To: Graphics Guys	**Date:**	February 5, 1975
From: Dick Shoup	**Loc.:**	Palo Alto
Subject: SUPERPAINT program	**Org.:**	PARC/CSL

A new program called SUPERPAINT now exists on the color video system. Its operation as seen by the user is described here in proposal form. The program is simply a menu-driven collection of many of the capabilities and programs which existed as separate programs on the system (see my memo "Old software on the Color Video System"). The hardware, support routines, etc. are the same as described in that memo.

SUPERPAINT can be used to create and edit simple, cartoon-like color pictures and to manually create animated sequences. At this writing (2/4/75), it has some bugs and could be developed a great deal more. I'll undertake this at some time in the future if interest is sufficient.

The command structure is simple and consistent over the various commands. The executive is mostly table driven so that new commands and capabilities are easy to add. There are 2 pictures or spaces which can be displayed on the monitor. the menu or control space and the image or picture space. Both are 16-color (4 bit-per-point) images. The current control space is shown in Figure 1. Figure 2 identifies the menu icons individually.
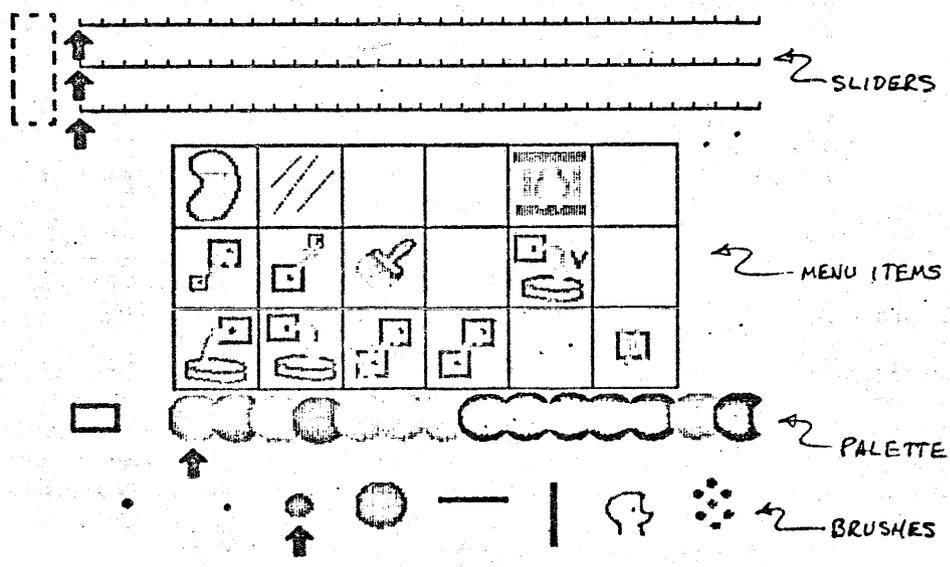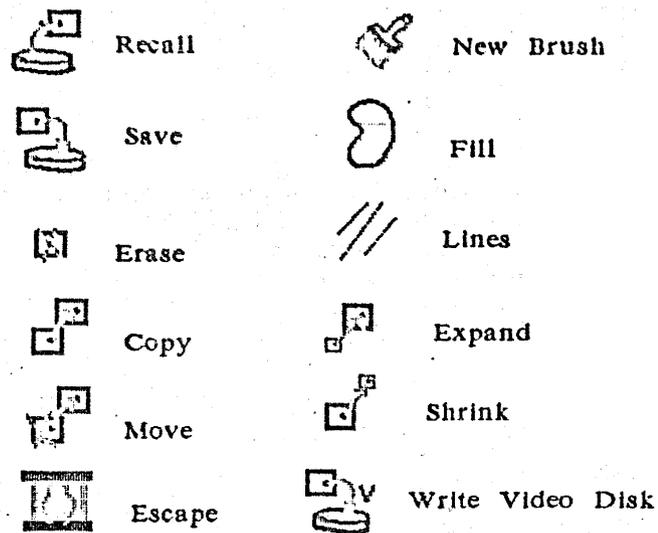

FIGURE 1.

Figure 2.

The picture space contains no brushes, palette, or control information of any kind. Initially it is filled with the special color value transparent. The picture space may be thought of as a transparent cel through which one can see the background color and on which one can paint and manipulate images. The background is a constant color (initially white) over the entire picture space and, like other colors, may be changed using the sliders (see below).

Commands are given via the tablet and any function which requires a parameter will supply an appropriate cursor symbol to indicate this. In addition, messages are frequently typed on the TTY to give a clear record of what is being requested and what is done. The philosophy about the TTY messages is this: 1) A beginner should be able to operate the system with little or no human assistance by referring to the TTY messages. However, 2) the program should be straightforward enough that everything is clearly indicated on the display screen and a user with even a little experience should not ever need to look at the TTY except to refresh his memory about what he has done.

The palette

In the control space is a display of the 16 possible color values. The rightmost value represents the color value transparent. It may be used to "erase" and to create various transparency effects (see below). A small arrow indicates the currently selected value. It is this value which is used during painting, filling, etc. Touching one of the values in the palette causes it to be selected and the arrow to move appropriately. In addition, a color value may be selected from those present in the picture space. This is done by touching the small rectangle in the palette area. Immediately the picture space will be displayed. The desired color value can then be selected by touching the pen to an appropriate spot. When this is done, the control space will reappear with the arrow pointing to the newly selected color value. When a color value is selected, either from the palette or from the picture space, the color sliders (see below) are set correspondingly.

The sliders

Three slider scales are displayed in the control space indicating the hue (dominant wavelength), saturation (percentage of white), and brightness (intensity) of the selected color value. The pointers on these scales change whenever a new value is selected. Furthermore, the pointers may be moved by touching them with the pen. When this is done, the selected color value will change accordingly in both the control space and in all corresponding areas of the picture space. This is also possible when the transparent color value has been selected. The effect in this case is to change the background color.

The brushes

Various paint brushes are also diplayed in the control space. An arrow indicates the currently selected brush. Touching a brush causes it to be selected. Individual brushes may be replaced by brush shapes you create (see below). The brushes normally used are taken from point array files named in the file STDBRUSHES.LI. You can change this by typing filename/B (where filename is a text file containing the names of 8 or fewer point array brush files) when you enter the program.

Painting

Touching the pen to the area of the tablet marked GO causes the program to switch spaces. If you're in the control space you'll GO to the picture space and vice-versa. When in the picture space, the selected brush will be displayed with the selected color value if the pen is held in proximity of the tablet (within 1/4 inch). Painting occurs whenever the pen is pressed down. To select another color, another brush or to get back to the control space for some other reason, just touch the pen to the GO area again. If the transparent color value is selected, the effect of painting will be to erase. That is, the background color will reappear wherever the transparent paint is used.

Making a new brush

The sequence of events necessary to make a new brush is as follows:

1.- Paint or otherwise create your new brush shape in the picture space. Ideally it should be a simple shape and consist of only one color. If the brush has only one color in it, the currently selected color will be used when you paint with it. If the brush has more than one color in it, those colors will be retained regardless of the selected color.

2.- Touch the NEW BRUSH icon in the control space. This will cause an immediate GO to the picture space and a corner cursor will be displayed.

3.- Specify a rectangle around your brush by positioning the 2 corner cursors appropriately and pressing the pen down when each is where you want it. Next a double-triangle cursor will appear.

4.- Using the triangle cursor, touch down to indicate the origin or positioning point of your brush. This will cause an immediate GO back to the control space.

5.- In the control space, touch down on the brush which you wish to replace. Your brush will appear in its place.

If at any time during this operation you touch the GO area of the tablet, the command will be cancelled.

Area filling

Bounded areas in the picture space can be filled with the selected color value. First, select the color value you wish to fill with. Touch the FILL icon in the control space. This will cause an immediate GO to the picture space. A double triangle cursor will be displayed, one half of which will be the color to be used in filling. Now touch a point within the desired area of the picture. If you touch the GO area of the tablet instead of the area to be filled, the operation will be cancelled. It's important to be sure that the desired area is really closed-- that is, bounded completely by points of a different color or colors. The transparent color value may be used to fill areas also. This creates the effect of a hole.

Moving a point array

Any part of the picture space can be moved (translated) and repositioned using the MOVE operation. Touching the MOVE icon causes an immediate GO to the picture space. There, use the 2 corner cursors to define the area of interest. Then specify an origin or positioning point (in or near the defined area) and a destination point. The defined point array will be moved so that the origin point is aligned with the destination point. Anything which has transparent (background) color value will not be stored, thus preserving the transparency effect. The original point array will be erased by storing transparent in its place. If the GO area of the tablet is touched at any time instead, the operation will be cancelled.

Copying a point array

COPY is identical to MOVE except that the original area is not erased.

Saving and recalling from the disk pack

Point arrays in the picture space can be saved on a disk pack and recalled at a later time. To save a point array, first touch the SAVE icon in the control space. This causes an immediate GO to the picture space and the display of a corner cursor. Specify the desired rectangular area and origin point in the usual way. If you touch the off-screen tablet area labelled DEFAULT, the entire screen will be saved with an origin point in the center. Then type on the TTY a name for the point array file followed by a carriage return. The point array values and their associated color definitions will be saved.

To recall a point array, just touch the RECALL icon in the control space. An immediate GO to the picture space will be executed and a filename will be requested via the TTY. Type the desired filename followed by a carriage return. Then specify the positioning of the origin point via the tablet. If you touch the tablet area labelled DEFAULT instead, the point array will be positioned where it was at the time it was saved.

Erasing

The effect of erasing can be created in 3 ways. One is to paint with the transparent

color value. Another is to use the area filling operation with the transparent color value. A third is to invoke the ERASE AREA operation. When this icon is touched, a GO to the picture space is executed and a corner cursor is displayed. The color value transparent will be stored throughout the rectangular area you define via the corner cursors. If the tablet area DEFAULT is touched instead, the whole picture space will be erased.

Shrinking and expanding

Scaling up or down by factors of 2 is available using the shrink and expand operations. Touching the SHRINK icon (for example) causes a GO to the picture space and expects a window definition (2 corners and an origin point, as usual). Then a destination origin point is requested for placement of the half-size resultant image. EXPAND operates similarly.

Line drawing

Straight (but jagged) lines may be drawn between consecutive tablet points using the LINES function. If the pen is kept close to the tablet, a "rubber-band" temporary line from the last point will appear and succesive lines will join. If you are careful to close your line drawing, it can be filled using the FILL function.

Writing on the video disk

Each time the WRITE VIDEO DISK icon is touched, the picture space will be written onto the video disk and the disk advanced one track. This feature allows animated sequences to be created manually. Note that various parts of the animated images can be prepared in advance, SAVEd on the disk pack, then RECALLed and assembled to create the desired picture sequence.

Escape

At any time, any other program may be executed as an overlay. Touch the ESCAPE icon and type the program name on the TTY. When the called program returns, SUPERPAINT will be reentered without loss of context.