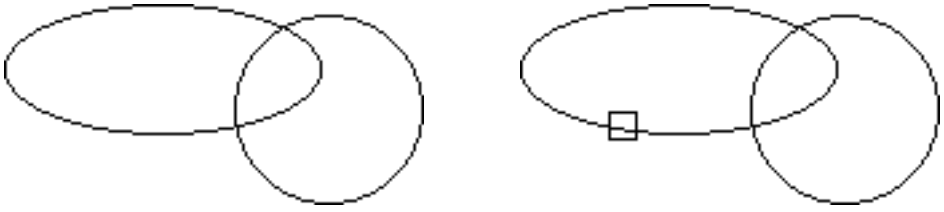
Draw Grid - Draws a grid over the entire bitmap. The width and height of the grid is specified via a number menu. The grid will be drawn with the current drawing brush size and dashing.

Draw Grid in Region - Draws a grid in a specified region. The width and height of the grid is specified via a number menu. The grid will be drawn with the current drawing brush size and dashing.

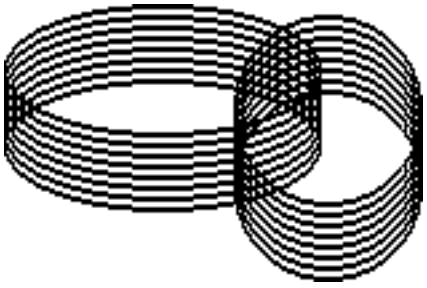
Draw Lines - Draws one or more line segments in the same manner as SKETCH. The lines will be drawn with the current drawing brush size and dashing.

Draw Open Curve - Draws a closed curve in the same manner as SKETCH. The curve will be drawn with the current drawing brush size and dashing.

Draw Over Connected Pixels from Region - Draws over all "connected" pixels starting from one or more pixels in a small region. Drawing may be done with the current drawing brush or a pattern. A pixel is connected to another pixel if it is one of the eight neighbors of the pixel. The operation is as follows. Suppose we have a display as shown to the left. We then select starting pixels by placing the box cursor as shown in the right figure.



Suppose we then select a pattern as shown to the left below. The resulting display will appear as in the figure to the right. Note that the user is requested to select the offset of the drawing brush or pattern.



Draw Over Connected Pixels from Selected Pixel - Similar to Draw Over Connected Pixels from Region. but a single pixel is selected as the starting point. The user places a separate "magnifier" window. When the cursor enters the bitmap editor, it changes to rectangular crosshairs and the surrounding 64 pixels are magnified 8 times and displayed in the magnifier window. When the crosshairs are over the selected pixel, the left button is clicked to specify the starting pixel.

Draw Polygon - Draws a polygon in the same manner as SKETCH. The polygon will be drawn with the current drawing brush size and dashing.

Draw Rectangle - Draws a rectangle in the same manner as SKETCH. The rectangle will be drawn with the current drawing brush size and dashing.

Draw Text - Places text. The font family, size, and style may be changed via Parameters menu subitems. The text is typed into a prompt window and then moved to the desired postion with the mouse.

Drawing Brush Size - Sets the size of the drawing brush.

Edges - Menu subitems trim the bitmap and add borders.

Edit - Menu subitems edit regions of the bitmap.

Edit Copy of Bitmap - Opens an edit window on the currently stored copy of the bitmap. See Create New Copy of Bitmap.

Edit Pattern - Opens an edit window on a selected pattern.

Edit Region - Opens an edit window on a selected rectangular region of the bitmap.

Erase Connected Pixels from Region - Erases all "connected" pixels starting from one or more pixels in a small region. A pixel is connected to another pixel if it is one of the eight neigbors of the other pixel.

Erase Connected Pixels from Selected Pixel - Similar to Erase Connected Pixels from Region, but a single pixel is selected as the starting point. The user places a separate "magnifier" window. When the cursor enters the bitmap editor, it changes to rectangular crosshairs and the surrounding 64 pixels are magnified 8 times and displayed in the magnifier window. When the crosshairs are over the selected pixel, the left button is clicked to specify the starting pixel.

Exact Size - Allows changing the size of the current bitmap by explicitly resetting the origin, width, and height in terms of the bitmap coordinates.

Expand - Expands the width and/or height of the bitmap by an integer factor of one to four.

Fill Box - Fills a specified rectangular region with the default texture.

Fill Box with Specified Color - Fills a specified rectangular region with a chosen texture.

Fill Region(s) - Fill one or more closed regions with the default texture.

Fill Region(s) with Specified Color - Fill one or more closed regions with a chosen texture.

Follow Pixels - Menu subitems follow connected pixels and erase or draw over them.

Font - Sets the font family, size, and style for text placement.

Get From File - Fetches a bitmap from a user specified file. The bitmap must have been written by the Put To File command or the Interlisp-D function WRITEBINARYBITMAP.

Grid - Sets the drawing grid so that selected points always fall on the specified grid. Gridding also affects placing and moving of patterns and other bitmaps.

Input From Screen - Captures a rectangular region from the screen and allows placement into the bitmap.

Insert Bitmap - Menu subitems insert the bitmap into TEdit or SKETCH.

Insert Bitmap Into SKETCH - Inserts the bitmap as an image object into a SKETCH window. The inserted bitmap may be edited in the SKETCH window by left clicking the image and selecting "Edit Bitmap." A window will be opened to edit the bitmap image object.

Insert Bitmap Into TEdit - Inserts the bitmap as an image object into a TEdit window. The inserted bitmap may be edited in the TEdit window by left clicking the image and selecting "Edit Bitmap." A window will be opened to edit the bitmap image object.

Invert - Gives a menu of options to Invert Horizontal, Invert Vertical, or Invert Diagonal. Inverts the entire bitmap. To invert a region of the bitmap, open an editor window on that region and perform the inversion there.

Magnifier Pixel Editor - Opens a separate "magnifier" window. When the cursor enters the bitmap editor, it changes to rectangular crosshairs and the surrounding 64 pixels are magnified 8 times and displayed in the magnifier window. A single pixel may be turned on or off via the left button or right button respectively.

Mask - Creates a mask of the entire bitmap. All enclosed regions become black. This facility is useful for creating a mask for the Interlisp-D function ICONW. The figure to the left shows a bitmap and the figure to the right is the resulting mask.

Move a Region - Allows a region of the bitmap to be selected and moved. The original region is cleared to all white.

Operation - Sets the primary drawing opertion to Paint, Replace, Invert, or Erase.

Orthogonal Lines - Constrains subsequent line drawing to orthogonal lines only.

Paint - Menu subitems invoke paint functions.

Paint Brush Size - Sets the size of the paint brush.

Parameters - Displays the current settings of all parameters.

Pattern Array - Allows placement of an array of patterns. The starting point, the number of rows, the number of columns, and the spacing in each direction are settable parameters.

Pattern Management - Menu subitems create, edit, retrieve, and save patterns.

Pixel Edit Bitmap - Opens the standard Interlisp-D pixel editor on the entire bitmap.

Pixel Edit Region - Opens the standard Interlisp-D pixel editor on a specified region of the bitmap.

Place Pattern - Places copies of a pattern into the bitmap.

Put to File - Writes the bitmap to a file in the same form as the Interlisp-D function WRITEBINARYBITMAP.

Quit - Terminates editing and returns the new bitmap.

Quit, Return NIL - Terminates editing and returns NIL.

Quit, Return New Bitmap - Terminates editing and returns the new bitmap. Identical to QUIT.

Region Selection Grid - Constrains subsequent region selection to gridded values.

Reset - Resets the bitmap to the original state.

Retrieve Patterns - Fetches patterns from a file. The file is in the form of one or more READBINARYBITMAP calls. Normally created by the menu item Store Patterns.

Rotate - Rotates the entire bitmap left 90 degrees, right 90 degrees, or by an arbitrary angle. To rotate a region of the bitmap, open an editor window on that region and perform the rotation there.

Save/Restore - Menu subitems save and restore the bitmap.

Set Auto-Save - Turn auto-saving on or off. The bitmap may be automatically saved

to a file periodically. The interval between saves is set via the menu item Auto-Save Interval.

Shift - Shifts the entire bitmap Left, Right, Up, or Down by a specified number of bits. Shifting left will add whitespace on the right, shifting right will add whitespace on the left, shifting down will add whitespace on the top, and shifting up will add whitespace on the bottom.

Show Specification Format - Displays an example of the Averaging specification which consists of a list of weights and a threshold.

Shrink - Shrinks the width and/or height of the bitmap by an integer factor of one to four.

Smaller - Allows the user to make the bitmap smaller by specifying a region within the existing editor window.

Store Patterns - Stores the set of currently defined patterns on a file in the form of one or more WRITEBINARYBITMAP calls.

Switch Colors - Inverts the colors in the entire bitmap. All on pixels are turned off and all off pixels are turned on.

Switch Colors in Region - Inverts the colors in a selected region. All on pixels are turned off and all off pixels are turned on.

Tesselate - Covers the entire bitmap with a pattern. Differs from Pattern Array in that the origin is at the 0, 0 point and the horizontal and vertical spacing is set to the pattern width and height respectively.

Tesselate Region - Similar to Tesselate, but covers only a selected region within the bitmap.

Texture - Sets the default texture for region filling.

Transform - Menu subitems transform the entire bitmap or regions thereof.

Trim Pattern - Removes all the white space from the edges of a pattern.

Trim Sides Precisely - Removes bits from one or more sides of the bitmap. The number of bits removed from each side is independently specified.

Trim White Space - Removes all the white space from the edges of the bitmap.

Undo - Undo the last edit operation. Undo has no affect on the setting of parameters. Undo itself is not undoable.

Appendix A - Software Installation

The Bitmap Editor is installed by loading BITMAPEDITOR.LCOM which also loads READNUM.LCOM. The Bitmap Editor also requires the Lispuser's package FILLREGION.

Appendix B - Bitmap Editor Parameters

Many of the operations in the Bitmap Editor are controlled by parameters that may be changed by the user. The parameters and their default values are as follows. If the use of the parameter is not obvious from its name, a short description follows.

EditBitmapAirbrushTimerIntervals - ((FAST 0) (MEDIUM 75) (SLOW 200)) The list of speeds and the intervals for the airbrush. The interval is the number of milliseconds between the "spray" action which draws 4 bits randomly within the brush.

EditBitmapBlockTime - 5 The block time in milliseconds used in operations where the CPU may be shared with other processes.

EditBitmapDefaultAirBrushSize - 8

EditBitmapDefaultArrowHeight - 15

EditBitmapDefaultArrowWidth - 10

EditBitmapDefaultAutoSaveDeltaTime - 10 The interval in minutes between automatic saving of the bitmap.

EditBitmapDefaultAveraging - ((0 2 0 2 9 2 0 2 0) 13) The default averaging weights and threshold.

EditBitmapDefaultBrushSize - 1

EditBitmapDefaultFont - (HELVETICA 12 MRR)

EditBitmapDefaultListOfDashings - ((6 3 1 3) (4 2) (3 1))

EditBitmapDefaultListOfTextures - (65535 42405 34850 18450 8580 5160 5140 32800 0)

EditBitmapDefaultPaintBrushSize - 2

EditBitmapMaxArrowSize - 100

EditBitmapMaxBrushSize - 128

EditBitmapMaxGridSize - 200

EditBitmapMaxPatternSize - 250

EditBitmapMenuFont - (HELVETICA 12 BRR)

EditBitmapMessageFont - (GACHA 12 BRR)

EditBitmapMinArrowSize - 5

EditBitmapMinPatternSize - 4

EditBitmapMinRegionSize - 10

EditBitmapMinSize - 10

EditBitmapPixelSelectBoxSize - 9 The size of the box cursor used in the Follow Pixels commands.